

CleanWave™ Technical Overview



How Electrocoagulation (EC) Works

Halliburton's CleanWave uses electrocoagulation as its primary technology for water treatment. EC is an electrical process that has the capacity to destabilize and coagulate suspended colloidal matter in water. When contaminated water passes through the EC cells, the anodic process releases positively charged ions which bind onto the negatively charged colloidal particles in water resulting in coagulation. At the same time gas bubbles, produced at the cathode, attach to the coagulated matter causing it to float to the surface where it is removed in weir and settling tanks. Once the solids are separated, the resulting clean water is suitable for drilling, completion, and production operations.

Benefits of Electrocoagulation

Halliburton's CleanWave unit has a design treatment capacity of approximately 20 barrels of water per minute. With easy scalability this gives operators the ability to quickly treat the large volumes of water in reserve and flowback pits and depending on the operation, to treat flowback and produced water during a fracturing operation. CleanWave was designed to remove suspended solids, oil, other insoluble organics and bacteria from the water. The operating conditions are regulated depending on the total dissolved solids (TDS) present in the water.

Key Benefits of CleanWave:

- 99% reduction in Total Suspended Solids
- Treats water with TDS ranging from 100 mg/L – 300,000 mg/L
- Unit rated at 2 - 20 bpm or 2,880 - 28,800 bbl per day
- Coagulates particles < 1 micron
- Reduces Turbidity to < 10 NTU
- Non-polymer treatment allows up to 75% reduction in sludge generation
- Breaks emulsions
- Removes divalents and heavy metals
- Automated processes
- Scalable
- Self-cleaning

Electrocoagulation is most effective at treating the following contaminants:

- Total Suspended Solids (TSS)
- Total Petroleum Hydrocarbons (TPH)
- Turbidity
- Bacteria (secondary benefit; provides ~90-95% removal)
- Iron Reduction