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RE: SWD CASE STUDY - PECOS, TEXAS



At Nomad Chemical LLC, we specialize in delivering innovative chemical solutions tailored to the unique challenges of the oil and gas industry. By partnering with Nomad, you gain a trusted ally dedicated to optimizing performance and reducing costs through customized, effective chemical treatments, methods, and systems. Contained herein, Nomad presents a case study that has been conducted in partnership with an SWD (salt water disposal well facility) located in Pecos, Texas.

The SWD located in Pecos, Texas was faced with severe scaling issues, causing regular plugging of flow lines and faulty pumping equipment. The scaling was so severe, a 6-inch flow line connecting the front tank batteries to the property's rear injection well would plug on a monthly basis, with flow lines in between plugging as frequently as every 12 hours. Hot oiling and vapor phase treatments did nothing to alleviate the issues. Nomad was contacted to conduct a site assessment and determine if the current chemical treatments and methods were sufficient.

A site assessment was conducted and Nomad staff quickly discovered the current chemical treatments and methods were terribly inadequate in solving the challenges presented by the issues plaguing the SWD. Reasons for the finding are as follows:

- ✎ The scale inhibitor was a low performing neutralized polyphosphate typically used for water well purposes. Oil field produced water will typically contain scale-forming compounds exceeding municipal water by as much as 200,000 ppm. The scale inhibitor was simply not robust enough to accomplish the task.
- ✎ The acid used to dissolve present deposits was not strong enough to affect the pH of incoming fluids. It was found the acid being used was a 10% ($\pm 3\%$) ethanoic acid (aka acetic acid, vinegar) that was being used to dissolve hundreds, if not thousands, of pounds of Calcium carbonate (CaCO_3) present in the flow lines. Ethanoic acid is a weak organic acid used to dissolve small, minor deposits of

readily exposed, water-wet CaCO_3 deposits found in municipal and water well flow lines.

Nomad Chemical solved this challenge by approaching the SWD issues from two angles: scale inhibition and pH control. Scale inhibition was determined via IC and XRD to be primarily made up of CaCO_3 , with minor amounts of CaSO_4 (Calcium sulfate) and Dithiazine, a solid by-product precipitate created by the substitution reaction of MEA triazine and H_2S (Hydrogen sulfide) present in the fluid stream. The pH was determined by a Mettler-Toledo pH meter and found the water to be near a pH 8, indicating the presence of HCO_3^- (bicarbonate) ions. Pump pressures ranged anywhere from 90 - 110 psi in the flow lines of the SWD. The goal was to be below 70 psi.

On February 7, 2025; Nomad replaced the former chemistries with two new products to satisfy the client's requirements: Nomad AC-23, a safe acid; and Nomad SI-119, a combination scale and corrosion inhibitor based on a proprietary telomer. The Nomad products provided two key advantages - an acid strong enough to influence the pH of incoming fluids and dissolve present scale, and a scale inhibitor robust enough to combat the heavy scaling tendencies of the incoming fluids.

Nomad's AC-23 is pumped, via an LMI OF-H-NP 58 gph pump, into two injection ports: the first is near the primary offloading/suction point for the trucks, and the second is near the pump discharge point to the rear tank battery. Nomad's SI-119 is being pumped, via an LMI OF-L-NP 21 gph pump, into the primary offloading/suction point in order to prevent scale deposition, and any corrosion, from occurring at the point of system suction. As noted, this is a multi-pronged approach to meet the needs of the client.

As of February 11, 2025; pump pressures have remained the same, if not fallen in certain areas. Although minor, cavitation is occurring at the discharge pump, indicating the generation of CO_2 (Carbon dioxide) due to the dissolution of carbonate scales present in the system. Nomad's AC-23 is also causing the dissolution of carbonate scales present in the settling tanks at the East end of the tank battery, noticed by the off-gassing and "rolling" of the pre-stage discharge tank. Pressures are not exceeding 90 psi as they were in the past.

Some areas of the SWD flow system are experiencing a drop in pressure by as much as 15 psi with the introduction of Nomad's AC-23. Currently, the Nomad "Hands On" approach is saving the client as much as \$25K/month in spot treatments of the SWD assets. It is expected that pressures will fall by more than 20 psi during the next month.

or two while the acid dissolves present deposits and the scale inhibitor prevents the precipitation and deposition of future deposits.

Should you have any questions regarding this case study, or are facing a challenge of your own, contact Nomad and let us know how we may be able to lend a hand. Thank you in advance for the opportunity.

Best Regards,

Nomad Chemical LLC

