

## EMERGING TECHNOLOGIES FOR PRODUCED WATER TREATMENT

**Naggs Nagghappan\***

Veolia Water Technologies  
120 S. State College Blvd., Suite G100  
Brea, CA 92821  
412-720-9600  
[naggs@veolia.com](mailto:naggs@veolia.com)

Veolia has designed, built, and is currently operating Produced Water treatment systems that enable reuse or discharge of the treated effluent. Two technologies that use Veolia's proprietary CeraMem<sup>®</sup> ceramic membranes as a key component were developed to meet the needs of the oil & gas industry. Frac water reuse is made possible with ROSS<sup>™</sup> technology, a treatment train that includes Multiflo<sup>™</sup> chemical softening prior to the ceramic membranes. This technology provides effective removal of scale-formers and particulates, and recovers >98% of the water for reuse in a packaged, modular solution at an installation in Utah. When discharge water quality is needed, OPUS<sup>®</sup> II technology is implemented to meet stringent TDS limitations. This technology utilizes a ROSS system followed by a Weak Acid Cation (WAC) softening system, cartridge filtration, and reverse osmosis membranes operated at an elevated pH. OPUS II generates high-quality effluent for discharge to even the most pristine streams, as evidenced by our successfully operating installation in southern California. Our presentation will explain each of these technologies and will include performance data from these facilities.

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