

# CASE HISTORY

*A deeper look into how Gradiant Energy Services' Selective Chemical Extraction (SCE™) technology tackled the Permian Basin's toughest water challenges*

# SUCCESS SNAPSHOT

## BENEFITS OF SCE™ TECHNOLOGY

- Designed to handle varying water quality
- Specific chemistry plan
- Patented chemical dosages developed through algorithm
- Clarifier to manage solids control
- Consistent effluent water quality
- Manned system
- Award winning HSE program
- Modular 15,000 bpd systems

## BACKGROUND & CHALLENGES

- Executed a continuous mobile treatment solution with zero liquid waste
- Ensured effluent water quality matched the desired quality standards
- Minimized footprint for location setup

## GES SOLUTION & RESULTS

- Analyzed produced water and suggested GES's SCE™ technology
- SCE™ technology provided high-volume treatment rates while cleaning water only to the needed level – and not beyond
- GES successfully treated water at 25,000 bpd rate while meeting all KPIs
- Minimal solids generated through innovative chemical program; reducing costs for the client

**2018 STARTED STRONG FOR GRADIANT ENERGY SERVICES (GES) IN THE DELEWARE BASIN,** with unprecedented work for one of the industry's biggest operators. GES' patented Selective Chemical Extraction (SCE™) technology treated produced water, by means of chemical precipitation to the operator's stringent specifications. Two modular units treated 25,000 bpd, and pushed the recycling envelope as GES treated challenging produced water while consistently meeting the strictest key performance indicators (KPIs).

### THE CHALLENGE

The Permian-based operator was interested in a water technology service that could treat its produced water for the high Iron, Oil and Grease, Turbidity, Hydrogen Sulfide, and low Free Available Chlorine and Oxidation Reduction Potential (ORP) values. The desired effluent water quality would ensure the water was compatible with both the fracturing fluids and the reservoir.

One challenge GES faced was after the start of the service, the KPI for Iron had changed. Initially, the client had requested A KPI for Iron < 2 ppm. During treatment, new requests brought the KPI to less than 1 ppm and, soon, all the way down to 0.5 ppm. In all, this meant GES' technology needed to bring the iron down from a range of approximately 20 mg/L to a 0.5 mg/L range -- all while maintaining 25,000 bpd as the treatment flow rate.

TREATED WATER CRITERIA		
<b>pH</b>	6.0-8.0	No units
<b>Iron</b>	<.5	mg/L
<b>O&amp;G</b>	<10	mg/L
<b>ORP</b>	>350	m.V as S.H.E
<b>Turbidity</b>	<10	NTU

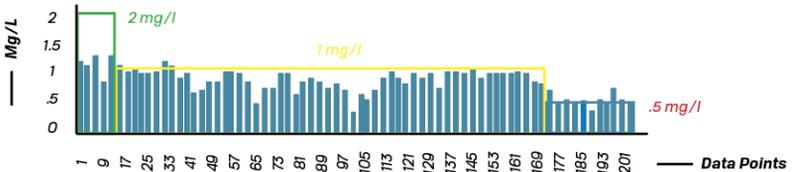
Another typical challenge in treating produced water with chemical precipitation is solids handling. The volume of solids can be cumbersome and often the system has to shut down. While treating such high volumes, solid waste generated could be substantial. Handling high sludge volumes while maintaining complete reliability and operability is critical for the operator.

### THE SOLUTION

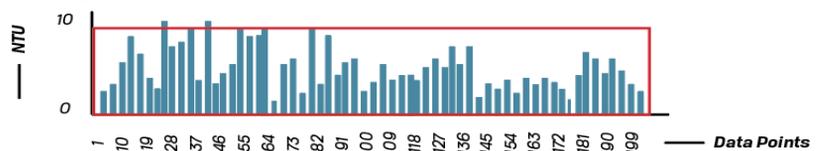
To address the challenges, GES recommended two of its SCE™ units. In this case, the SCE™ technology provided high-volume treatment rates while simultaneously cleaning water to the specified KPI's. The onsite technical support team developed a chemistry plan specific to the clients changing needs. The chemistry plan was then managed through a proprietary algorithm for the changing influent water quality. The patented clarifier worked as-designed; maximizing solid-liquid separation at high treatment rates without any system downtime.

The deployment of GES' SCE™ technology was monumental and went above and beyond the operator's needs. Changing influent water quality was treated to strict, effluent standards with consistent performance. What's more, the treatment technology is outfitted on mobile trailers, offering a minimum footprint on top of a rig-up and rig-down time of just 48 hours.

### EFFLUENT IRON



### TURBIDITY WITHIN KPIs



### OIL&GREASE WITHIN KPIs

