Shell Exploration & Production

Pros & Cons of Typical Shell GoM Oil Dehydration and Water Deoiling Systems

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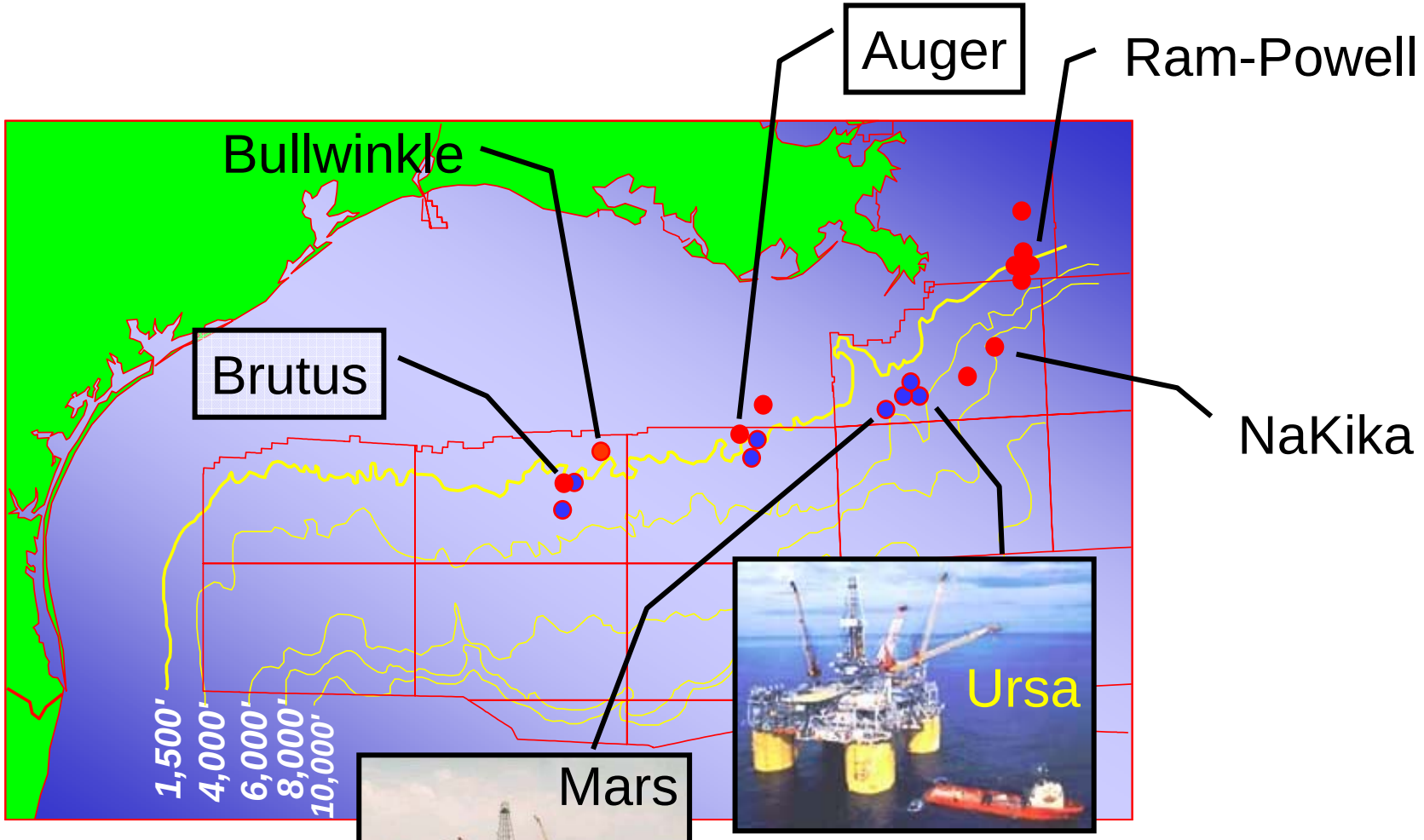
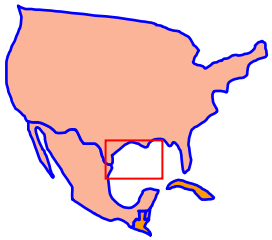
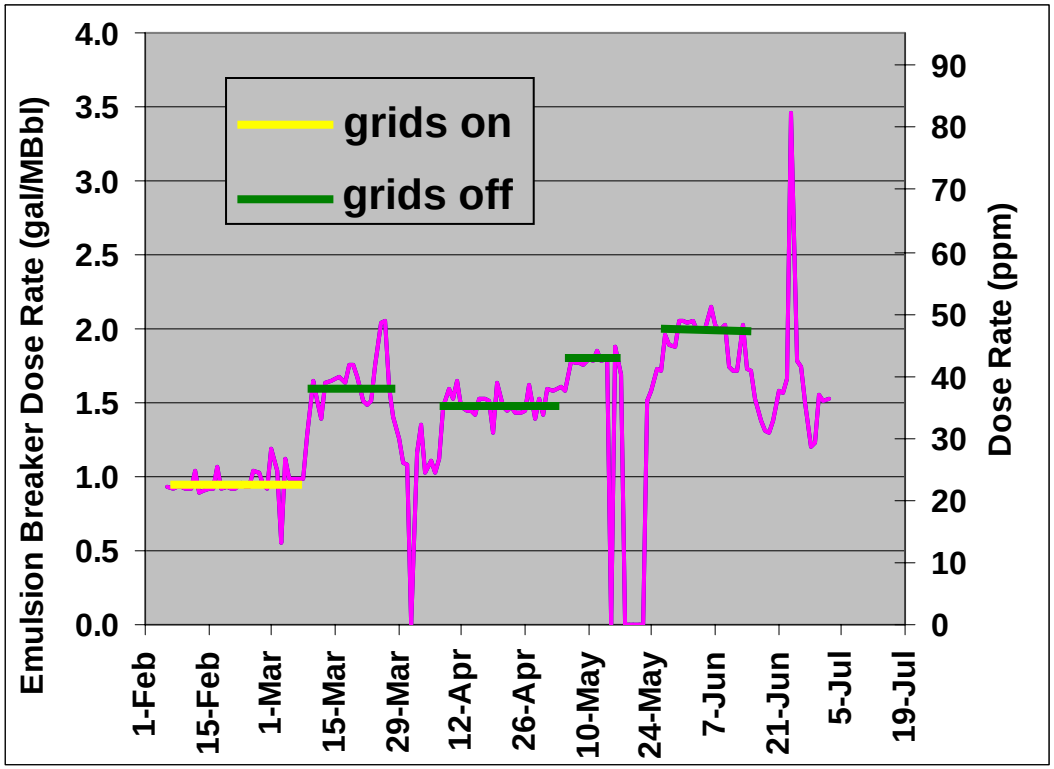




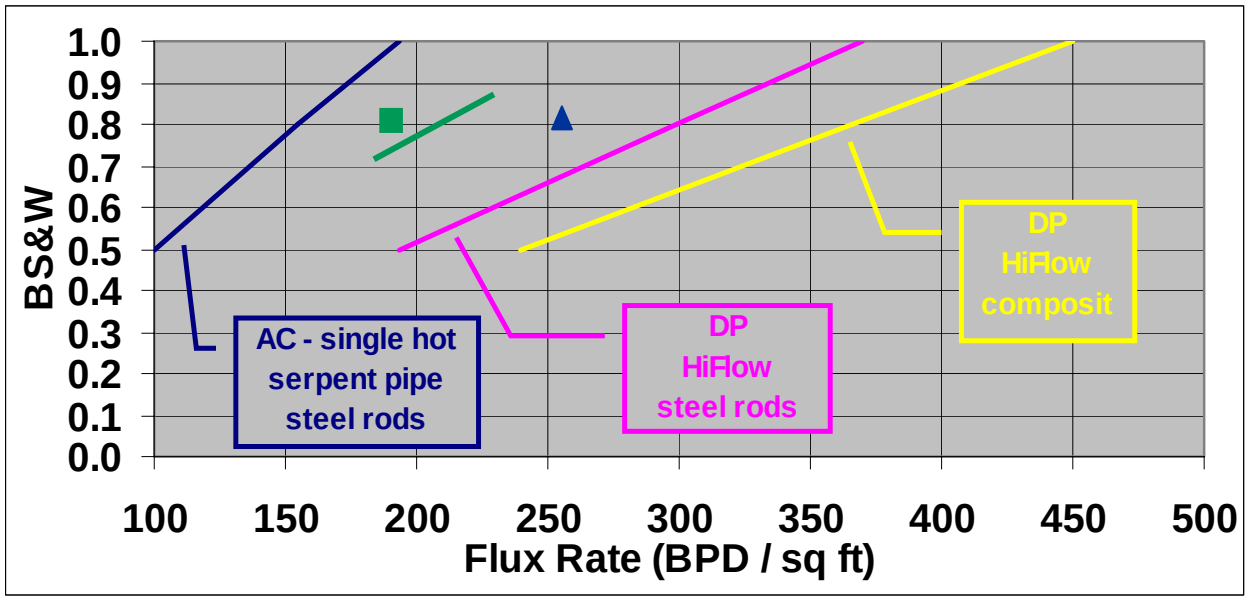
Platform	Oil (BOPD)	Water (BWPD)
Bullwinkle	64,000	24,000
Auger	56,000	30,000
Mars	155,000	20,000
Ram-Powell	80,000	20,000
Ursa	96,000	23,000
Brutus	40,000	8,000

Ursa BOT w/ & w/o Grids Operating

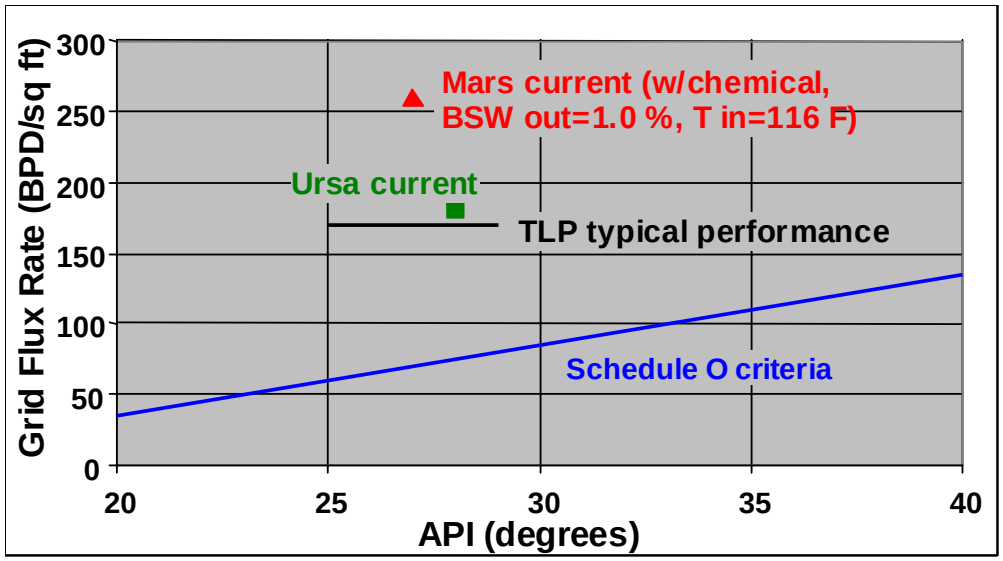


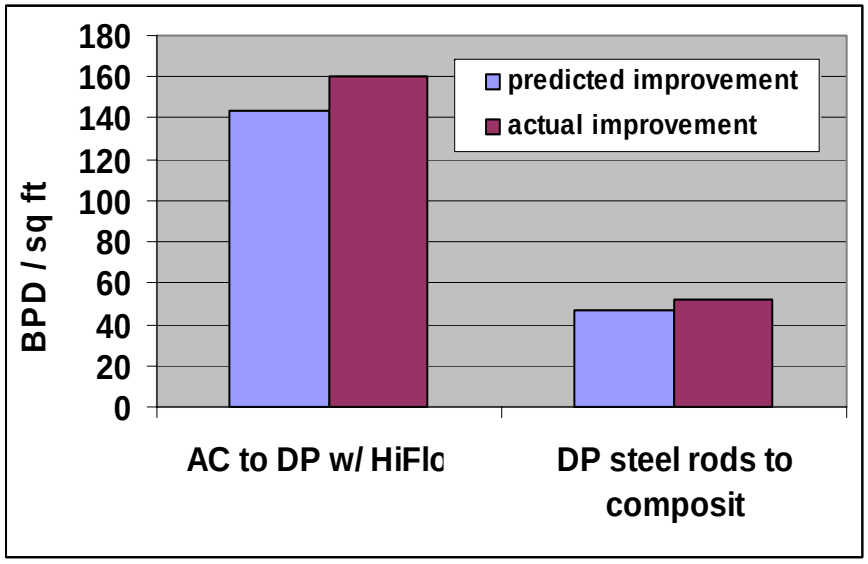
AC grids vs Emulsion Breaker:
EB w/ grids off: additional 0.5 to 1.0 gal / MBbl
➔ 300,000 to 500,000 $ / year

BOT NATCo Designs:



- Mars performance is much better than models. Factors to consider:
  - CEF,
  - EB rate,
  - breaking recycles,
  - pad draining,
  - operating conditions, etc..





Low Shear Pumps:

- Recessed impellor is not low shear – need to follow Low Shear Design Guidelines.

- For critical low shear service, Twin Screw has been proven to work, but requires expert involvement in FAT, and requires careful operation.

- Is it really necessary to use a low shear pump?
  Perhaps a traditional (or true low shear) centrifugal pump with an LIC to VFD (eliminate the LCV) would work just as well.

Shell & Shell NOV (BP/Shell JV) Centrifuge Experience:

Disc-Stack Centrifuges:

- Well tested in laboratory and pilot field settings
- Recommended in Deoiling Manual (1993)
- Strong need – small drops / methanol
- Virtually no technical support to locations

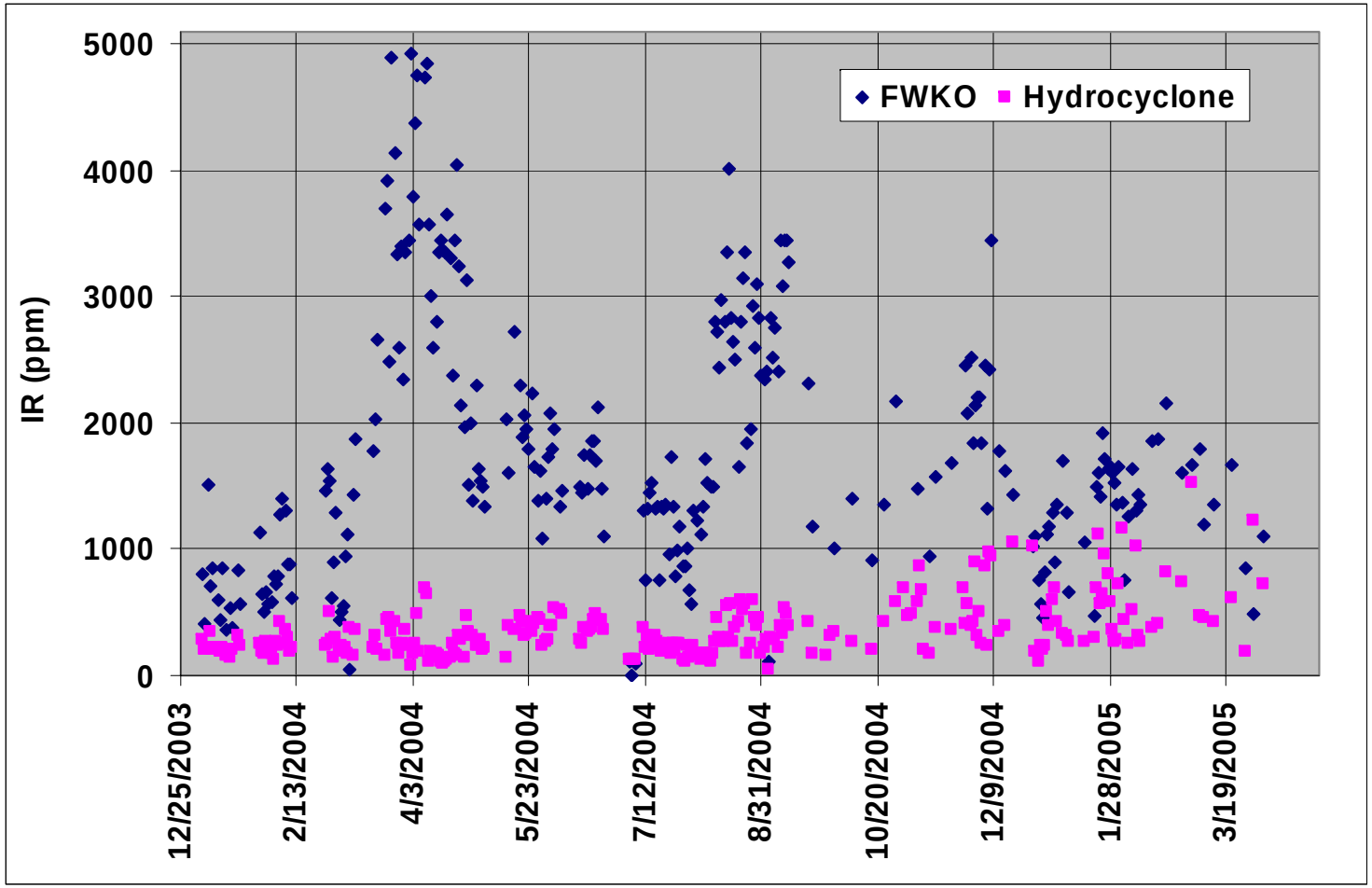
Larger units (higher forces) fail

Smaller units work okay but require maintenance / TLC

Shell Experience: 

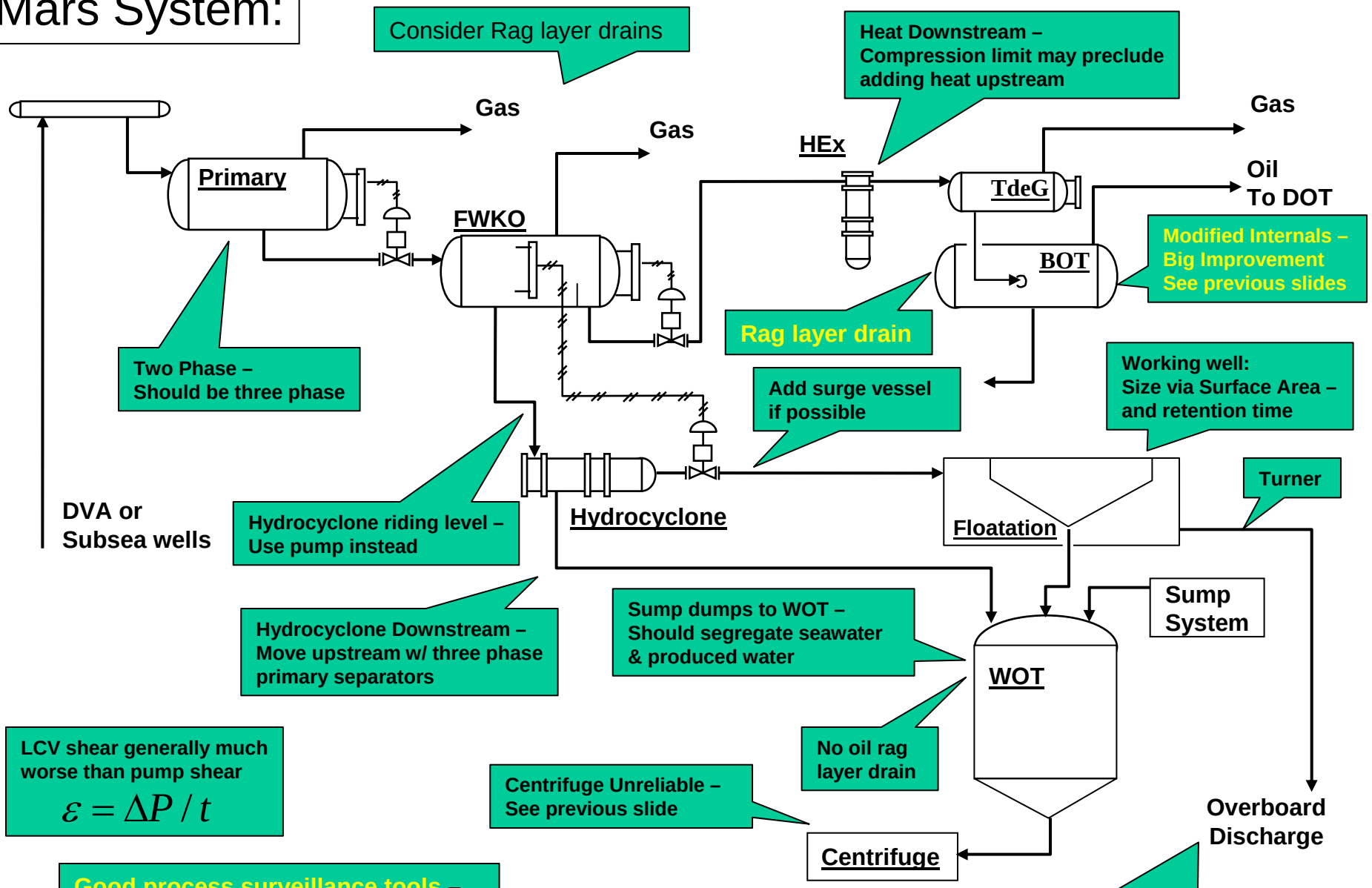
Location	Water Treating Success	Reliability Success	Status
MP-252	Good	Difficult to maintain	Working
Auger	Not Tested	Failed	Removed
Mars	Good	Failed	Removed
NaKika	??	Failed	Removed
Holstein	??	Failed	Removed

Historical Auger HC Performance (IR readings):

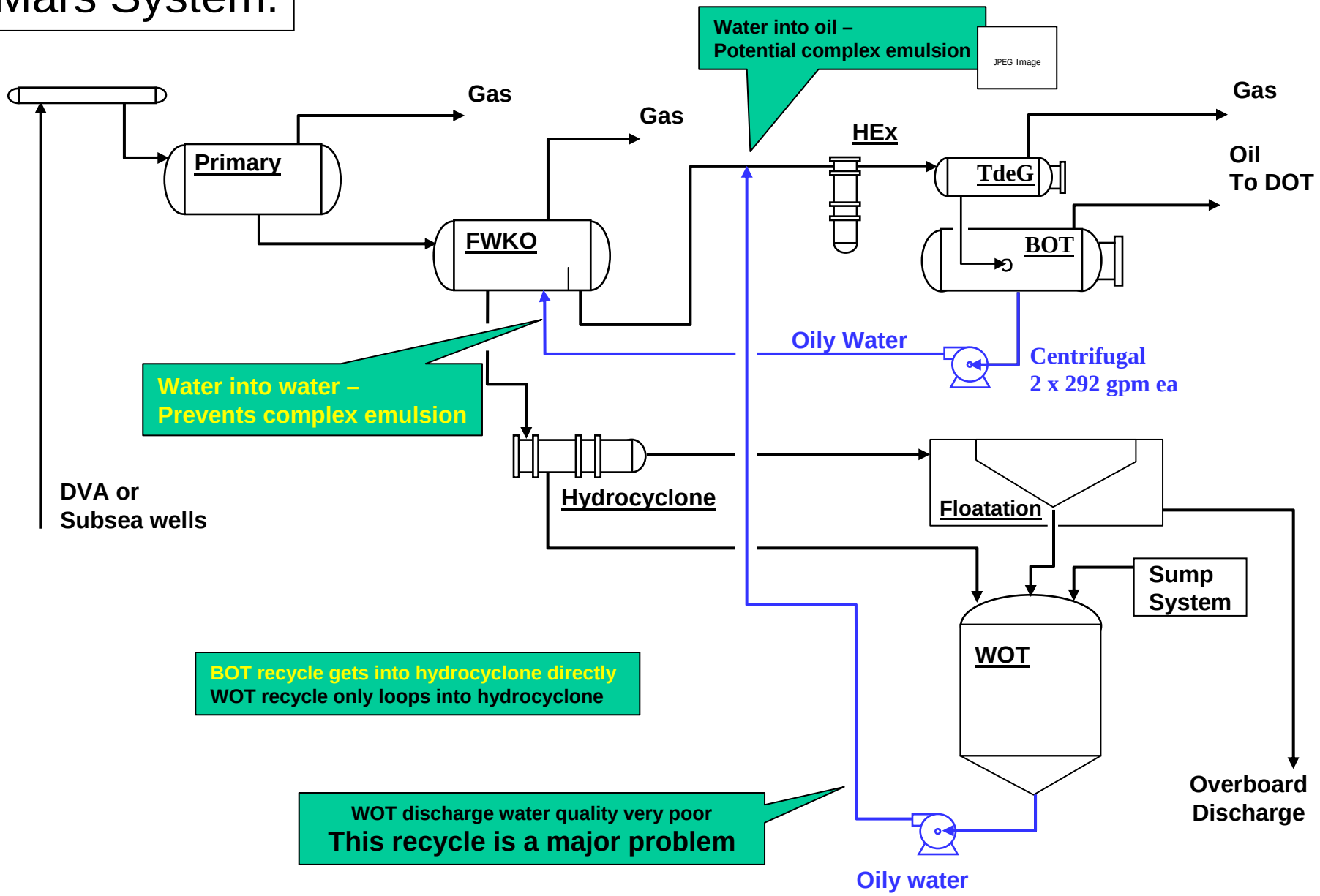


Gradual deterioration in frequency of backflush and in pressure and liner adjustments

Mars System:


Consider Rag layer drains
Heat Downstream – Compression limit may preclude adding heat upstream
Gas
Gas
Gas
HEx
Primary
FWKO
TdeG
Oil To DOT
BOT
Modified Internals – Big Improvement See previous slides
Rag layer drain
Two Phase – Should be three phase
Add surge vessel if possible
Working well: Size via Surface Area – and retention time
Turner
DVA or Subsea wells
Hydrocyclone riding level – Use pump instead
Hydrocyclone
Floatation
Hydrocyclone Downstream – Move upstream w/ three phase primary separators
Sump dumps to WOT – Should segregate seawater & produced water
Sump System
WOT
No oil rag layer drain
LCV shear generally much worse than pump shear
$\varepsilon = \Delta P / t$
Centrifuge Unreliable – See previous slide
Overboard Discharge
Centrifuge
Good process surveillance tools – But limited tools to monitor O/ W
Use CRA or internal coatings to allow chemical flexibility – e.g. acid treatments
Submerge the pipe, break the vacuum w/ N2 or gas, avoid separation

Mars System:


Water into oil –
Potential complex emulsion
JPEG Image
Gas
Gas
Gas
HEx
Primary
FWKO
TdeG
BOT
Oil
To DOT
Oily Water
Centrifugal
2 x 292 gpm ea
Water into water –
Prevents complex emulsion
DVA or
Subsea wells
Hydrocyclone
Floatation
Sump
System
WOT
BOT recycle gets into hydrocyclone directly
WOT recycle only loops into hydrocyclone
Overboard
Discharge
WOT discharge water quality very poor
This recycle is a major problem
Oily water

Summary of Opportunities:

Deoiling Manual and Best Practices are outstanding:

- but should be updated (1993, 1997)
- too specialized for project design personnel,
  short guidelines / recommendations are needed

Need specific Guidelines on:

- Slops handling (proper design for slops handling)
- How to minimize recycles from reject streams
- Prevent sheens due to slugging / surges

Need new equipment to handle methanol / solids / small drop size:

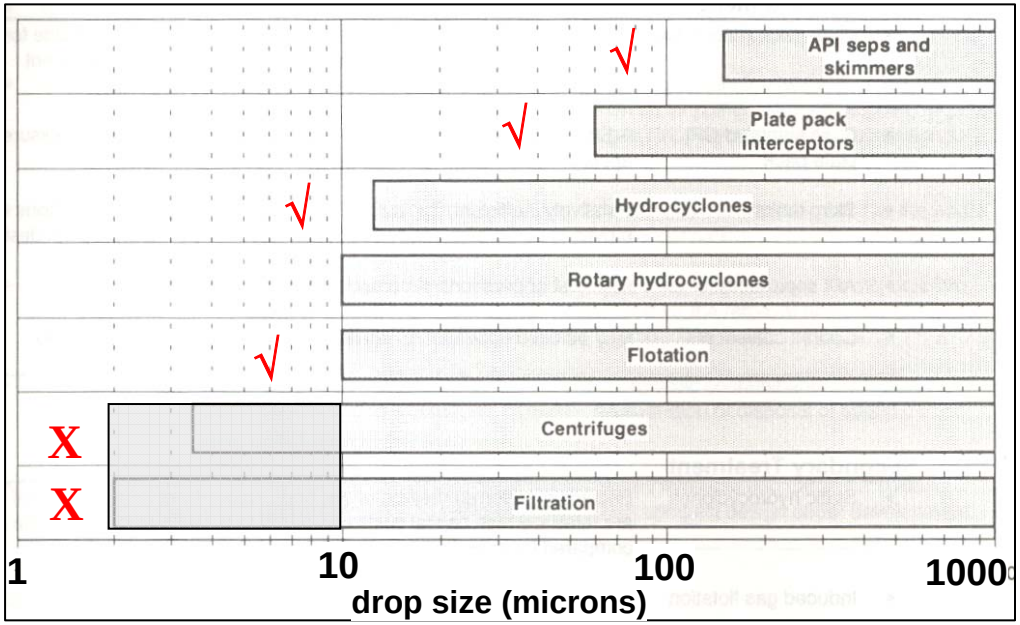
- Large disc-stack centrifuges worked – but reliability problems
- Need compact equipment for brown fields
- Need alternative to current filtration options:
  Crudesorb, activated carbon – Cetco HIFlow is promising

Need better corrosion resistance:

- To handle acid treatments
- Consider coatings (TK-69)

Need better Planning for Water Handling

- Field development plans
- PtL
- Reserve payload for EOL water



Walsh, GoM Water Handling Experience