

ShaleFlow™

*A Transportable, Modular Solution
for Produced Water Reuse*

.....

Veolia has developed ShaleFlow™, a cost-effective transportable solution for reuse of produced water and flowback water from hydraulic fracturing operations. This compact, modular system utilizes proven technologies designed to enable reuse with the flexibility to be moved as the field is developed.

Benefits

- Enables reuse of produced or flowback water
- Reduces fresh water demand
- Minimizes produced water disposal costs
- Minimizes deep well injection volumes
- Reduces overall operating costs
- Flexible delivery solutions – DBO/DBOO



Features

- Compact treatment system in three modules
- Packaged system ready for “drop and go” treatment
- High effluent quality allowing for water reuse
- >98% water recovery, zero liquid waste
- Non-hazardous sludge suitable for landfill disposal
- Equipment designed to operate in high corrosive environment
- Single-point responsibility

Enabling Water Reuse in Shale Applications

Veolia’s ShaleFlow is ideal for treatment of flowback and produced water for reuse in hydraulic fracturing and completions operations.

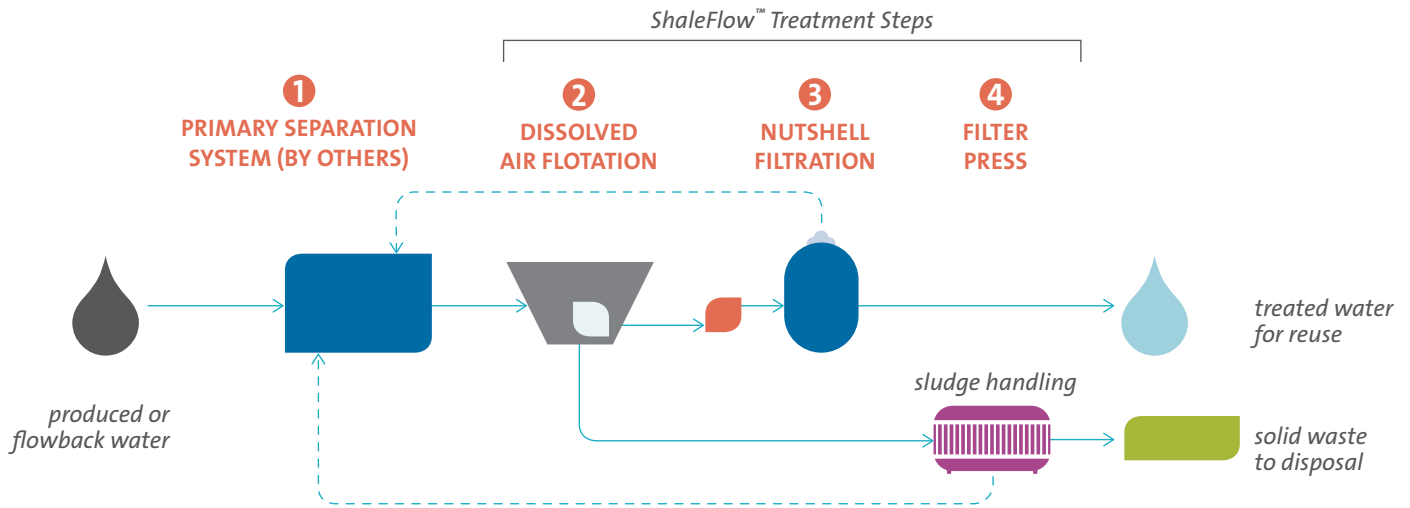
ShaleFlow can treat up to 10,000 barrels per day (300 gpm) and will accept a wide range of influent water quality while still producing effluent water quality with low levels of particulates and scale-formers. The solids are dewatered using a packaged filter press, maximizing water recovery. The process generates a non-hazardous solid waste that can be hauled to a landfill for disposal.

All of this is accomplished in our simple “drop and go” system consisting of three transportable modules. Reuse of the system effluent will drastically lower total overall water costs and will eliminate the risks associated with transporting fresh water and produced water to and from the site.

Guaranteed Performance for Worry-free Water Management

Veolia offers Operation & Maintenance services to provide a 24/7 performance guarantee for the ShaleFlow process. Our trained technicians ensure high uptime availability of the process and are skilled in managing feed water variability while maintaining consistent treated water quality. The result is a replenished supply of water and a non-hazardous waste suitable for disposal.

Process Flow Diagram



1. Primary Separation

Primary Separation is required prior to the ShaleFlow modules to remove bulk oil and solids from the inlet water and to provide buffer capacity to the treatment system. This step is typically provided by others.

2. Dissolved Air Flotation

Veolia's DAF uses dissolved air to achieve highly efficient separation and removal of oil and solids from the water. Oxidant-based chemistry is added in the DAF for removal of hydrogen sulfide, iron, and manganese while disinfecting the feed water. After conditioning of the oil and solid particles, microbubbles in the water cause the flocs to float to the surface for removal.

3. Nutshell Filter

Veolia's nutshell filter is unparalleled in removing suspended solids and oil from water. Walnut shell media resists fouling better than other media, is easily cleaned, and is not affected by heavy oil surges. The filter uses a fluidized cleaning process that effectively strips contaminants and oil from the media. Back-wash water is recycled to the Primary Separation system.

4. Automatic Filter Press

Settled solids and floated sludge are dewatered using an automatic filter press. Solids produced are non-hazardous and are capable of passing the paint filter test for easy disposal. The automatic filter press provides an easy solids dewatering operation while minimizing overall disposal costs and water losses. Water from the filter press is recycled back to the Primary Separation system.

ShaleFlow™ Performance Data

CONSTITUENT	TYPICAL FEED	UNITS	PRIMARY SEPARATION	DISSOLVED AIR FLOTATION	NUTSHELL FILTRATION	TREATED WATER
Suspended Solids	4000	mg/L	●	●	●	< 5
Oil & Grease	1000	mg/L	●	●	●	< 5
H ₂ S	100	mg/L	-	●	-	< 1
Bacteria	20,000	CFU/ml	-	●	-	ND
Iron	30	mg/L	-	●	●	< 1
Manganese	30	mg/L	-	●	●	< 1

● Removes bulk volume ● Reduces to near final quality ● Polishes to final quality

Resourcing the world

Veolia Water Technologies

Tel +1-800-337-0777 • water.info@veolia.com

www.veoliawatertech.com