



Experts in Water & Fluid Separation

Champions for the environment, leaders in
gas flotation

Technology Managers' Network Meeting Smart Technology Showcase

APS Turbocharging Fluid Separation

19th May 2025

Best available technique • Best environmental practice • Improved energy impact factor

PRIVATE & CONFIDENTIAL



The Challenges

- Increasing environmental focus
- Tightening regulations
- Diminishing field economics
- New fields ties
- Increasing water cuts
- PW Bottlenecking
- PWRI



APS Value Proposition

Mobile Rental Equipment

- Reduce OIW overboard
- Improve PWRI performance
- Debottleneck produced water
- Ensure capacity for future tie-ins
- OPEX or CAPEX options
- Short lead-times
- Turbocharges the performance of existing separation process

MIFU™
Microbubble Infusion

Produced Water Separation Challenges

Traditional Gas Flotation

- Poor performance
 - Single bubble size / one size fits all approach
 - Gas concentration not controllable
- Low fluid throughput (inline application & size/weight)
- Adversely affected by system slugging

Filtration

- Low fluid throughput (inline application & size weight)
- Unsuitable for high solid loading
- High consumable costs
- Waste generation – onshore shipping and disposal
- Manual handling / exposure risk

- Side stream and recirculation application
- Small size, low weight.
- Uses existing client process vessels.
- Generates and controls DGF and IGF bubble sizes, and combination of both.
- Can be applied between primary, secondary and tertiary separation process
- Single unit treats up to 140,000bwpd

- Ease of retrofit
- Dissolved Gas Flotation (DGF)
- Induced Gas Flotation (IGF)
- Combination of both DGF and IGF
- Fully automated
- Light weight, small footprint
- DNV 2.7.1
- ATEX Zone 1 Rated
- No consumables / waste
- Cost competitive
- Derisked application – small scale test units



How does the Technology Work?

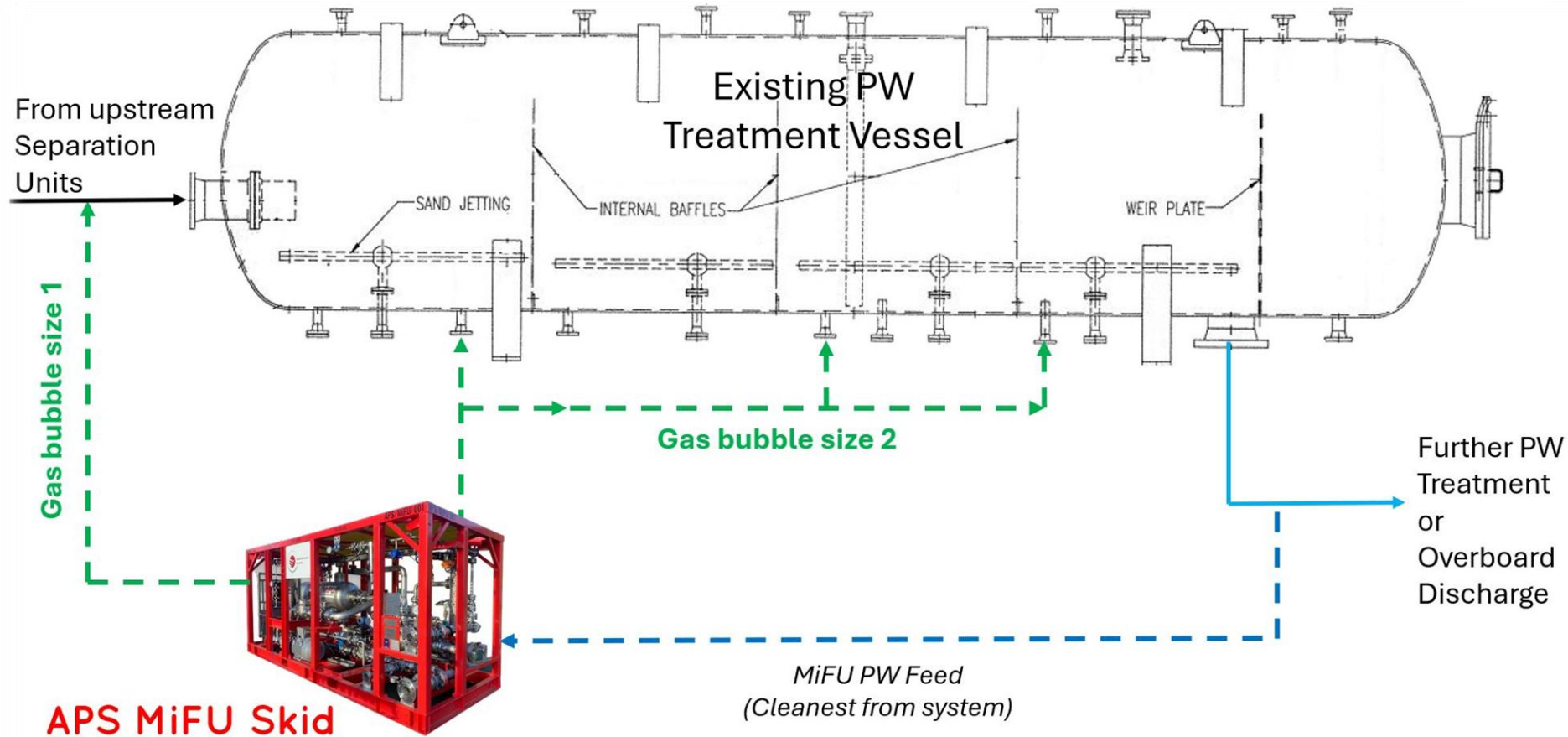
- Portion of cleanest water is taken from separation process to act as **MiFU**TM feed water.
- **MiFU**TM generates microbubble infused water and reinjects to multiple points on existing process.
- Microbubble size matched to contaminant (oil droplet / solid particle).
- Microbubbles attach to contaminant improving contaminant rise rate and removal efficiency.
- Different sized microbubbles can be applied to different points on process to match contaminant sizes or further improve rise rate.

How do APS validate the Technology?

- Validate microbubble flotation prior to **MiFU**™ deployment
- Small-scale microbubble flotation testing
 - Offshore laboratory benchtop analysis
 - PW plant testing (sample point connection)
- Contaminant size distribution
- OIW /Suspended solids concentration
- Test and select deoilers
- Establish **MiFU**™ tie in points, laydown areas and utilities

STEP SURVEY™
Site Testing for Enhanced Processing

Example MiFU Tie-In



-  - Portion of produced water is taken from process to act as MIFU feed water
-  - MIFU generates microbubble infused water (MIW)
-  - MiFU discharges MIW to multiple points on existing process

Challenges

- OIW discharge to sea >100mg/L
- Production compromised
- Heavy oil wet solids
- Slop / cargo tanks utilised to increase fluid separation retention time to achieve discharge limit
- Severe process slug flow
- Multiple technologies previously trialled to reduce OIW

Objectives

- Achieve a “step change reduction” in OIW to sea without the need to use slops / cargo tanks

MiFU Application

- STEP Survey identified microbubble size and qualified chemical pre-trial
- Multiple injection points to client degasser vessel

Trial Results

- Surpassed OSPAR OIW regulatory discharge limit
- Able to direct overboard year round
- Unaffected by sea state
- Unaffected by system slugging



**Additional injection point (unavailable during trial) and Gas Water Ratio optimisation (supply chain limitation) and switch to fuel gas would have yielded further removal efficiency (nitrogen in use for trials)*



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