



# Upstream energy

*EOR seawater injection  
sulphate removal process*

# Enhance reservoir efficiency with Veolia's sulphate removal process for seawater injection

VWS Westgarth, the offshore energy capability business unit of Veolia Water Technologies, is the technology leader and the world's largest single supplier of seawater sulphate reduction process (SRP) membrane systems.

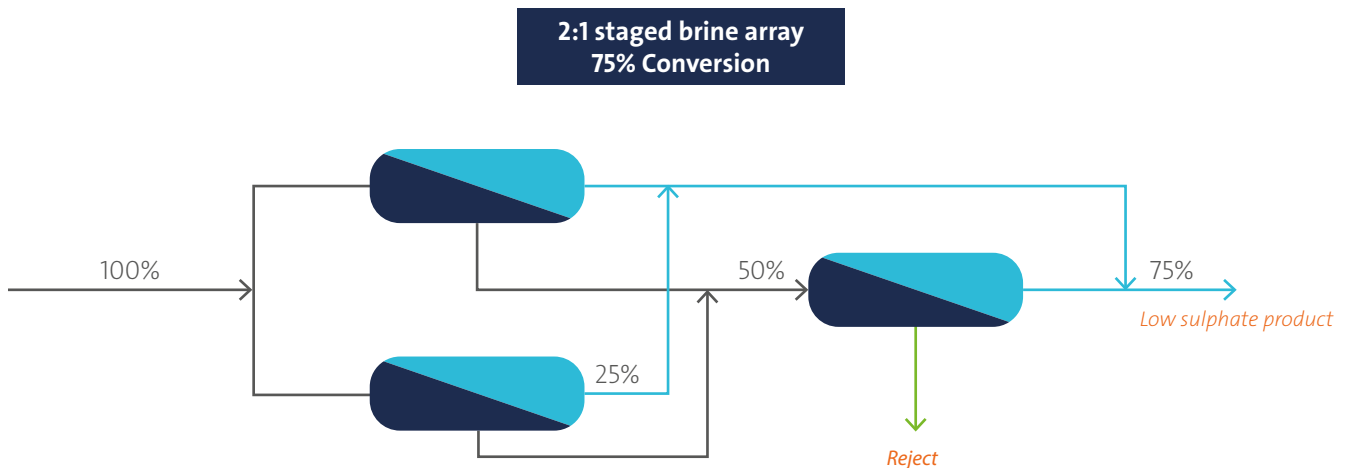
With more than thirty years experience of SRP system design and operation we have a unique understanding of offshore water treatment processes and of the high build specifications the marine environment requires to achieve high availability and reliability.

## Our Solution

By extracting sulphates from injection seawater, our SRP technology ensures the economical and efficient prevention of scale avoiding the need for chemical or mechanical intervention.

## How it works?

Our SRP utilises state-of-the-art nanofiltration membranes to selectively remove sulphate while leaving other salts (sodium, chloride, etc.) substantially unaffected. The diagram below shows the typical 2:1 staged brine array design:



### Membrane configuration

The sulphate removal membranes are typically configured in a 2 to 1 brine array, this to minimise the volume of feed seawater required, optimising the feed to product ratio at circa 75%.

### Sulphate removal process

The seawater feed is introduced to the first array of membranes, allowing 50% of the feed to pass through the membrane material while rejecting sulphates on the membrane surface. The 50% reject water (brine) is then fed to the second array of membranes, where further 50% passes through as low sulphate water.

### Overall recovery

The two flows of low sulphate water are blended to achieve an impressive overall recovery rate of 75%. The 75% low sulphate seawater is injected into the formation, while the remaining 25% of high sulphate reject is discharged overboard safely without endangering the environment.





## Benefits of our SRP water injection system

- Reduces seawater sulphate ( $\text{SO}_4$ ) concentration from around 2,500 ppm to less than 50 ppm (at  $< 24^\circ\text{C}$ ).
- Significantly reduces sulphate scale precipitation in production wells.
- Reduces the quantity of scale inhibitor required downhole and in topsides equipment.
- Eliminates the economic and operational impacts associated with reservoir scaling.
  - Limits pipe constriction.
  - Maintains reservoir permeability by limiting formation plugging.
- Prevents well souring by controlling sulphate reducing bacteria (SRB), which in turn reduces equipment corrosion problems and the equipment required for scrubbing, removal, and handling of hydrogen sulphide.
- Reduces safety hazards associated with hydrogen sulphide
- Reducing scale reduces the potential for naturally occurring radioactive material which can be attached to the scale.
- Meets the stringent design and environmental criteria related to offshore platforms.

At VWS Westgarth, we are committed to providing innovative and customer-focused water treatment solutions to the offshore energy industry. Our Sulphate Removal Process water injection systems offer a cost-effective solution to scale prevention while enhancing formation production and stability, minimising chemical use and electrical power to reduce the operations carbon footprint.

Our commitment doesn't stop at the design and build supply, our aim to support our clients throughout the entire lifecycle of their asset. Our

through-life service offering includes our Hubgrade™ “real-time” asset integrity monitoring software, offshore service support, onshore technical support, spares management, and our Hydrex™ water treatment and production chemical range.

Our mission is to help our clients to reduce their carbon footprint and greenhouse gas emissions by capitalising on our extensive experience in water treatment system design and our module integration know-how, to provide innovative efficient solutions that will contribute to a greener future.

# Resourcing the world

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