



A QUALITATIVE EVALUATION

Tank Bottom Sludge Treatments Of Crude Oil Storage Tanks In



Condition:

Two 271,000 bbl (200 ft diameter) crude oil storage tanks were treated with Bioneat prior to cleaning the tanks for inspection. Bioneat is an EPA certified green, non-toxic, biodegradable product. It is safe for humans and the environment. The Bioneat was used to aid in the removal of the sludge build up in the tanks that could not be pumped because actual volumes of sludge before and after the treatment was not able to be physically measured, visual inspection and customer estimates were used to evaluate the results.

Customer Comments:

The Tank Supervisor expressed that he believed the product significantly reduce the amount of sludge present and adequately softened the remaining sludge enabling it to be removed with a hydraulic gear pump. He also stated that not having to remove any of the product with shovels and buckets made the job more efficient reducing the cleaning crew billable hours.

Procedure:

Both tanks were pumped as low as possible, and the inspection man-way opened for visual inspection. After the visual inspection, the man-way was bolted back on, and the tank filled to approximately 10 feet with a light crude oil. Bioneat concentrate was added to a tank truck containing local well water resulting in a 20 percent Bioneat solution. The Bioneat solution was added to the tank and the two propellers were then engaged to agitate the tank.



RESULTS

Tank 1:

Visually estimated to have an average of 6 to 8 inches of sludge accumulation prior to the treatment. The 6 to 8 inches is 2,800 to 4,200 bbls of accumulation. The customer decided to use one tote of the Bioneat concentrate. The treatment fluid was blended in a tank truck and added to the tank. The resulting fluid was a 20% solution of Bioneat totaling 1,375 gallons. The propellers were engaged for approximately eight days and the tank re-opened for visual inspection. The customer's impression was that 1/3 to 1/2 of the sludge was dissolved and removed. The remaining sludge was softened sufficiently to be pushed to a hydraulic gear pump and transferred from the tank. It was also estimated to have reduced the cleaning time by 2 or 3 days.

Tank 2:

Visually estimated to have an average of 8 to 12 inches of sludge accumulation prior to the treatment. The 8 to 12 inches is 4,200 to 5,600 bbls of accumulation. The customer decided to use two totes of the Bioneat concentrate. The treatment fluid was blended in the tank truck and added to the tank. The resulting fluid was a 20% solution of Bioneat totaling 2,750 gallons. The propellers were engaged for approximately 11 days and the tank re-opened for visual inspection. The customer's impression this time was approximately the same as with tank 1. An estimated 1/3 to 1/2 of the sludge was dissolved and removed. The remaining sludge was softened sufficiently to be pushed to a hydraulic gear pump and transferred from the tank. It was also estimated to have reduced the cleaning time by 3 or 4 days.

Conclusions:

Given the small treatment volumes and the use of well water to mix the treatment fluid, the customer viewed these treatments as a success. The treatment volumes used on these two tanks ranged from approximately 0.8% to 1.0% of the sludge volume in tank 1 and approximately 1.1% to 1.5% of the sludge volume in tank 2. The treatments are believed to have paid for themselves by just the cleaning time being reduced. What is more, the sludge dissolved and returned to a sellable/usable product is a big win. Using the 1/3 estimate, 900 to 1400 bbls in Tank 1 and 1400 to 1850 bbls in Tank 2 were reclaimed. We are confident that a treatment of 3.0% of the sludge volume and possibly some procedure modifications will be a highly effective treatment to reclaim the sludge and dramatically reduce cleaning time.

Recommendations:

Bioneat recommends using 3.0% of the sludge volume for the treatment volume. In addition, it is preferred the fluid be mixed with distilled or RO water for best results. The Bioneat mixture will react with the hardness in the water consuming some of its effectiveness. If possible, we believe that adding the treatment fluid to the tank with just enough oil to cover the sludge and allowing a day or two soak time prior to floating the roof and engaging the propellers, the results would be improved.

Low Volume Non-Problematic Well Treatment Test

Bioneat Degreaser was used to treat two oil wells in Cleveland County, OK to determine if the product could enhance production from the wells whose production has dropped from high volumes when initially completed to very low production volumes over the last 24 years. The wells were drilled in 1987 and both had initial production of approximately 250 barrels of oil per day. Prior to the Bioneat treatment, both well were only producing 1 barrel or less per day. The wells are considered low volume and non-problematic well because neither have inherent barriers to production such as mineral scale formation or paraffin precipitation that would occur over time to impede production. Both wells produce a high-quality sweet crude oil. The well depths range from 1100 feet deep to 1600 feet deep. The thickness of the producing sandstone intervals are approximately 10 feet thick.

The objective for treating these wells was to achieve the following goals:

1. Create documentation of the product being used as a well intervention product.

This documentation provides prospective customers with a degree of confidence the new product is a viable well intervention product and enhance the ability to persuade the use of the product in their wells. This objective has been achieved with the treatment of these two wells, however more documentation of well treatments is always a big advantage.

2. Establish or show the product has little to no risk of damaging the producing formation.

Low volume producing wells have high risk of production loss when foreign fluids are introduced into the formation that create any impairment to the permeability of the production interval. If these treated well only return to initial production volumes, then this objective is achieved.

3. Determine if treatment increases the inflow of formation fluids.

Commonly long term producing wells that have achieved steady state flow for years will have a very consistent ration of formation water to oil. The water portion of this ration is generally multiple time higher than the oil portion. If the fluid volume produced is increased the corresponding portion of oil is expected to increase proportionately.

4. Chemically alter the physical properties or characteristics of the producing formation to stimulate its ability to produce fluids.

Mother nature dictates the formation properties and characteristics. If we can temporarily alter these properties to be more favorable for the fluids to flow then we have achieved stimulation. Oil producing formations are almost all oil wet, meaning oil is what is chemically bonded to the rock. Oil bonded to the rock will not flow and is left behind. The oil molecules attached to the rock also reduced the effective size of the pore throats all fluids must flow through to get to the well bore, and the oil flowing through the pore throats is attracted to the oil coating the walls creating drag/friction to flow. Temporarily changing the formation rock from oil wet to water wet accomplishes two major advantages. This will strip oil from the rock and make it mobile. A water wet rock will displace oil from the surface and allow oil to flow without the drag/friction associated with oil wet rock.

Ten Day Post Treatment Results

Well results will be reported in 10-day increments. Because the wells are low volume producers, a 10-day report cycle is used to provide a better representation of daily averages. Both wells have minimal gas production that is not of sufficient volume to be sold.

Both wells were treated with 40 barrels of a 9:1 Produced water:Bioneat Concentrate solution and shut in for 48 hours. The wells were put back on production and monitored for fluid production.

Well Name F-6 Results Summary:

- 24 hours after treatment well has gas break through
- 48 hours after treatment well is turned to production
- 72 hours after treatment well is producing oil and water
- 10 days after treatment well is producing 250 percent more fluid on average and the oil production has doubled.

Well Name S-3 Results Summary:

- 24 hours after treatment well has gas break through
- 48 hours after treatment well is turned to production

- 10 days after treatment well has returned to pre-treatment production rates with a possible slight increase in total fluid production.
 - This well has half the pump capacity to move fluid as the F-6 well. The next ten-day report will give a more representative analysis of the treatment results.

Results Discussion:

The first two objectives of this project have been successfully satisfied. Objectives 3 and 4 have been validated and awaiting additional data to quantify. This short term data is encouraging because it satisfied our objectives. It is however short term data and does not give us ability to evaluate economical feasibility yet. Keeping in mind that these well are not problematic well and we are not treating a physical restriction to production, I believe this product, with these results, has given it strong merit as an oil well intervention product.

Additional Note:

My preliminary testing in other oil related applications show good promise. This being related to the presentation I sent of my testing. We currently have the product in front of several chemical companies to evaluate. Will update on this when available.