

Enviro-Syn[®] BSD-40E[™] barium sulfate dissolver doubles injection rate and reduces treatment costs by 10-fold compared to mechanical remediation on water disposal well WCSB, Cadomin Formation, British Columbia

A midstream company operating in the Western Canadian Sedimentary Basin was experiencing reduced injection rates on a water disposal well due to scale build up in the formation and tubing string. Enviro-Syn[®] BSD-40E[™] was selected over a mechanical drill out and hydrochloric acid (HCl) treatment to reduce downtime and costs associated with the treatment. The BSD-40E treatment eliminated the need for a service rig and was catered specifically to the barium sulfate scale. The results indicated the average injection rate doubled and was maintained for at least 45 days post-treatment.

CHALLENGE

Barium sulfate (BaSO_4) is one of the most challenging types of scale to deal with and results in reduced wellbore conductivity and fouled equipment, which decreases disposal well injection rates. Barium sulfate contains NORM (Naturally Occurring Radioactive Material) making formation fluids a challenge to handle on surface. As a result, *in situ* treatments are often preferred using either mechanical or chemical means for removal.

However, mechanical removal is costly because it requires a service rig or coil unit to perform the treatment, often resulting in multiple days of downtime. For chemical removal, barium sulfate scale is insoluble in HCl, so an alternative chemistry is required. Barium sulfate scale also has a tendency to reprecipitate after being dissolved in solution, which can further exacerbate production and fouling issues.

SOLUTION

BSD-40E was designed to dissolve sulfate scales and has a number of unique properties that make it ideal for dissolving scale in water disposal wells. It has the ability to dissolve high amounts of barium sulfate scale, in addition to reducing the size of sulfate particles to limit the amount of reprecipitation after the scale has been removed. It also has a lower activation temperature and a lower pH compared to other products on the market, which make it safer to handle and easier to use.

A midstream company working in the Cadomin formation saw a significant decrease in the injection rates at a water disposal well because of barium sulfate scale buildup. Due to the low bottom hole temperature, produced water was heated to 60°C (140°F) and injected the day prior to the treatment to increase the temperature of the formation and tubulars. 4 m³ (1,056 gal) of BSD-40E was heated to a temperature of 90°C (194°F) with a hot oiler and injected using a pressure truck in 1 m³ (264 gal) increments with a 0.5 m³ (132 gal) fresh water spacer and displaced to the perforations to soak. An additional 1 m³ (264 gal) of produced water was injected two separate times to push the BSD-40E further into the formation followed by a shutdown and soak. At the end of the treatment, the well was left for approximately 12 hours to soak. Injection resumed the following day.

RESULTS

The disposal well injection rates were compared before and after BSD-40E treatment (Figures 1 & 2) while a constant injection pressure was maintained. The post-treatment injection rates were more than double those observed prior to the stimulation treatment and were sustained for the 45 days of observation following the treatment.

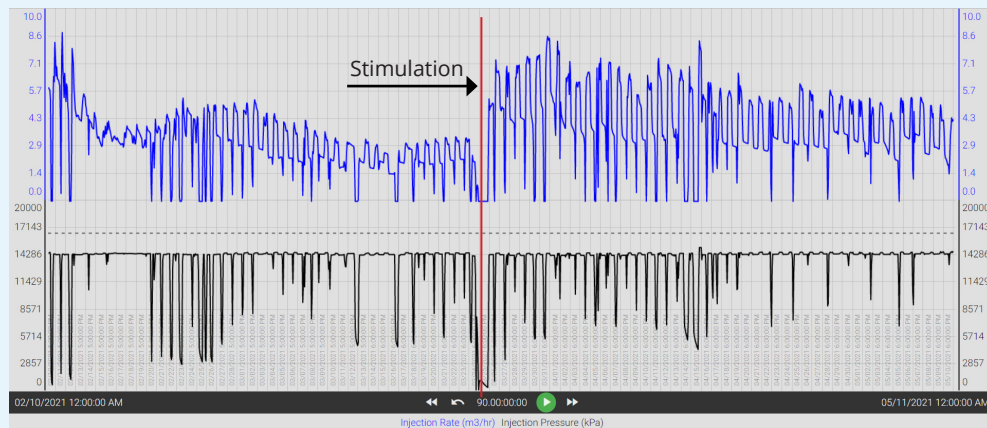


Figure 1. 45 days of data pre- and post-treatment were recorded. The post-treatment injection rates were more than double the injection rates observed prior to the stimulation treatment and were sustained for the 45 days of observation following the treatment.

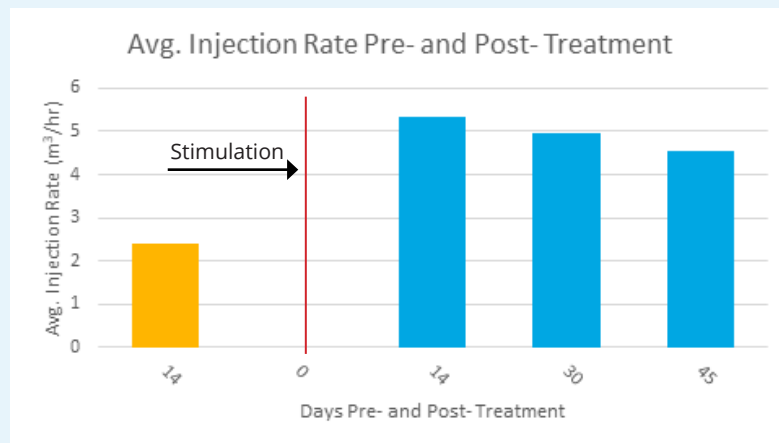


Figure 2. The average injection rates are displayed for the 14 days prior to treatment (orange) and 14, 30 and 45 days following the treatment (blue). The average post-treatment injection rates were more than double those observed prior to the stimulation treatment.

In addition to the successful increase in injection rate, the BSD-40E treatment cost was approximately 10 times less and only required a single day of down time versus a typical 4 days with a conventional mechanical remediation. The company has adopted BSD-40E moving forward on disposal wells with barium sulfate scale concerns.