The CoLD® Process
Treatment of Flowback/Produced Water

Resourcing the world
The CoLD® Process

The CoLD® Process is a patented crystallization process developed by Veolia as a simpler and more economical approach for desalination of shale gas flowback and produced water as compared to conventional thermal processes. CoLD is the crystallization of high solubility salts at low temperature and deep vacuum. It eliminates the need to remove calcium salts in the produced water, thereby reducing the pretreatment operating costs. The CoLD Process is an ideal solution for treatment of produced water containing high concentrations of total dissolved solids (TDS) for surface discharge or reuse.

Benefits of the CoLD® Process
- Desalinates high-TDS produced waters
- Lower OPEX as compared to conventional methods
- Eliminates the need for calcium removal in pretreatment
- Produces clean water suitable for discharge or reuse
- Simple, robust process with high reliability and availability
- Minimizes dependency on deep wells
- Reduces truck traffic and associated carbon emissions

Turn Produced Water into an Asset

Both flowback and produced water can contain very high levels of TDS, composed mainly of dissolved chloride salts of sodium, calcium and magnesium. Significant quantities of barium and strontium salts may also be present, as well as some heavy metals and naturally occurring radioactive material (NORM). The produced water is also contaminated with a range of hydrocarbons.

Treatment for reuse or discharge is becoming more prevalent in the industry as environmental and economic concerns limit disposal options. Increased reuse of produced water is driving the implementation of physical, chemical, biological, and thermal treatment methods. Thermal desalination of produced water is a proven method to completely separate the salts from the water, so both can potentially be beneficially reused.

Veolia has applied proven process designs based on HPD® Evaporation and Crystallization technologies used in the salt, fertilizer, and chemical industries to develop a simple and robust process to treat flowback and produced water from hydraulic fracturing and generate clean water suitable for reuse or discharge.
Cost Effectiveness of CoLD® Crystallization

Conventional thermal processes for desalination of produced water require complete softening of the produced water using lime, soda ash, caustic, and other chemicals to replace the calcium and magnesium ions in the produced water with sodium ions in order to produce a crystalline solid. In some cases, a final drying step is necessary to produce a stable solid suitable for disposal.

In comparison to a conventional approach, the CoLD Process requires minimal pretreatment for removal of specific ions and contaminants to prevent scaling, fouling and corrosion of equipment. Calcium is not targeted for removal in the pretreatment processes, which results in lower chemical demand and sludge generation.

The CoLD Process operates under deep vacuum at low temperature. The chemistry of many produced waters favors the formation of hydrates and double salts, which precipitate at low concentrations as the temperature of the solution is lowered. When concentrating the waste stream at low temperature, dissolved solids will crystallize at relatively low concentration, without the need for calcium removal in the pretreatment process and the resulting sludge production.

Enables Reuse or Discharge at Lower OPEX

The CoLD Process will completely desalinate high-TDS produced water containing significant quantities of chloride salts. Substantial savings in OPEX are achieved by eliminating the necessity for calcium removal and discharging the final solid product as a wet cake, which does not require any further drying in order to transport it to a disposal site.

This results in a simpler flow scheme, less equipment to operate, and a smaller footprint. Depending on site-specific NPDES requirements, CoLD crystallization might require post treatment processes for removal of ammonia and volatile organic compounds to lower levels. Veolia provides proprietary technologies for post treatment processes to make the treated water suitable for reuse or surface water discharge.

Innovative Process Solutions

Veolia Water Technologies is the global leader for innovative process solutions that use HPD® Evaporation and Crystallization as core technologies. With more than 1,000 installations in more than 30 countries, Veolia has decades of process design experience applying HPD technologies in the oil & gas, power, chemical, mining, salt, and fertilizer industries, providing wastewater treatment, volume reduction, and ZLD systems.