Produced Water Evaporators

Evaporation technology is an accepted method of treating oilfield produced water from enhanced oil recovery operations such as SAGD and CSS. This thermal process provides high-quality distillate as feed water for steam generation and allows the flexibility of using either traditional OTSGs (once-through steam generator) or drum-type boilers.

Issues with Conventional Processes

First generation evaporative processes use large amounts of chemicals (caustic, chelants, dispersants, etc.) to keep the scaling species soluble. The use of these chemicals is costly and does not always provide scale-free operation which results in additional chemical or mechanical cleaning. High-hardness brackish makeup water is particularly difficult to process with elevated pH levels in the evaporators without pre-treatment. Disposal of high pH evaporator concentrate also requires large amounts of chemicals in order to produce brine that is suitable for deepwell discharge. Cavern disposal of high pH concentrate has been problematic with several economic and technical challenges.

The Silica Sorption Process, when utilized with HPD® evaporators, offers a more cost-effective, safer, and environmentally friendly method of disposing of evaporator concentrate.

Veolia Water Technologies has developed process technology for cost-effective treatment of produced water containing high levels of silica and other scaling components. This technology, called The Silica Sorption Process, is designed specifically for produced water treatment. The scaling tendencies and organics levels of produced water make it a challenging application. The advantages of the Silica Sorption Process include:

- Ability to tolerate high-hardness produced water and brackish makeup water
- Accepts high oil and grease levels in feed water and oil upsets without scaling or fouling of heat transfer surfaces
- Lower chemical costs for operation
- Flexible disposal of evaporator concentrate with little or no post treatment
**Silica Sorption™ Process Flexibility**

The Silica Sorption Process offers significant improvements in evaporation system economics and operation when compared to standard evaporative processes by reducing chemical consumption and providing straightforward disposal options for evaporator concentrate.

The process eliminates the potential for silica and hardness-related scale by sorbing silica and co-precipitating other compounds onto sorption crystals utilizing commercially available chemicals. As a result, the process is able to tolerate higher levels of hardness and organics in the evaporation system. This provides the opportunity for use of high-saline, high-hardness make-up rather than fresh water.

Producers combining Silica Sorption technology with onsite or offsite disposal options can realize sizeable capital and operating cost savings.

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**Benefits of the Silica Sorption Process**

- Provides a robust, cost-effective evaporation system to treat produced water and produce boiler feed water for SAGD production
- Reduced chemical consumption, resulting in cost savings of 25% or more
- No EDTA addition required
- Cost-effective disposal of evaporator concentrate with little or no post treatment
- Integrated Vapor Washer ensures higher-quality distillate for boiler feedwater
- Additional removal of Calcium and Magnesium allows use of high hardness, saline makeup water
- RLD crystallizer or ZLD system recovers more water, reduces waste