

Licensable Technologies

System for Treatment of Co-Produced Water

Applications:

- Removal of organic compounds from co-produced water and vapors
- Pretreatment of water for RO systems or as stand-alone treatment option
- Treatment of O&G coproduced water, bilge water, and water from other industrial processes

Benefits:

- Provides low-cost, environmentally safe treatment with low energy requirements
- Keeps system costs low by using commercially available components and regenerable SMZ
- Eliminates expensive removal and reinjection costs associated with current disposal method
- Creates new source of usable water, especially in arid regions
- Increases RO system lifetime with SMZ-VPB-MBR pretreatment

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Summary:

Produced water associated with the oil and gas (O&G) industry annually introduces hundreds of billions of gallons of brackish wastewater in the U.S. alone. Most produced water is highly saline and contaminated with a complex mixture of salts, volatile and semi-volatile organics,

metals, organic acids, and particulates, as well as additives from the drilling process, including alcohols and surfactants. Oil and gas companies pay to have this contaminated produced water trucked to reinjection sites for disposal—an expensive and time-consuming process that can represent as much as 10% of the total cost of hydrocarbon production.

Los Alamos National Laboratory (LANL) has developed a new system for treating produced water. The three-part treatment system includes a Surfactant-Modified Zeolite (SMZ), Vapor Phase Bioreactor (VPB), and Membrane Bioreactor (MBR). This treatment system offers O&G companies and water users a cost-effective treatment process to decontaminate produced water for beneficial use. In addition to lowering O&G production costs, LANL's technology will provide a new water resource for industry and agriculture, and a more environmentally friendly solution for disposing of produced water.

The SMZ portion of the treatment system works by adsorbing organic compounds from produced water and filtering out iron and manganese floc that may be present. When saturated with organics, the SMZ is regenerated by air stripping. The off-gas is directed to the VPB, which biologically converts the volatile components, particularly BTEX, to innocuous by-products at up to 99% removal efficiency. The produced water is pumped through the MBR component, which removes organic acids. Finally, the treated produced water can be run through a traditional reverse osmosis (RO) system to remove salts. The result is clean water that can be used for industrial or agricultural purposes, or safely reintroduced to a water system.

LANL's produced water treatment system is tolerant of a wide range of chemistries, and may be fully automated to provide continuous produced water treatment. This system may be used to treat produced water with a variety of contaminants, contaminant concentrations, flow rates, and stripping rates, making it flexible for use with produced water from nearly any location. Additional applications for the produced water treatment system include treatment of bilge waters and co-produced waters from other industrial processes, such as power generation.

Development Stage: Successfully field tested with laboratory prototype

Patent Status: Patent pending

Licensing Status: Available for exclusive or non-exclusive licensing

