Artificial Lift R&D Council

Innovative Packerless Gas Separator Design in ESP to Rod Pump Conversion

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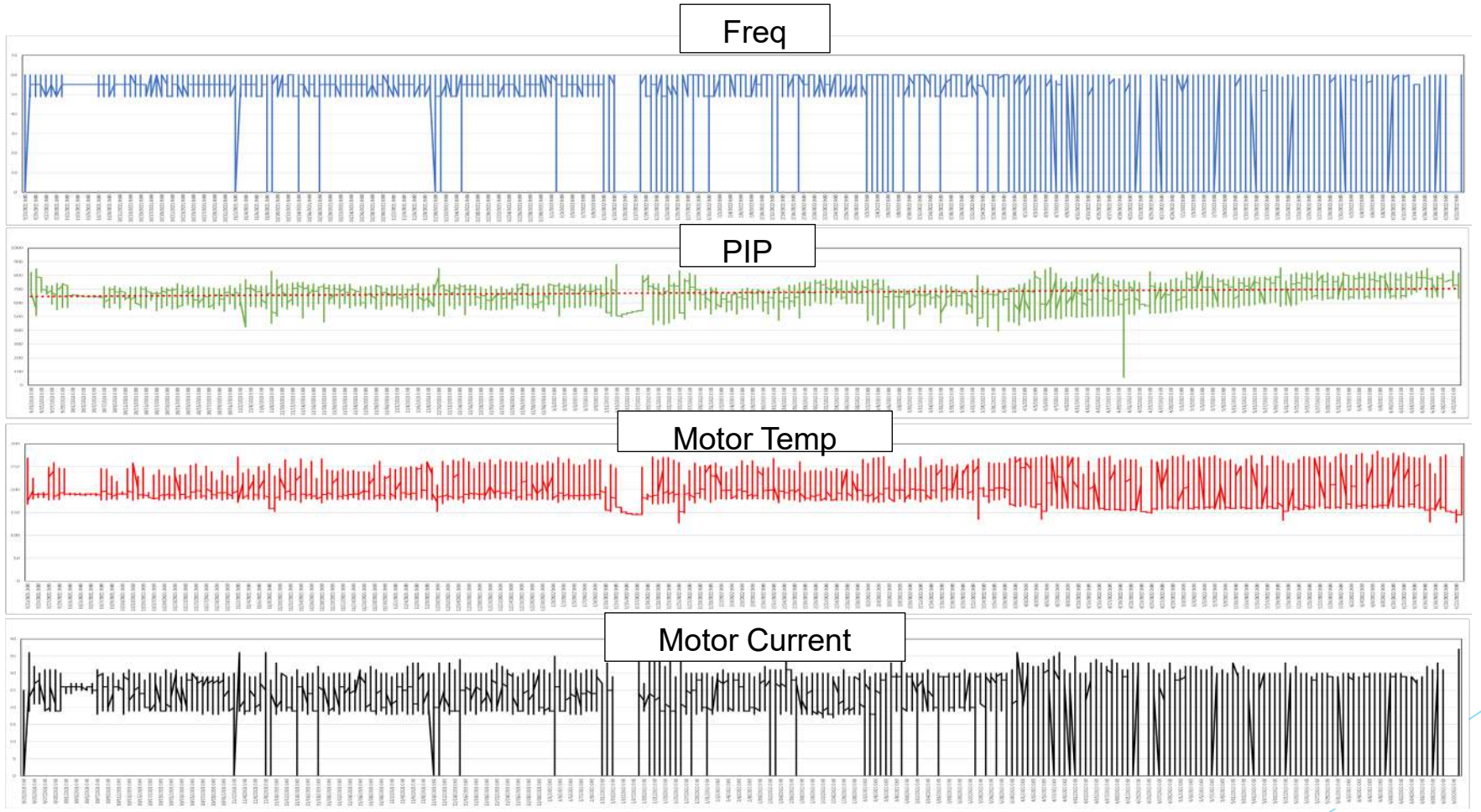
2023 International Sucker Rod Pumping Workshop
Aug 28-31, 2023. Midland TX

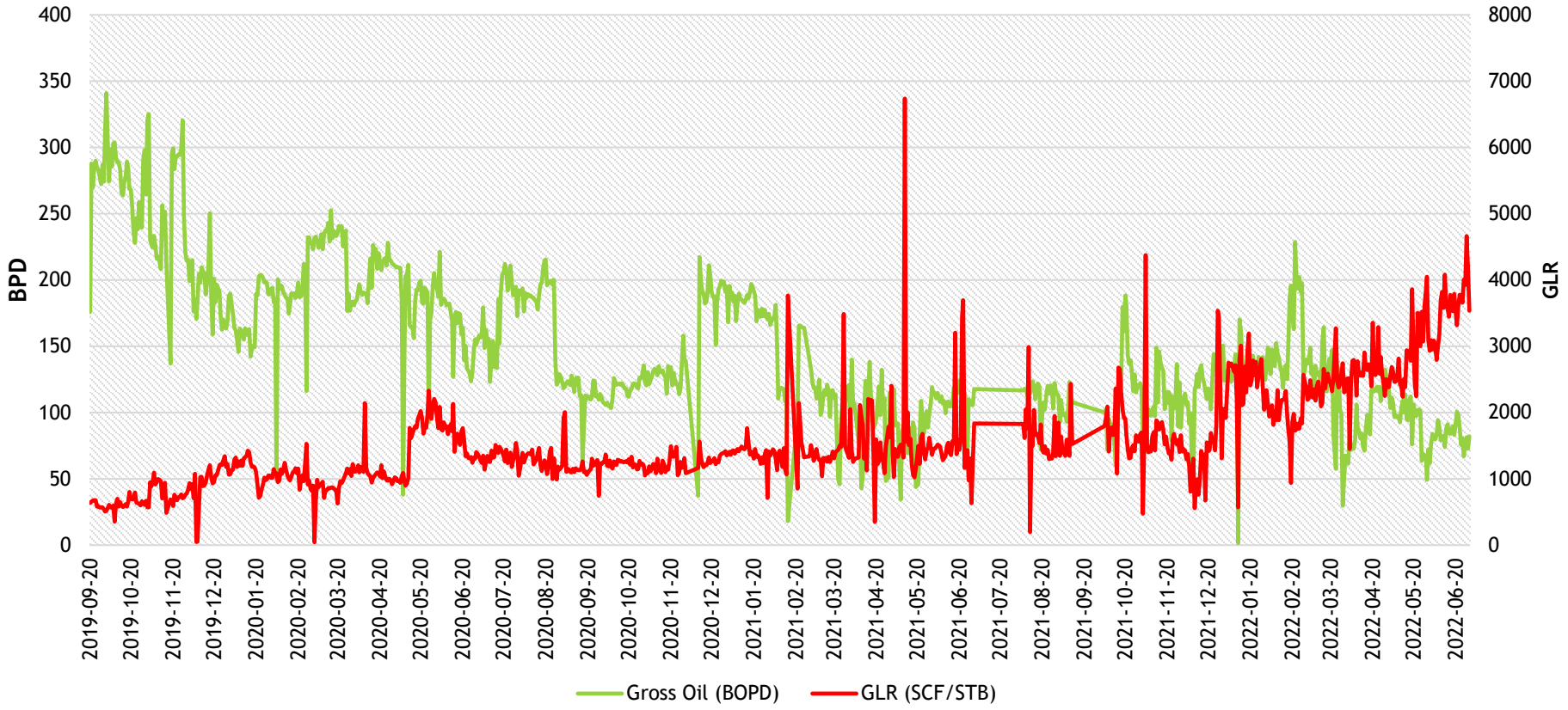
AGENDA

- Gas Challenges on ESP & Problem Description
- Rod Lift Conversion Problems
- Rod Lift Conversion Problem Causes
- G-FORCE PACKERLESS
- Case Studies

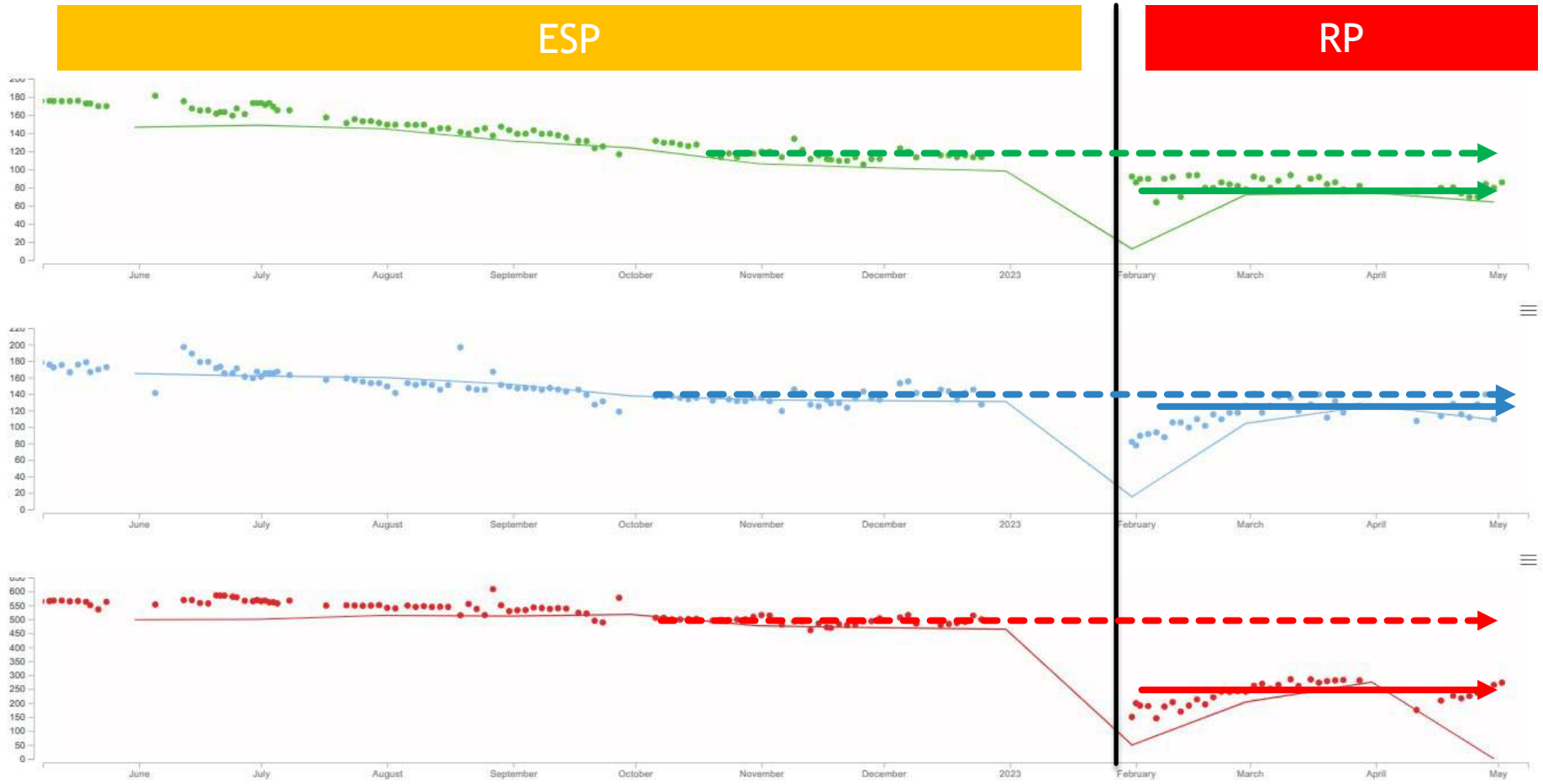
Gas Challenges on ESP & Problem Description



Gas Challenges on ESP & Problem Description



Rod Lift Conversion Problems



Rod Lift Conversion Problem Causes

- Gas Interference → Low Pump Volumetric Efficiency
- Low Productivity → Decrease in oil production by 50 barrels or more
- Small Casing Sizes → Limited Gas Separation Efficiency
- Narrow venting area for gas separation
- Pump and rod string design

G-FORCE PACKERLESS SEPARATION MECHANISM

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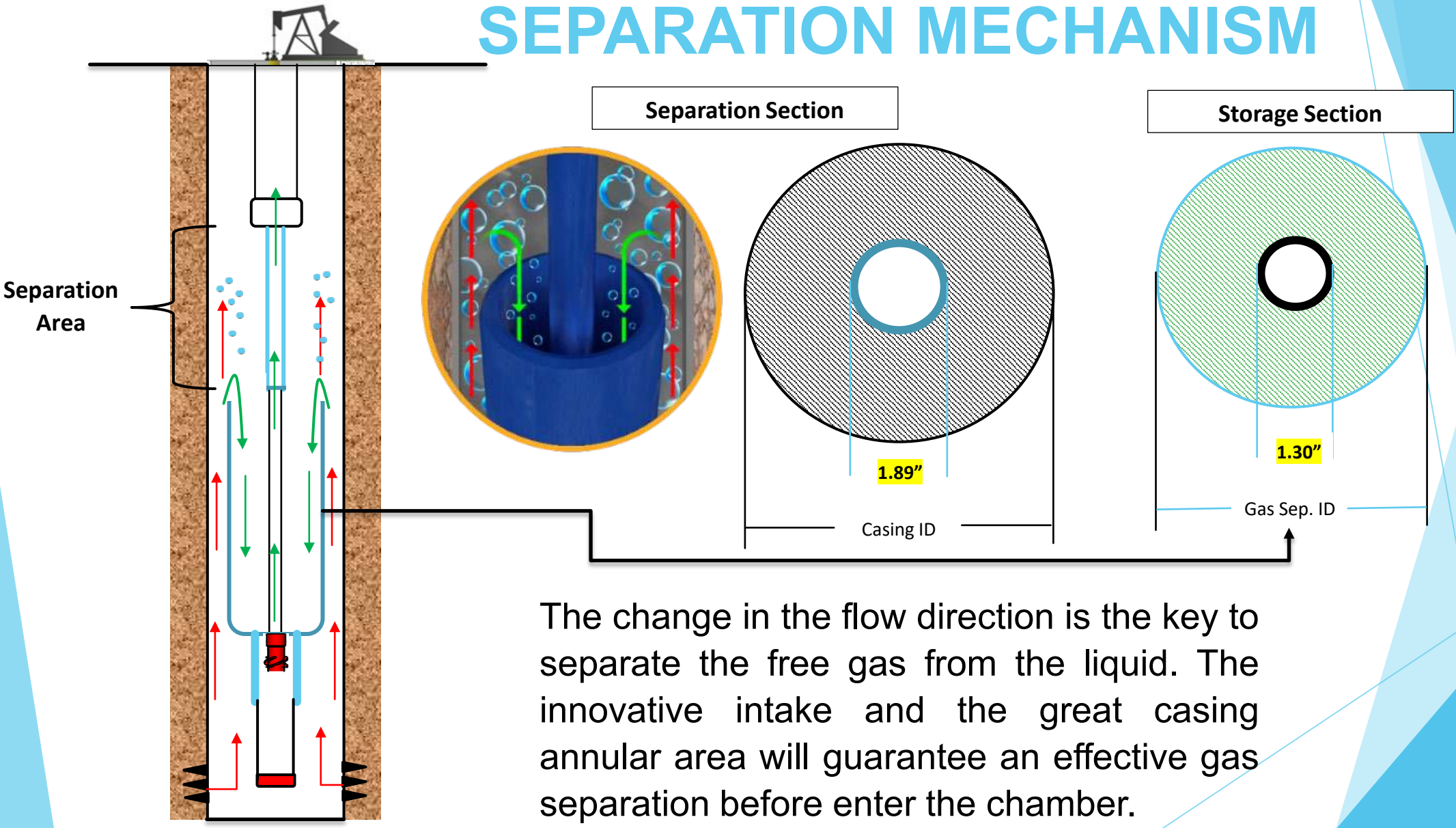

The change in the flow direction is the key to separate the free gas from the liquid. The innovative intake and the great casing annular area will guarantee an effective gas separation before enter the chamber.

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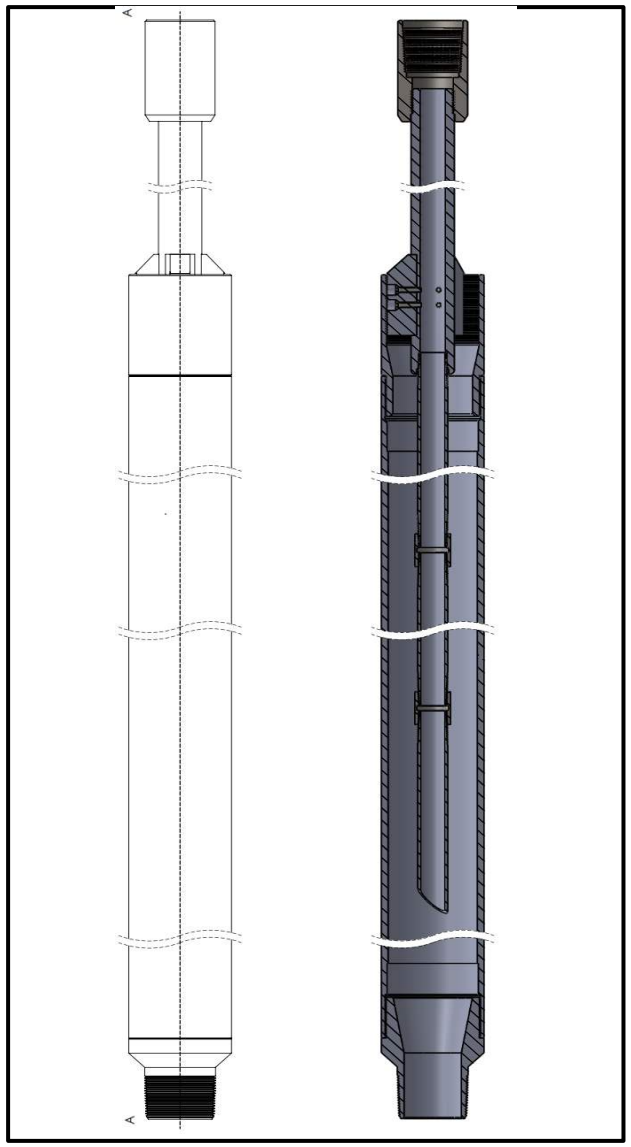
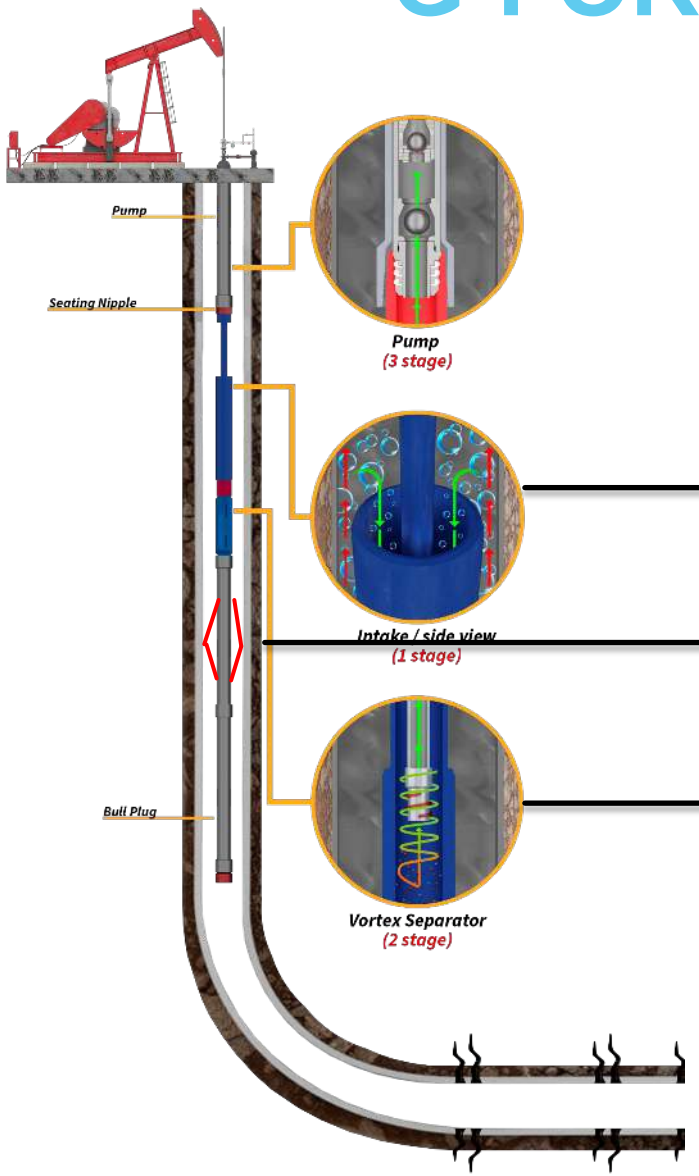


SPECIFICATIONS

Specifications	
Neck Tensile Strength (psi)	75,000
Dip Tube OD/ID (in)	1.315/1.000
Length Available (ft)	24 48 72
Housing Collapse Minimum	11,950 psi
Housing Hydrostatic Pressure	10,000 psi
Housing Yield Strength	85,000 MIN / 95,000 MAX
Housing Tensile Strength	95,000 psi
Yield Strength (Inner Threads)	120,000 psi minimum
Housing Burst Pressure	10,480 psi

G-FORCE PACKERLESS



Low or high Inclination installs

TAC Below the Gas Separator

Easily Combined with a Desander

AUGMENTED REALITY

G-FORCE PACKERLESS

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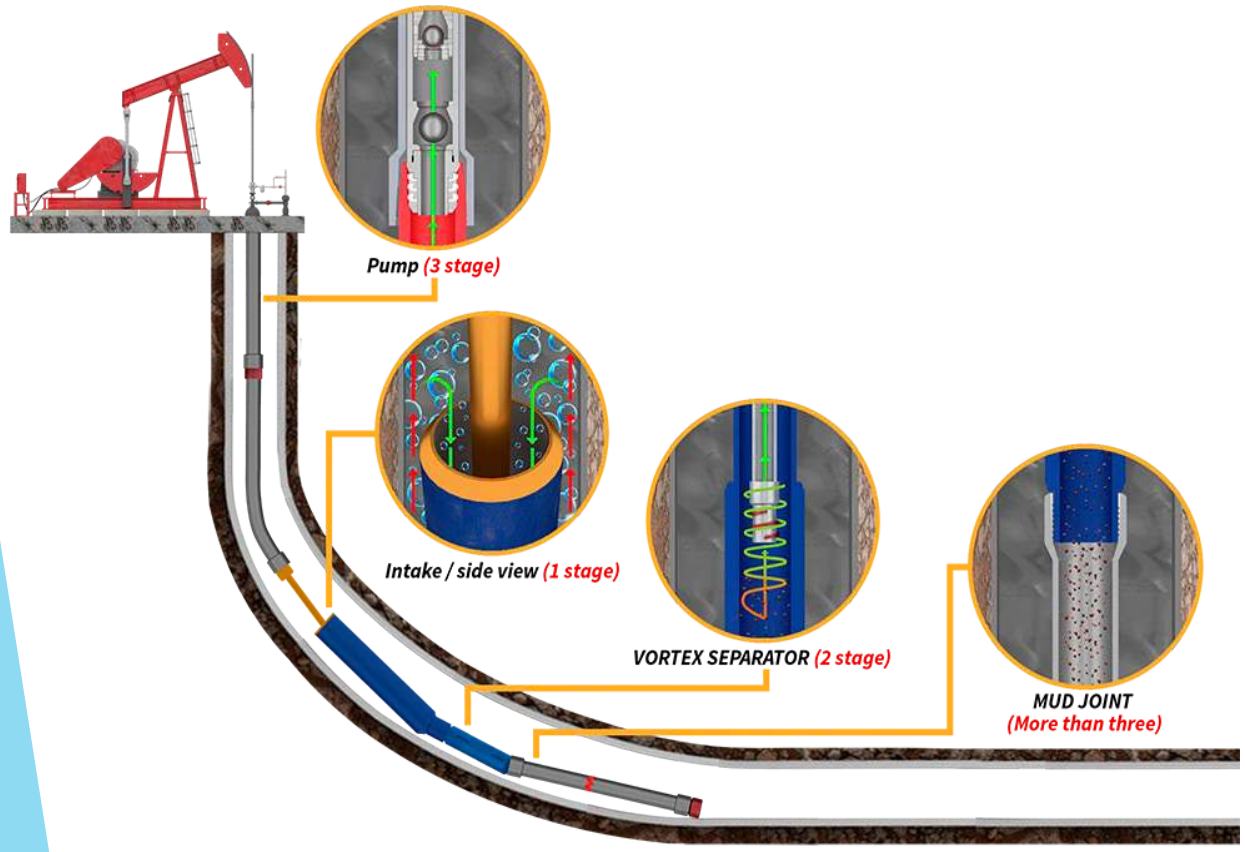
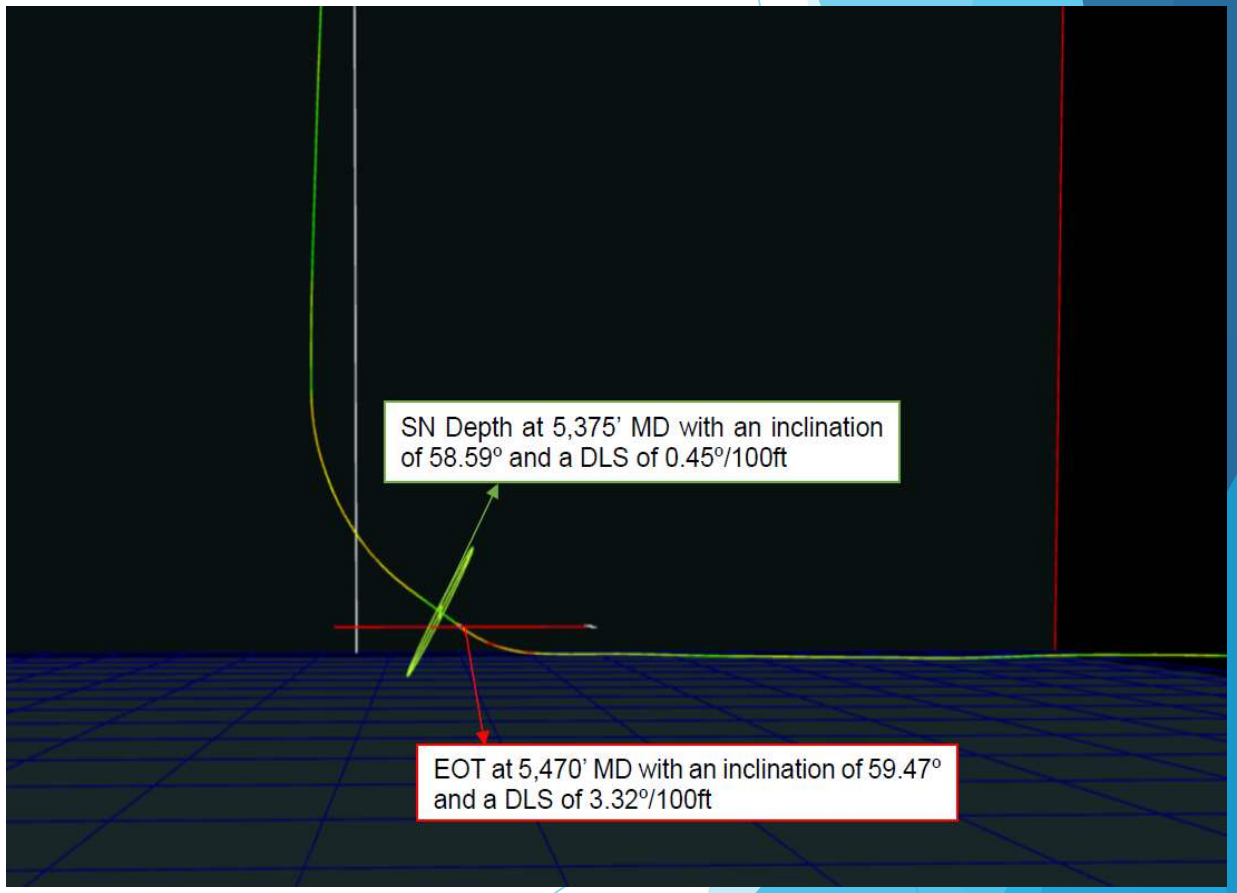
Design





CASE STUDY 1 - Midland Basin

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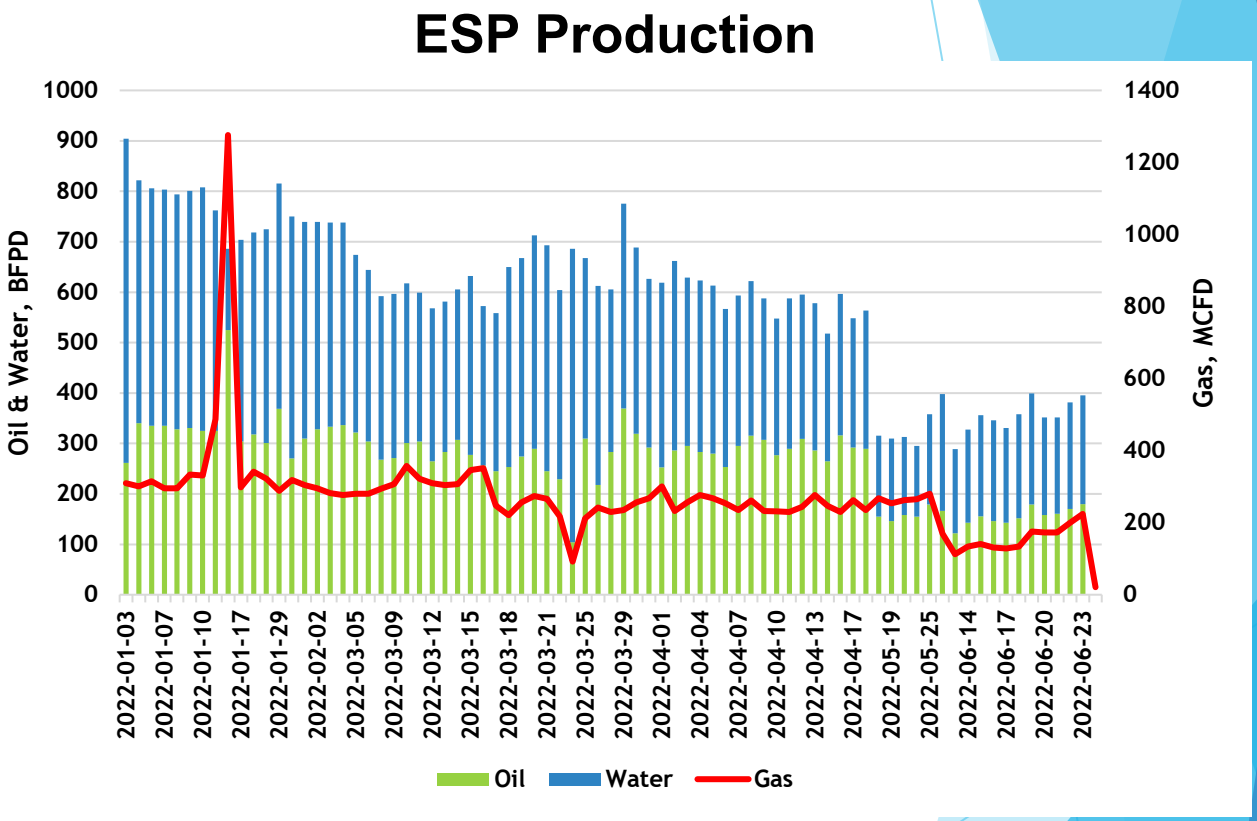
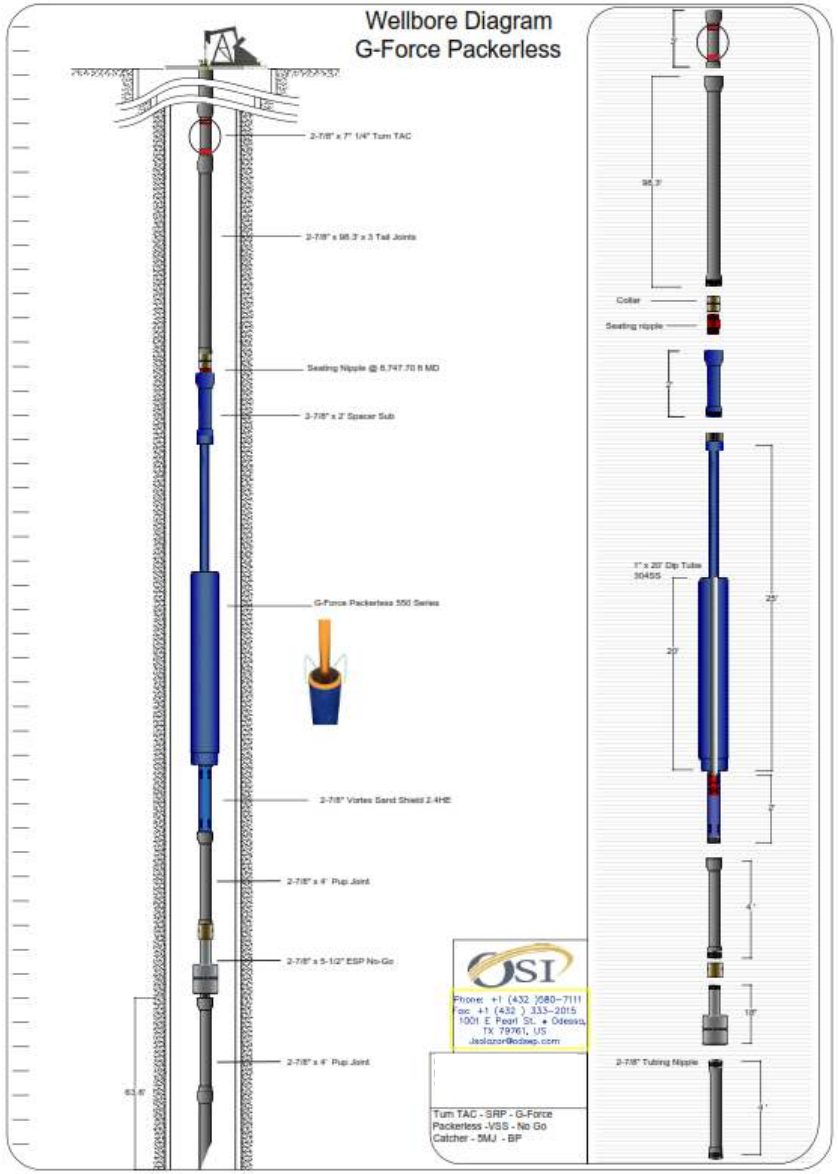
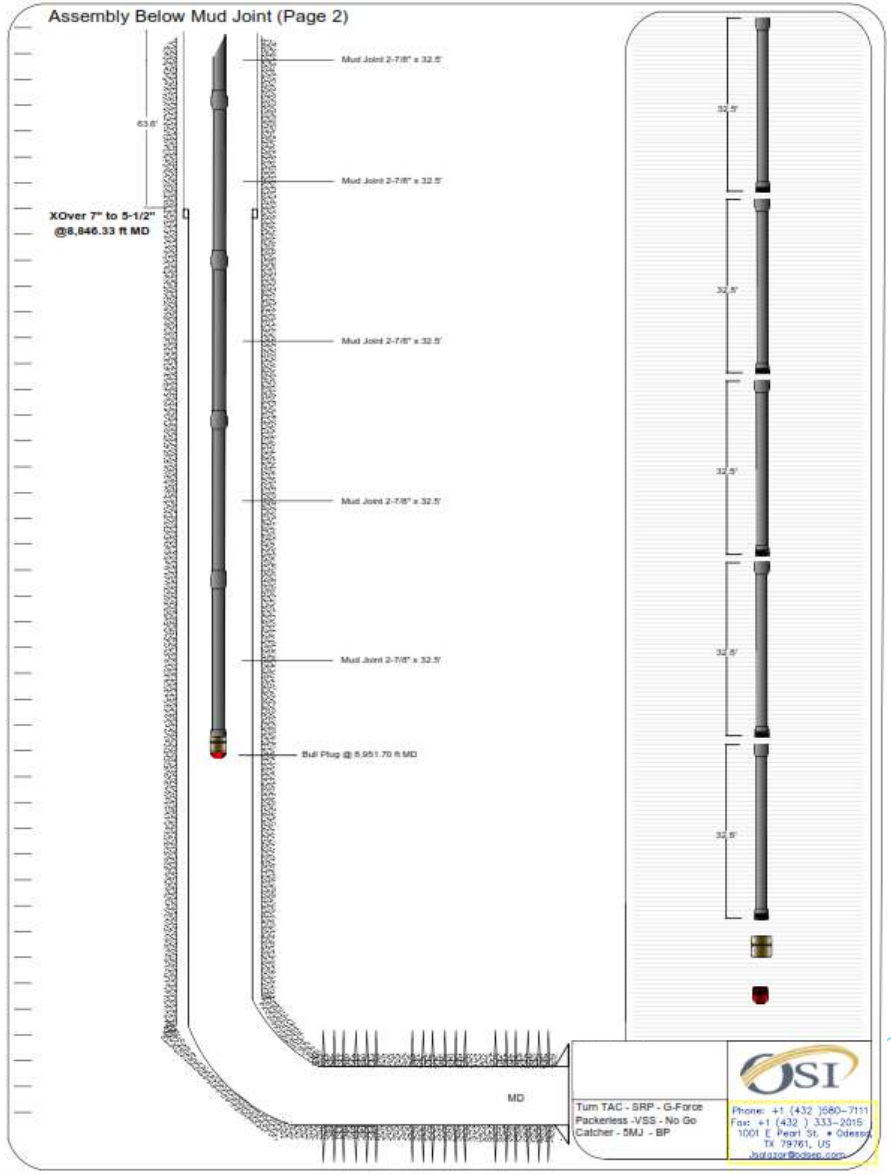
WELL CONDITIONS		
CASING 32#	7	IN
CASING ID	6.094	IN
DRIFT CASING	5.969	IN
LINER #20	5-1/2	IN
TUBING	2-7/8	IN
FLUID PRODUCTION	399.5	BFPD
WATER CUT	55.22	%
OIL FLOW	178.88	BFPD
WATER FLOW	220.62	BFPD
GAS FLOW	175.9	MCFD
GOR	983.34	SCF/STB
GLR	440.3	SCF/STB
PUMP DEPTH	8,747.70	MD FT



CASE STUDY 1 - Midland Basin





CASE STUDY 1 - Midland Basin

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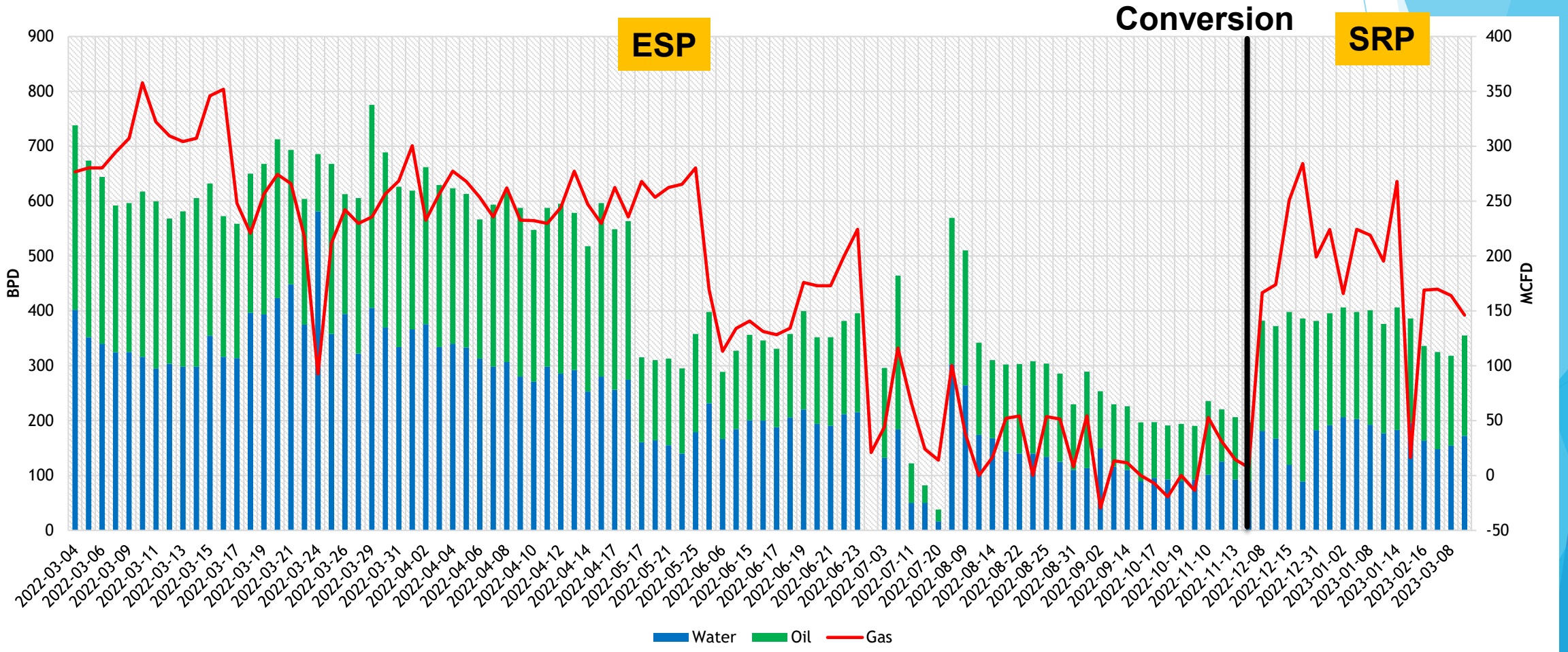
Results

Separatation Effeciency, ηn	78.91	%
Quiet Zone Volume	18.45	gal
Effective Strokes	9.23	
Retention Time	1.58	min



CASE STUDY 1 - Midland Basin

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Results

Rod pump volumetric efficiency

CASE STUDY 2 - Howard County

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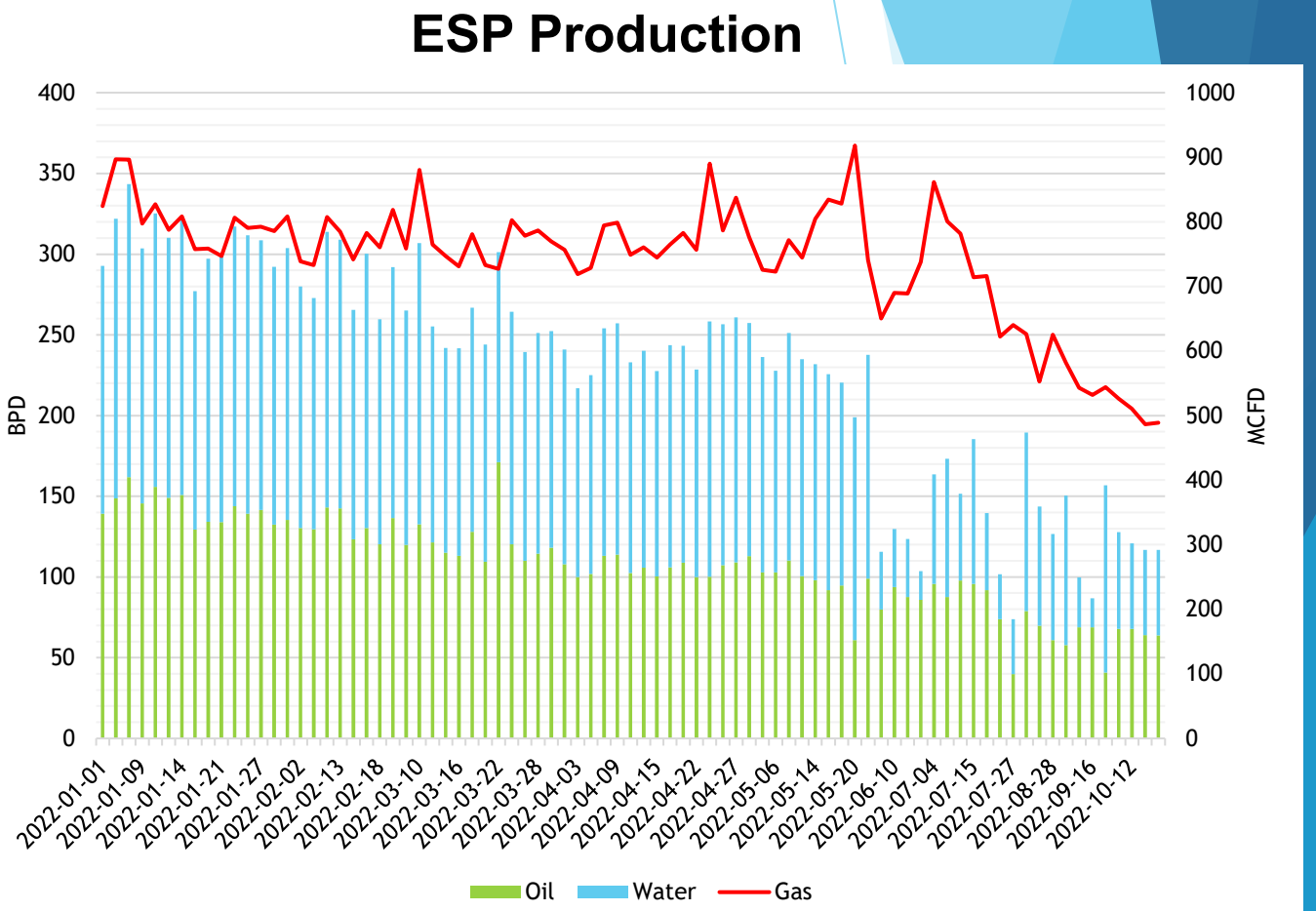
WELL CONDITIONS		
CASING 32#	7	IN
CASING ID	6.094	IN
DRIFT CASING	5.969	IN
TOL (7,078')	5-1/2	IN
TUBING	2-7/8	IN
MAX FLUID PRODUCTION	189.47	BFPD
WATER CUT	58.42	%
OIL FLOW	78.78	BFPD
WATER FLOW	110.69	BFPD
GAS FLOW	626.26	MCFD
GOR	7,949.5	SCF/STB
GLR	3,305.3	SCF/STB
PUMP DEPTH	6,801.50	MD FT



CASE STUDY 2 - Howard County

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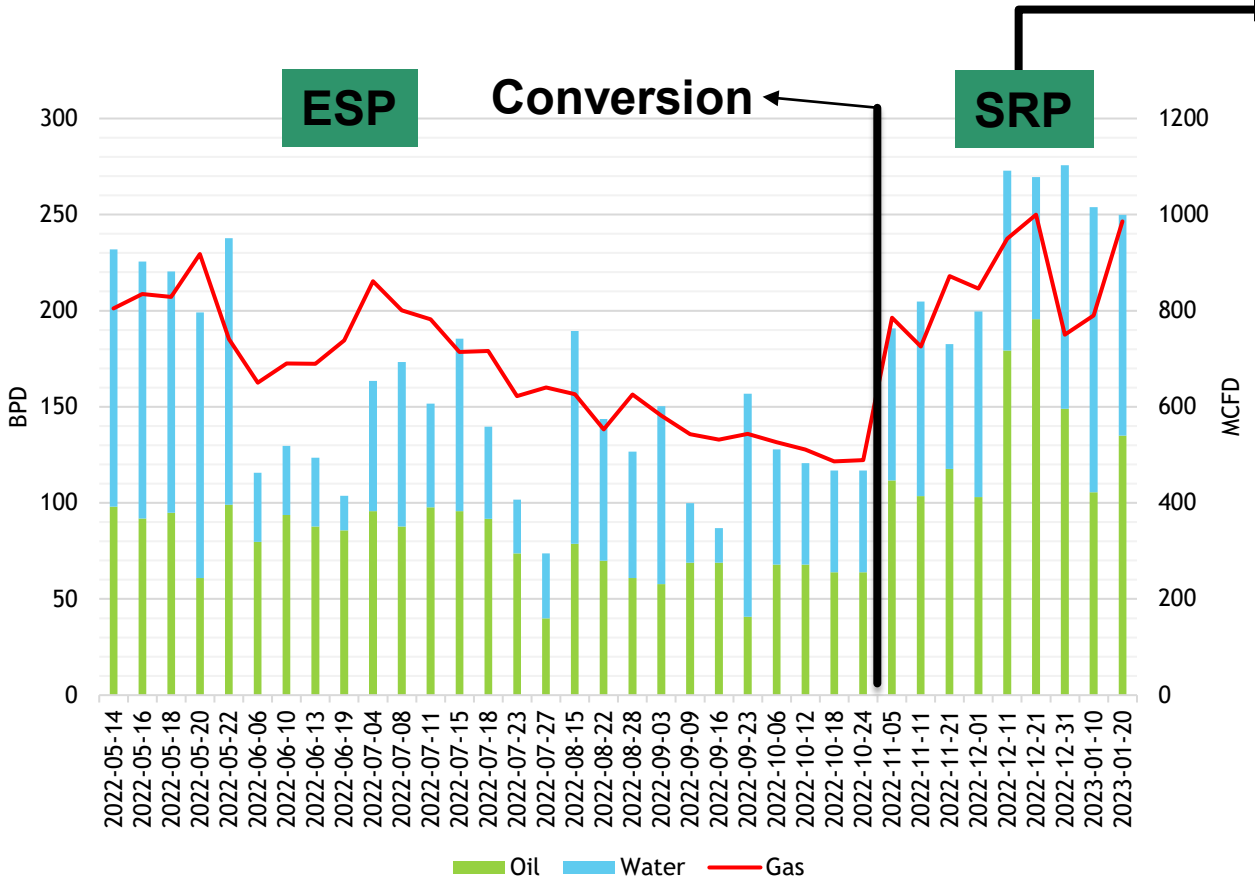
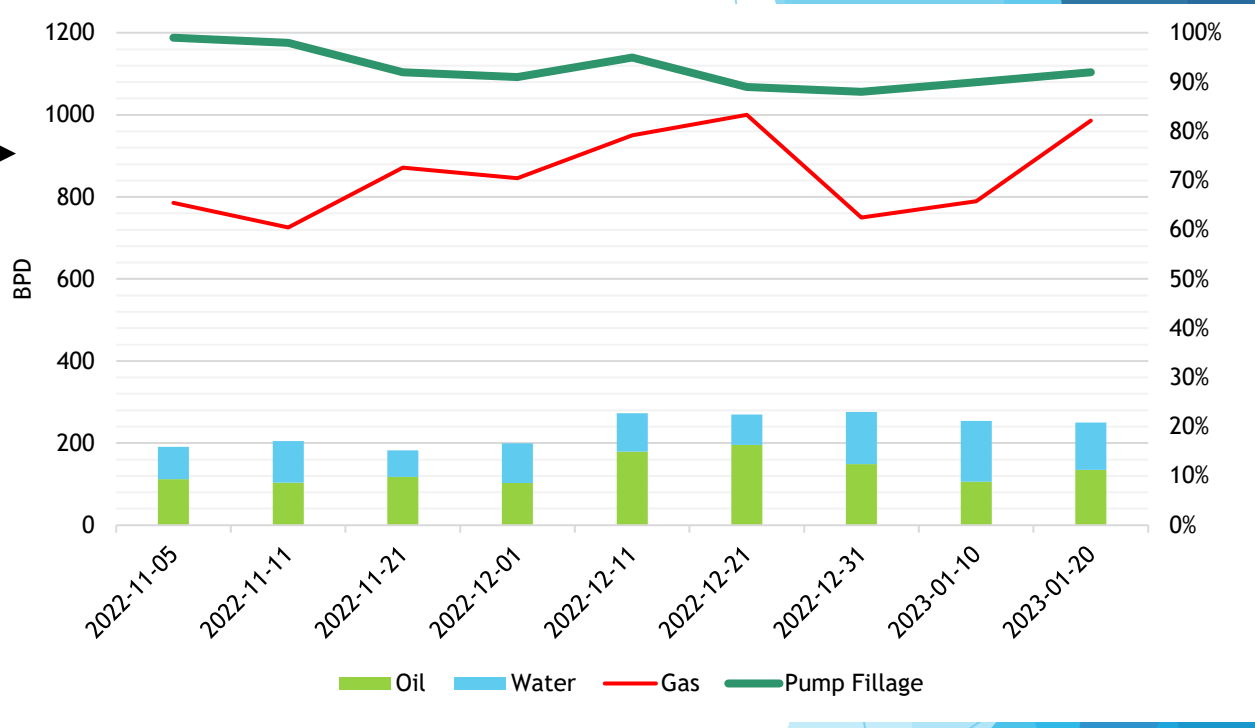
Results





CASE STUDY 3 - GL to RL conversion

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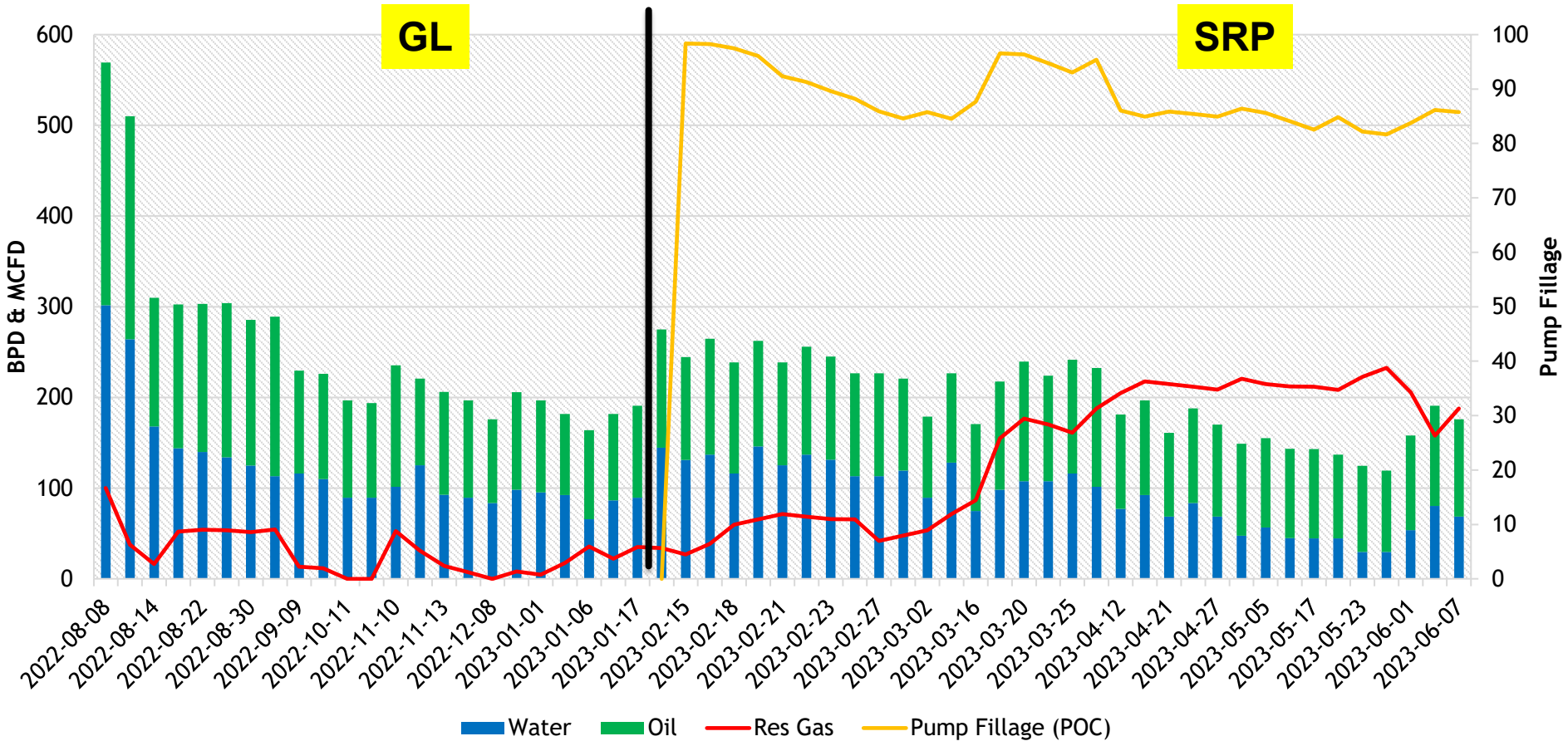
Results



Thanks to OSI and the operator companies for sharing the information presented in this paper.

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