



North Sea
Transition
Authority



STAUPER
WATER TECHNOLOGIES



Stauper Coalescence Chamber Technology

Retrofit or new build pressure vessels, replacing hydrocyclones and degassers to increase water handling capacity by up to 200% and improve produced water quality

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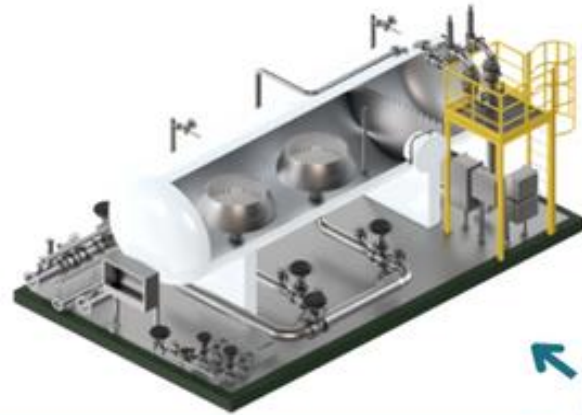
Stauper Configurations Fit it All

Enhanced Produced Water De-Oiling Technology - Stauper Coalescence Chamber Technology)

Horizontal Vessel Orientation

Vertical Vessel Orientation

**Flotation
Degasser**

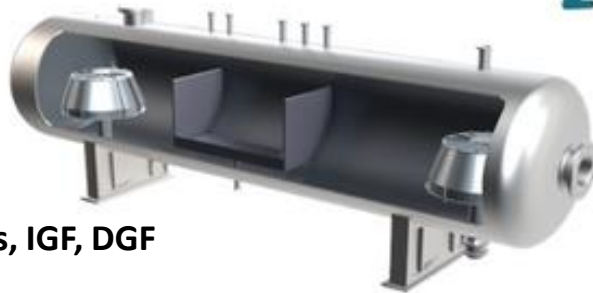


**Standard
CFU**

New Build

**Horizontal
Retrofit**

E.g. Degassers, IGF, DGF

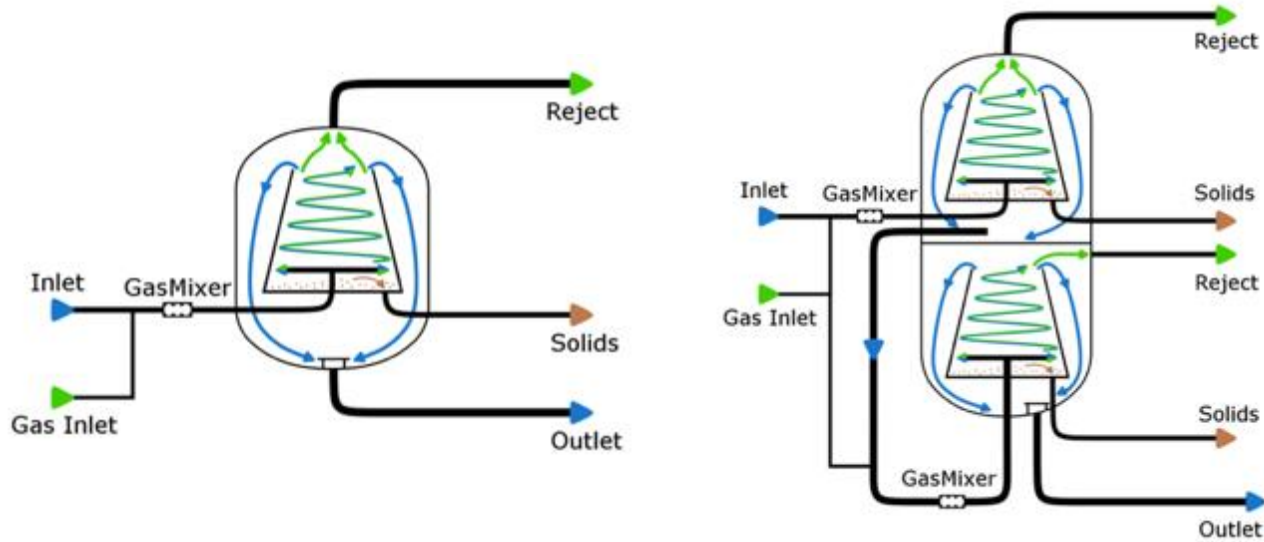


**Vertical
CFU
Retrofit**

Retrofit

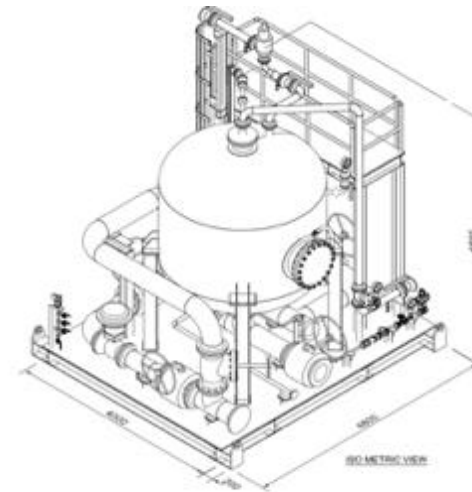


Multi-Stage Technology

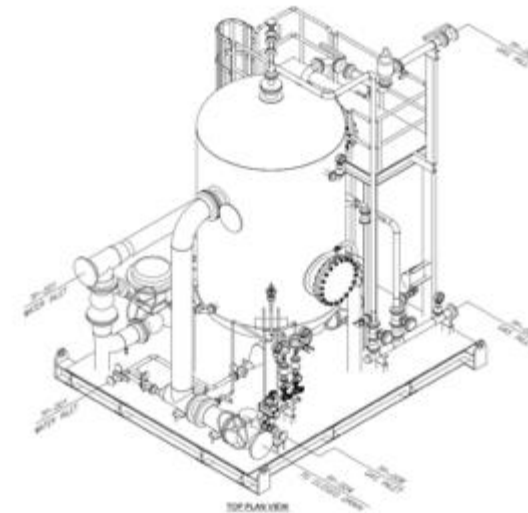


Enables several complete flotation steps in one pressure vessel with 100% process stages

- Saving cost, footprint and weight



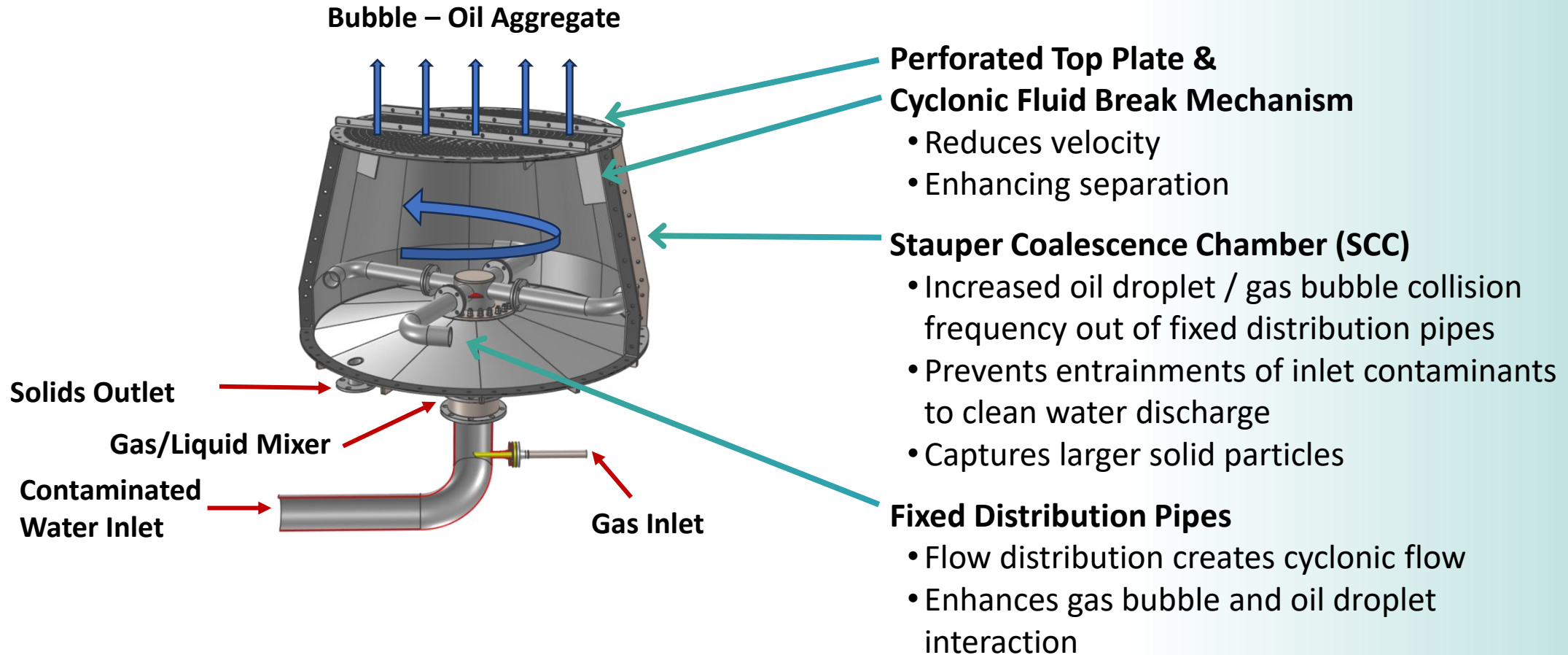
Single Stage CFU



Two Stage CFU

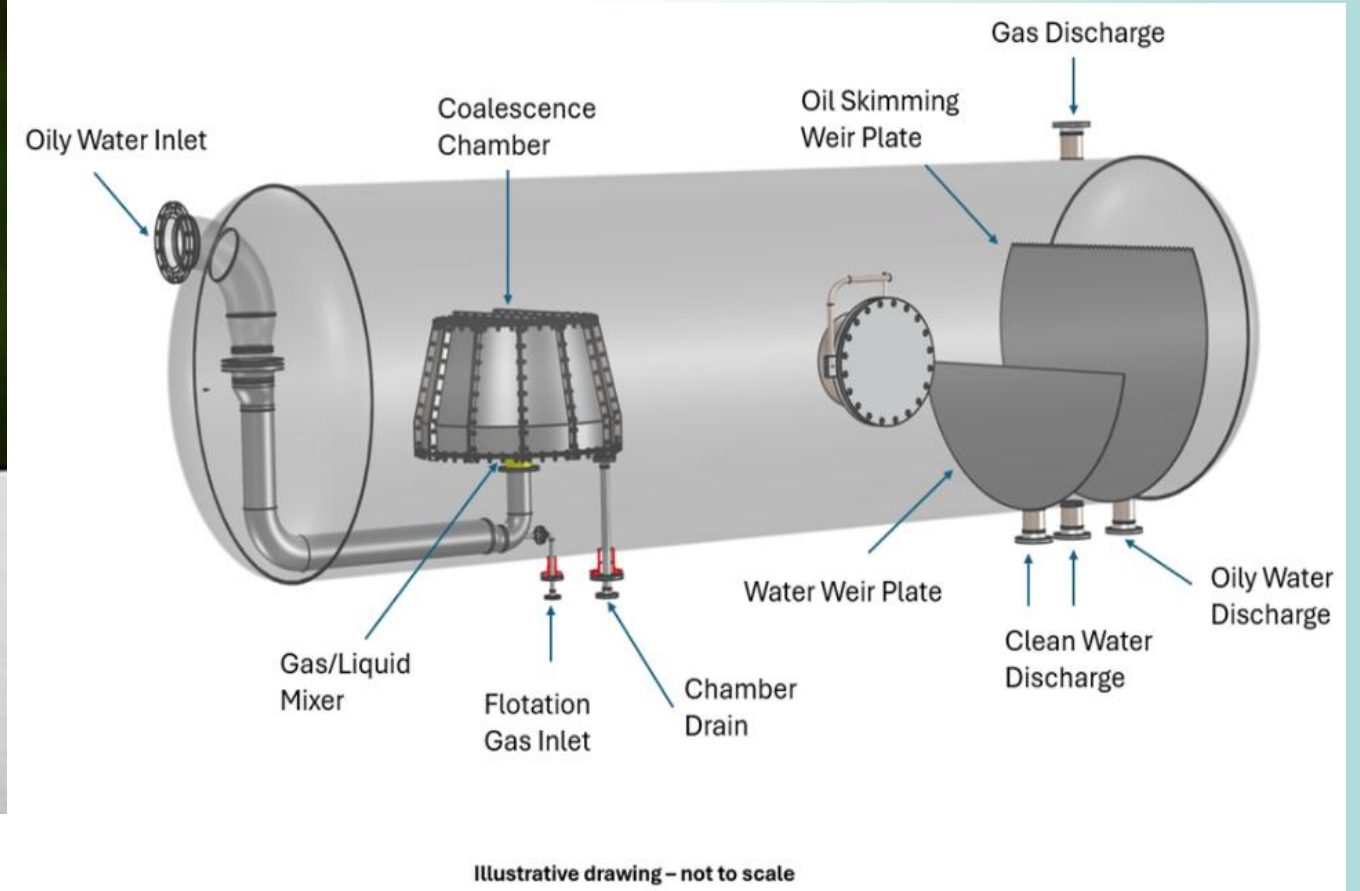
The Heart of the Stauper Flotation Technology

Stauper Coalescence Chamber Technology



Retrofit a Ship in Bottle's Inspired Design Concept

Stauper Coalescence Chamber Technology



- Easy Installation
- Existing control philosophy maintained

Why Upgrade with The Stauper Retrofit

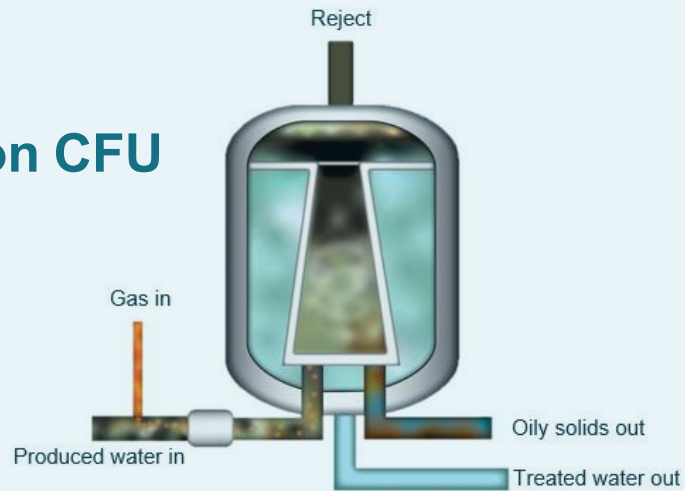
Stauper Coalescence Chamber Technology

- **Increased PW handling capacity**
Simplified process lay-out
- **Increased Water Quality**
More stringent discharge requirements “15 ppm OiW”
- **Increased Production System robustness**
Existing equipment prone to clogging on small-bore dispersion nozzles
- **Decreased Engineering Time & Complexity**
No Heavy lift operations, decreased engineering time and no hot work required
- **Decreased Capex and Opex**
Reduced maintenance and chemical dependency



Stauper Coalescence Chamber Technology SCC The “Chip”, The Upgrade

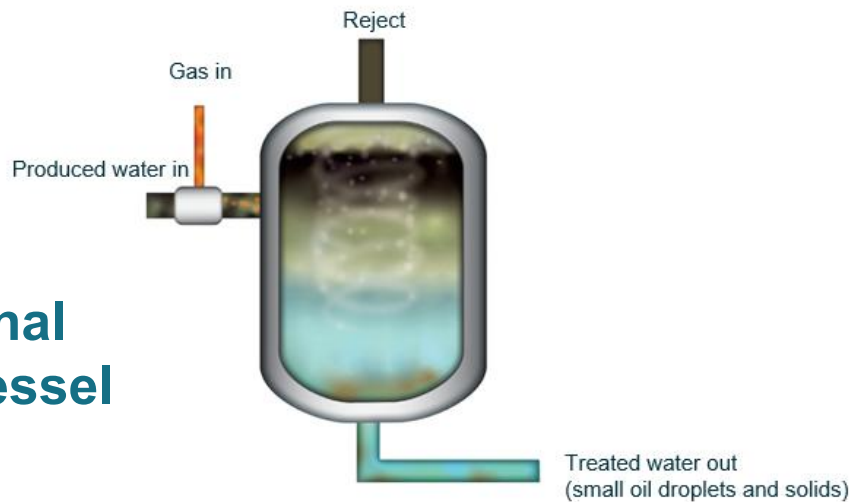
Latest Generation CFU Design



VS

Stauper Coalescence Chamber Technology

Earlier Traditional Open Vessel Design



Higher Efficiency

- Co-current flotation (flow direction bottom up)
 - less entrained oil droplets/gas bubbles to clean discharge
- Separate inlet chamber – SCC and CFU vessel
 - avoid polluting discharge water with inlet water
 - maximize oil droplet/gas bubble interaction

• Calm separation zone

- enhanced separation
- No short circuit of

• Solids removal

High robustness

- No small-bore openings
 - No clogging
 - No moving parts



IKEA and Lego inspired Assembly Methodic

Stauper Coalescence Chamber Technology

- Piece by piece through manway
- Bolting only – no hot work required
- No re-certification of pressure vessel required



Prototype Skid with Stauper Coalescence Chamber Technology

Stauper Flotation Degasser

Horizontal Retrofit



Skid	Unit	Value	Comment
Capacity	BPWPD / m ³ /h	6037 / 40	@ 90 sec retention time
Design Pressure	barg	FV / 17.6	255 Psi
Design Temperature	°C	-20 / 100	
Length	mm	3520	
Width	mm	2400	
Height	mm	2800	w/o PSV installed
Vessel ID	mm	1200	
Vessel TT	mm	2894	
Weight - dry	kg	5900	
Weight - operational	kg	8500	
Material of Construction: Duplex SS (316SS for internals)			
Power 230 VAC / 50 & 60 Hz			
ATEX Zone 2 (II3G Ex ec IIC T4)			
Local PLC – Touch screen operated – no signal interface required			

Save Space and Reduce Complexity by StauperMulti-Stage CFU

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Example Competitor:
Two Treatment Stages – Two vessels in Serial Operation

VS

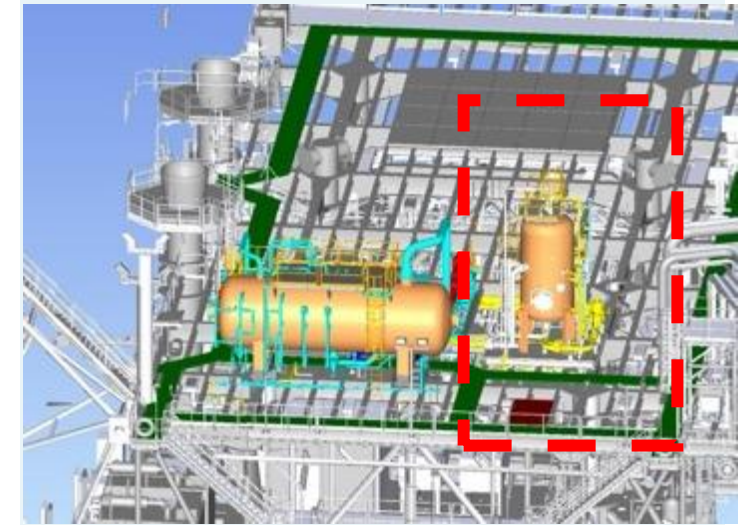
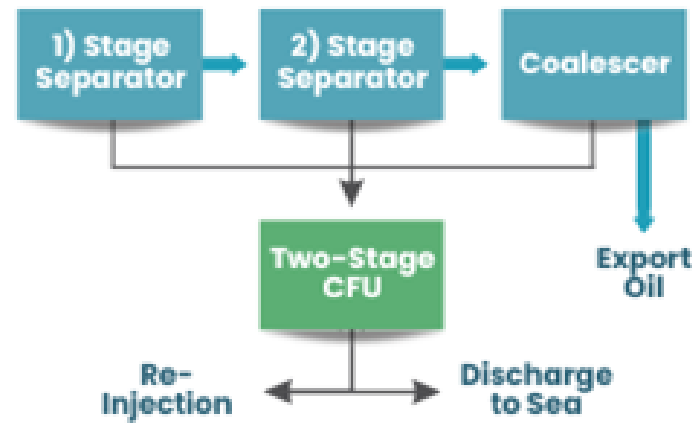
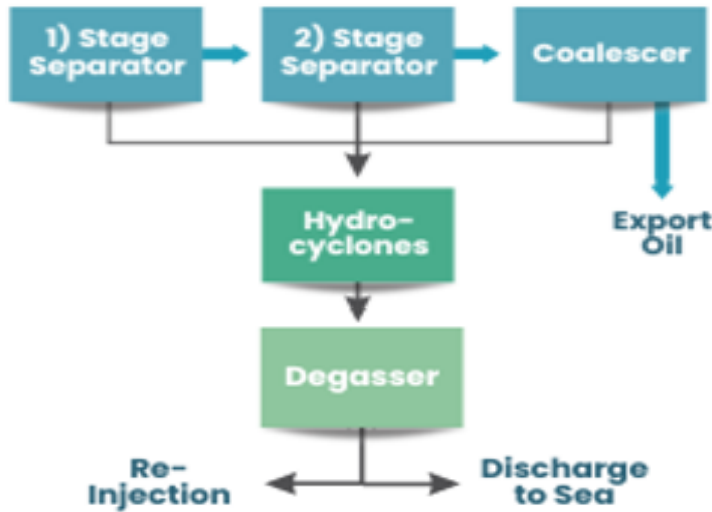
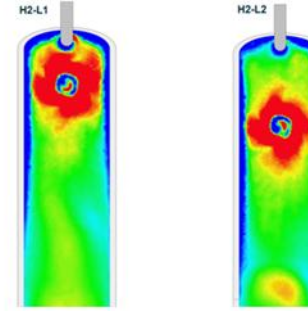


Stauper:
Two Treatment Stages in One Vessel

- Reduced footprint
- Less weight
- Reduced complexity

PW System Simplification

Stauper Coalescence Chamber Technology



Two-Stage CFU tied directly into separator



Efficiency

- Test results confirmed in full-scale

Two-Stage CFU as single De-Oiling Technology

- Less complexity
- Single system / pressure vessel required
- Savings on footprint, weight & cost

Performance Result Brazil DGF - Retrofit

Stauper Coalescence Chamber Technology

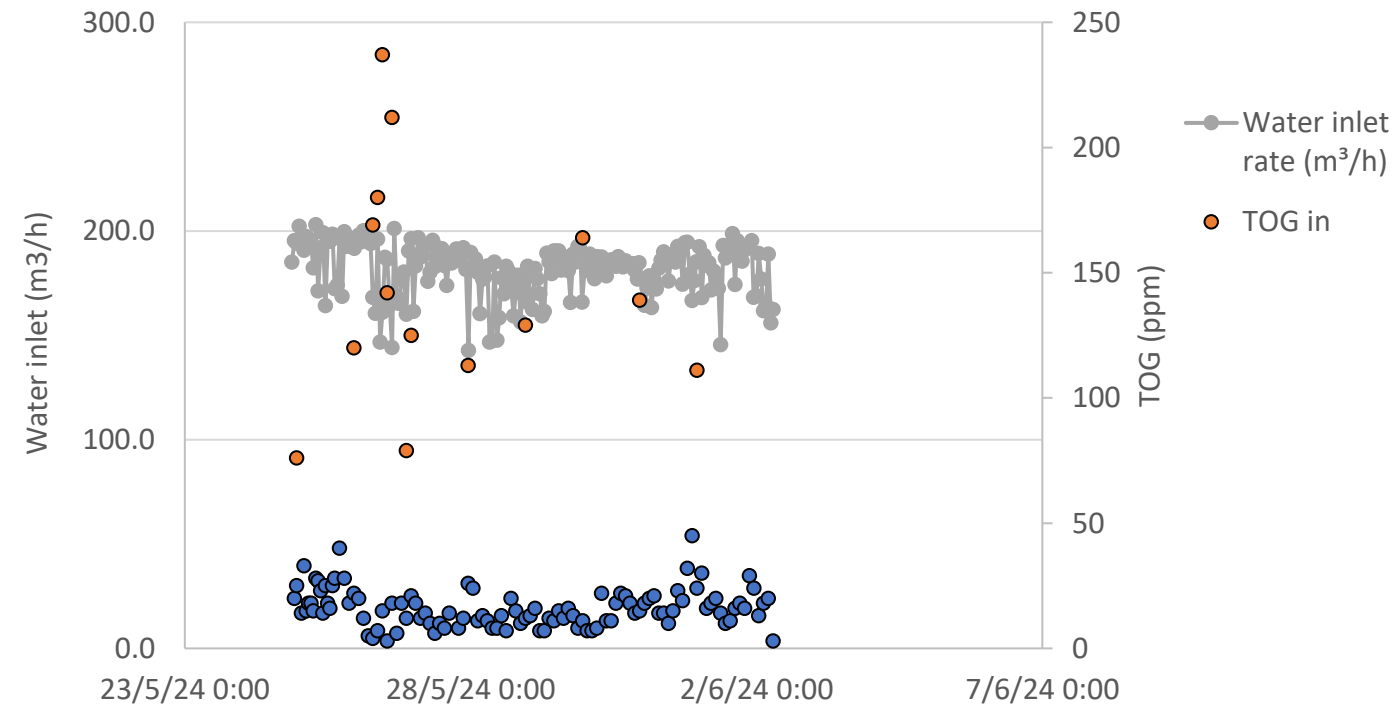


Average flow 27,300 BPWD / 181 m³/h

- 83% over previous design capacity (15,000 BPWD / 99 m³/h)
- 61% of new design capacity (45,000 BPWD 298 m³/h)

TOG Inlet: 143 ppm (average)

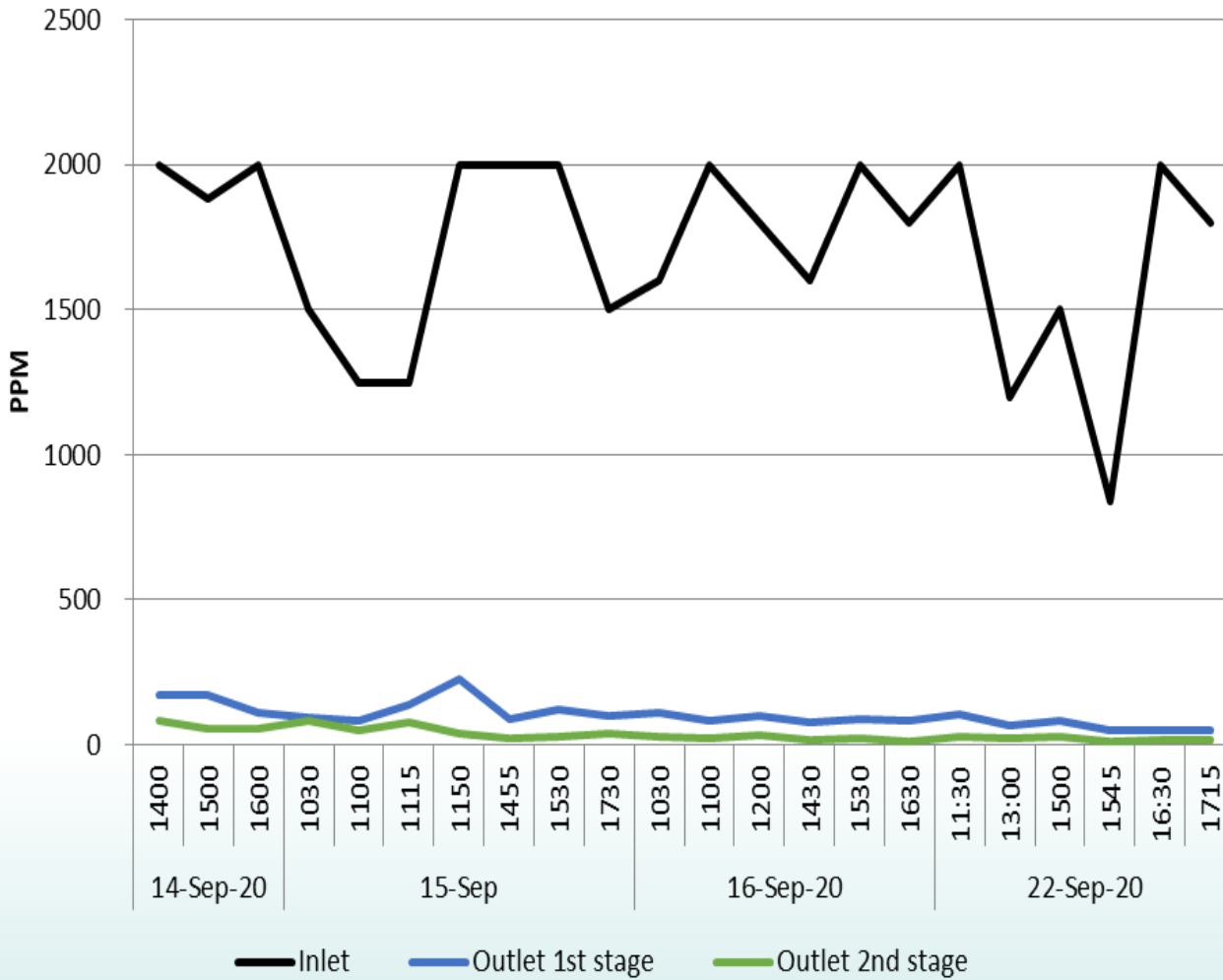
TOG Outlet: 16 ppm (average)



Superior Performance in Heavy Oil SAGD

Downstream FWKO

Stauper Coalescence Chamber Technology



Average OIW in CFU A: 1685 ppm
 Average OIW in CFU B: 145 ppm
 Average OIW out CFU B: 21 ppm (as low as 11 ppm)

Average OIW removal:
 over 99 %

Oil API: 10.8 (heavy oil)

No chemicals
 (flocclants)
 added to aid
 CFU separation.



2000 ppm - 123 ppm - 29 ppm
 (water with dissolved organics)

Collect the Hardest and Last ppm of OiW

Benchmark of Technology

Test North Sea – tie-in d/s Hydrocyclones
Stauper Coalescence Chamber Technology

Competitor

vs

STAUPER

Sample Point	Average With Flocc	Efficiency % With Flocc
Inlet	12 mg/l	-
Out Stage 1	5 mg/l	58%
Discharge	2 mg/l	83%

Data presented at Tekna PW Mgmt. seminar in January 2019

Sample Point	Average With Flocc	Efficiency % With Flocc	Average No Flocc	Efficiency % no Flocc
Inlet	15 mg/l	-	17 mg/l	-
Out Stage 1	0,8 mg/l	95%	6 mg/l	65%
Discharge	0,2 mg/l	98%	2 mg/l	88%

Data presented at Tekna PW Mgmt. seminar in January 2018



CapEx & OpEx savings



OTC-37042-MS

Increased Produced Water Treatment Capacity by Retrofitting of an Existing Dissolved Gas Flotation Vessel

S. Asdahl, H. Angman, and R. G. Nilssen, Stauper Water Technologies AS, Porsgrunn, Norway

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Stauper CFU Wins Gold Recognition

Awarded to the Team at PT Saka Energi
Indonesia, in the PGN Subholding Gas
Continuous Improvement Program 2025

www.stauperwatertech.com



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SCC

(Stauper Coalescence Chamber)

Unique Value Propositions



- Upgrade Infrastructure by retrofit:
- Simplify the Scope of Work:
- Reduced footprint, increased performance and increased capacity:
- Significant Reduced Lead time:
- Less Maintenance:
- Robust and Stable Process:
- Superior Oil in Water Separation:.
- No consumables:.

