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MENAPS 2022

MIDDLE EAST AND NORTH AFRICA PERFORATING SYMPOSIUM

Unlocking Oil Reserves from Inaccessible Platforms Utilizing DSL

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Field Background

Number of platforms : 84.

Number of complex : 11.

Morgan filed is the eldest field in GUPCO and the largest oil reserve in the Gulf of Suez

Two **Main reservoirs in the field:** Kareem & Belayium

Field start date: 1967

Cum production: 1.7 Billion STB.

M2 PF construction date: 1968

Oil Opportunity

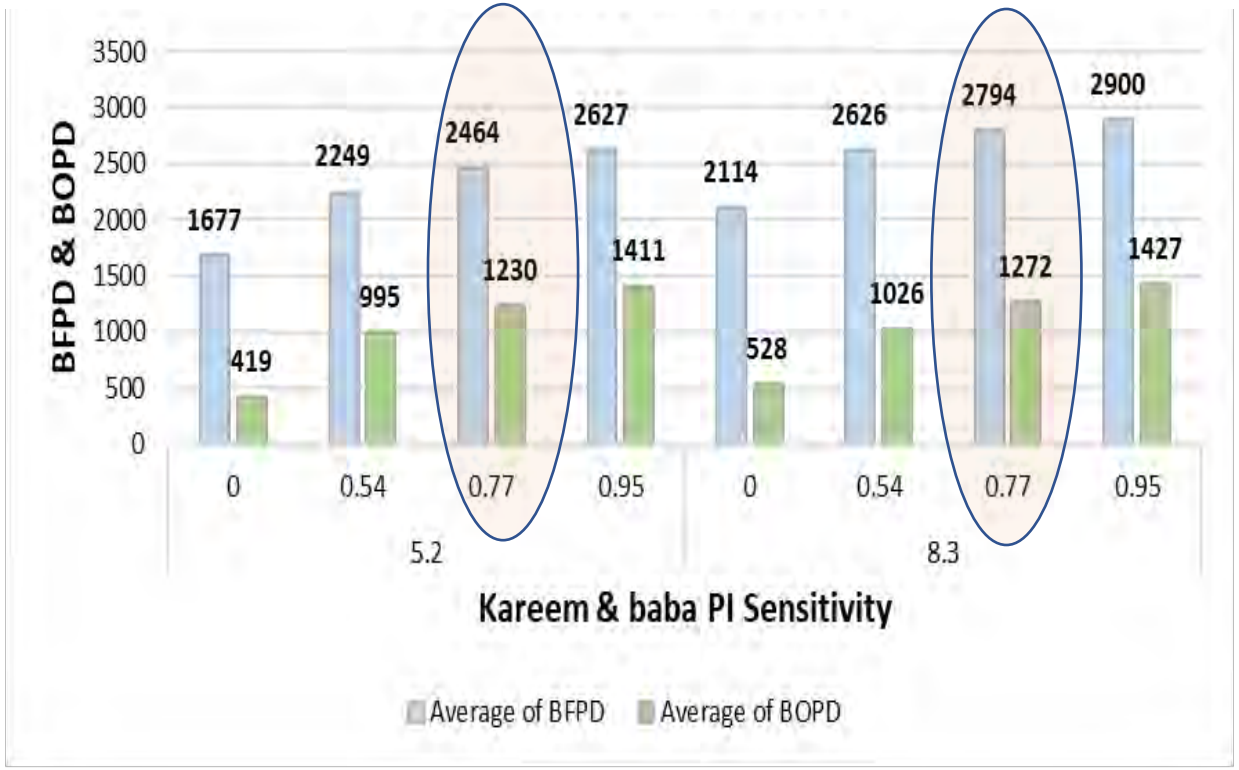
Well X

Last well test for the well : 1500 BFPD with 80% WC (300 BOPD).

Well status: produce with the assist of Gas lift.

Scope of work:

1. Perforate Baba where there is no current offset wells are producing from this formation
2. Re-perforate Kareem in order to restore its productivity



Well Y:

Well status: circulating gas (low production rate).

Same scope for well M2-2B

Expected gain: +/ 200 BOPD

Problem Definition

Location : Platform M2 , Offshore Gulf of Suez .

Objective : Perform Perforation Jobs on two wells

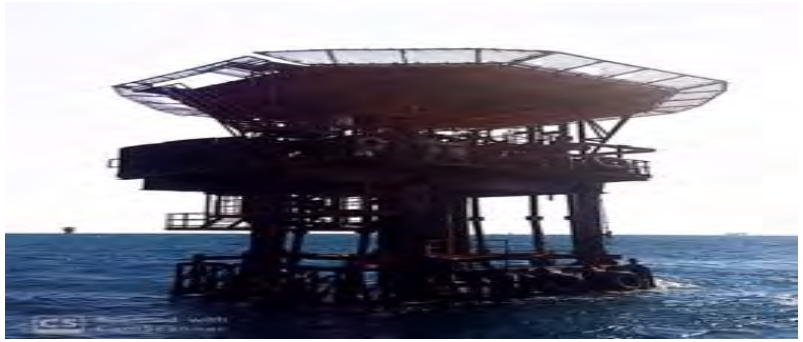
Expected Gain : Risked Value of 700 BOPD.

Problem : Platform is quite small and old , structure analysis showed maximum loading capacity of 8.5 Tons (including 3 tons of H2S emergency equipment) while E-Line Equipment 28-36 Tons.

Conventional Option : using Barge assist to Accommodate E-Line Equipment , The option was prohibitive for two reasons.

- Rental cost of the barge exceeds the 1 M$ for both jobs.
- Barge Approach requires to cut and retrieve part of an abandoned existing pipeline which is costly operation.
- Delayed Production during time of contracting barge and projects work to retrieve pipeline.

8.5 Ton Max. Capacity



Last SL operations on Platform

Assembly of E-line and DSL & value

E-Line

DSL

DSL Footprint & What is the Value

#	ITEM	GROSS WEIGHT (KG)	LENGTH (M)	WIDTH (M)	HIGHT(M)	FOOT Print (Kg /m2)
1	WIRELINE UNIT	8000	4.3	2.3	3.3	808.8978766
2	POWER PACK	3000	2.2	0.85	2.95	1604.278075
3	RIG UP BOX	2000	3.1	1.08	0.9	816.3265306
4	GENERATOR	2000	2.2	0.75	1.05	1212.121212
5	COMPRESSOR	1200	2.5	1.2	1.5	400
6	10 K PCE	4500	3.75	1.25	1.85	960
7	TEST PANEL	1000	1.5	0.85	2	784.3137255
8	TOOL BASKET	6800	7.3	1.2	0.9	776.2557078
9	SUPPLY BOX	1350	1.19	1.1	1.1	1031.32162
10	EXPLOSIVES BOX	1700	1.7	0.96	1.05	1041.666667
11	DIESEL TANK	550	1	0.75	1.7	733.3333333
12	MAST	4300	9	2.2	2.8	217.1717172
12	MAST RIG UP BOX	900	1.5	0.7	0.82	857.142857

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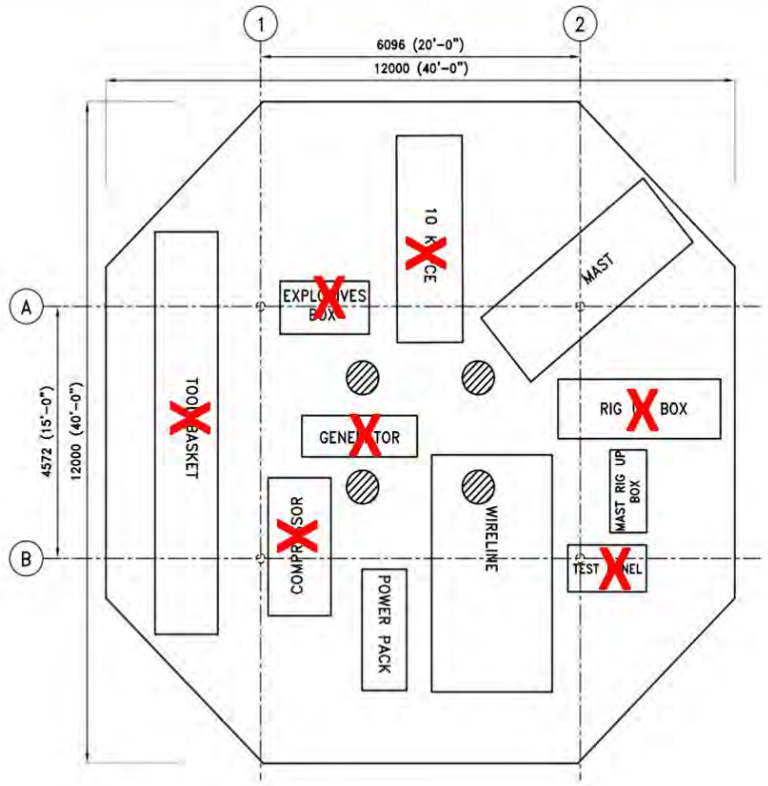


Equipment on PF : Unit 3.5 T , PP 2.1 T , Mast 1 T , BOP 0.65 T , tool 0.3 T , SCABA Box 0.5 T + 7 Persons = 8 Tons

DSL Footprint & What is the Value

Smaller Footprint
Can be rigged up on small platforms

Lighter Weight
Accessing Platforms with Limited Loading Capacity

Less Rigups
enhance logestics (can do both slickline & E-line Work)

Faster Rigup
60% quicker than Eline

Minimize Intervention Risk
No Braided line (eliminating bird nests)

Positive Depth Control
CCL, Inclination with a GR option

On Command Trigger
Explosive & Non-Explosive Trigger

Faster RIH & POOH
RIH & POOH @ 300 fpm

Jarring Capable
Detent/Spring & Spangs Jars

Assurance
Pressure, Temperature, Stress & Vibration

Easier pressure Control
No Grease injection required

DSL How it Works & What is the Value

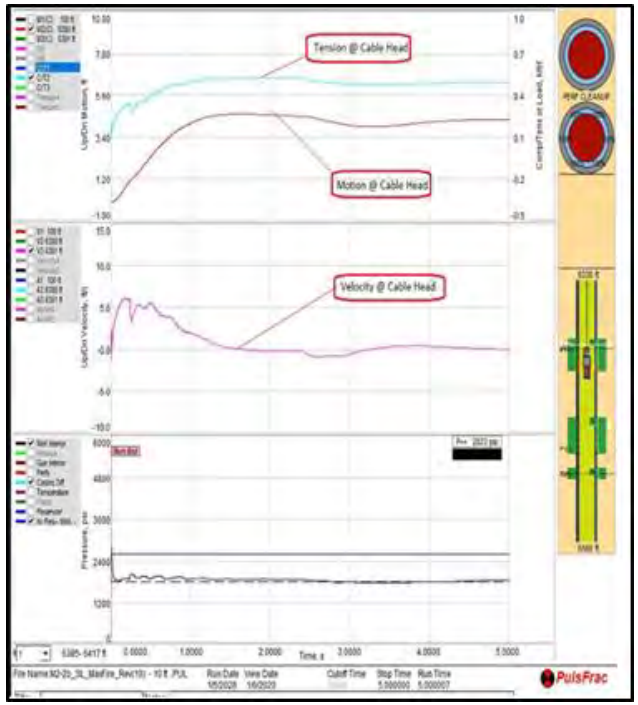
	Slickline	E-Line	Digital Slickline
Weight	8 – 10 tons	25 – 35 tons	8 – 18 tons
Foot Print	Small	Large	Small
Crew	3	5-6	3-4
Rig Up	Easy / Quick < 1 day	1 – 2 Days	Easy / Quick < 1 day
PCE	Simple / stuffing box and slickline BOP	Complicated / Grease Injection / Quad BOP	Simple / stuffing box and slickline BOP
RIH Speed	Up to 300 Ft/ min	Limited with cable compression	Up to 300 Ft/Min
Drift Run	Yes	Yes	Yes
Pulling / Setting Valves	Yes	No	Yes
Fishing	Yes	No	Yes
Scale removal	Yes	No	Yes
Flowing Survey	Yes	Yes	Yes
Depth Correlation	Memory	Real Time	Real Time
Production Logging	Memory	Real Time	Real Time
Multi Finger caliper	Memory	Real Time	Real Time
Cement Bond Log	No	Real Time	Real Time
Noise Logging	Memory	Real Time	Real Time
Perforation	Memory	On command	On command
Punch	Mechanical	Explosive / Chemical	Mechanical/Explosive
Plugs	Memory/Low Expansion	On command /High Expansion	On command / High Expansion
Cement Bailer	Mechanical	On command	On command
Feed Through Jars	Memory	No	Yes

Challenges and solutions

Challenge :

Two wells have oil potential that requires add perforation but due to structure capacity of Platforms the conventional E-Line Equipment (~28 Tons) Couldn't be used.

The historical way accessing platforms with structure limits is to do the operations with barge or rig assistance depending on water depth which increase the cost of operations dramatically which in some cases can’t be managed with the inherent subsurface uncertainties.



Improvement :

- Alternative solution was proposed to use Real time slickline perforation (Relay TM) for first time in Egypt.
- The technology uses battery downhole to power on the tools and uses antenna to transmit and receive “electromagnetic signals” and communicate with the tools downhole.
- Equipment weight after modifications could be as low as 8.5 tons “similar to slickline equipment” & specific offloading procedures were set to avoid exceeding this weight during any point of operations

Challenges and solutions

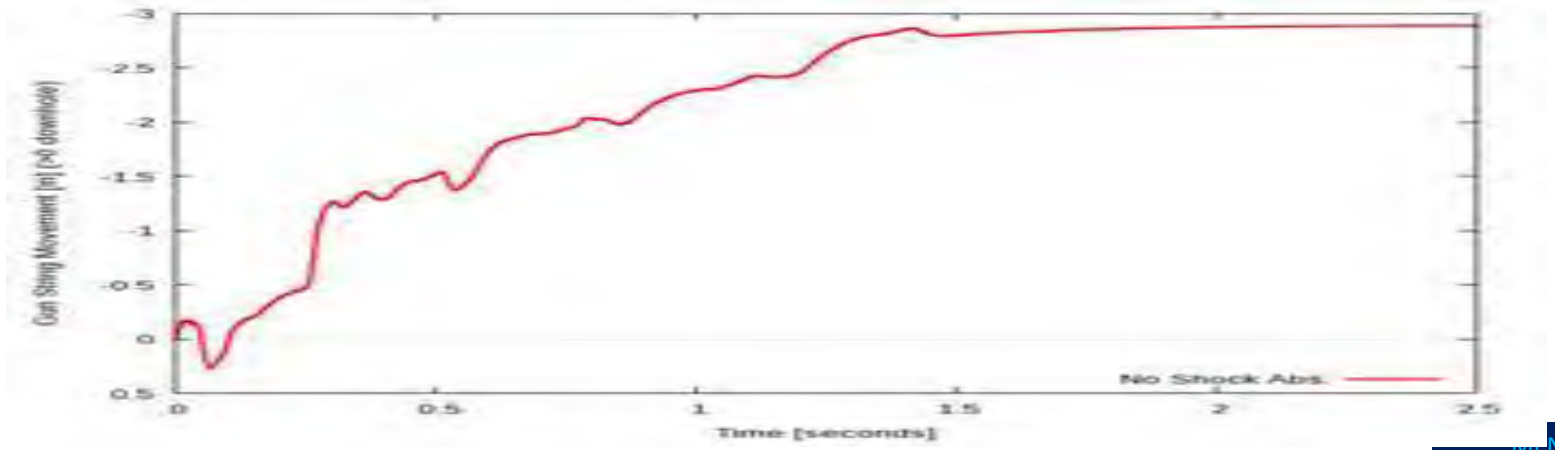
Challenge :

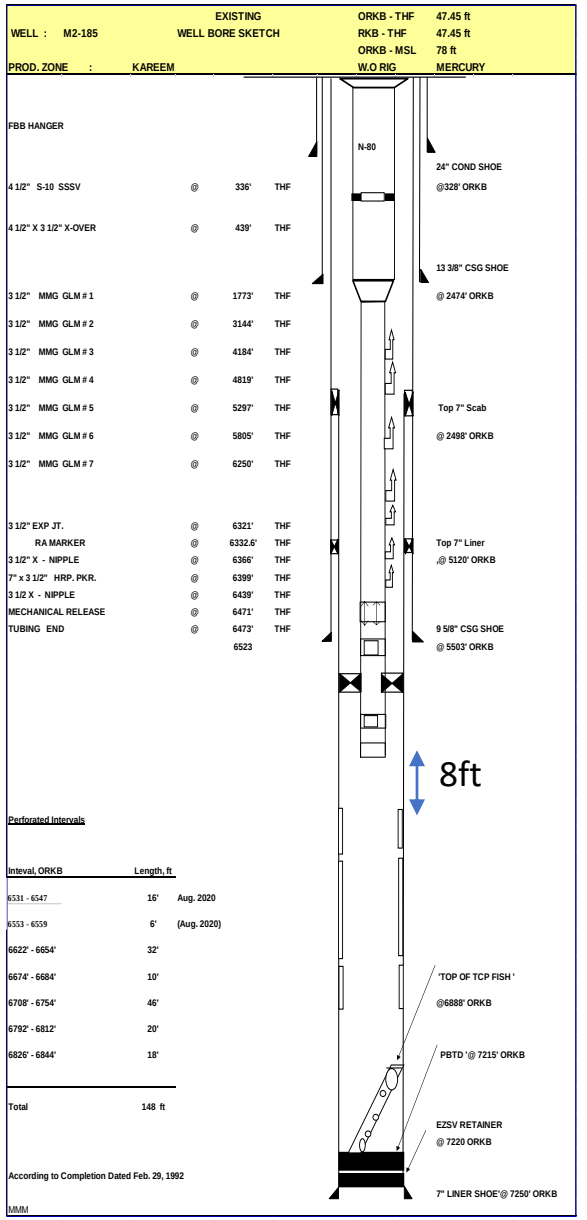
One of the wells (well Y) has as an issue related to the distance between tubing end and the proposed top interval which is only 8 ft.

Solution:

- To sacrifice value of Baba and lose value of +/- 200 BOPD
- To simulate the run and calculate the gun movement using shock model to the see the maximum motion for the gun no to exceed 8 ft.

In this case the under balance should be measured in-situ which has been achievable with the DSL because it contains built-in down hole pressure and temperature sensors





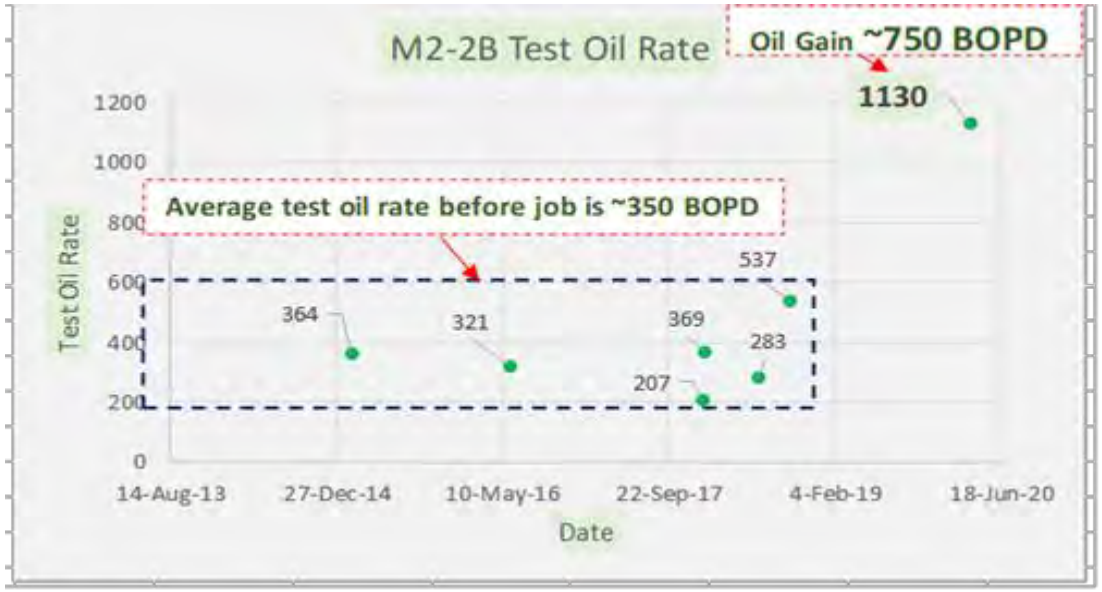
Results

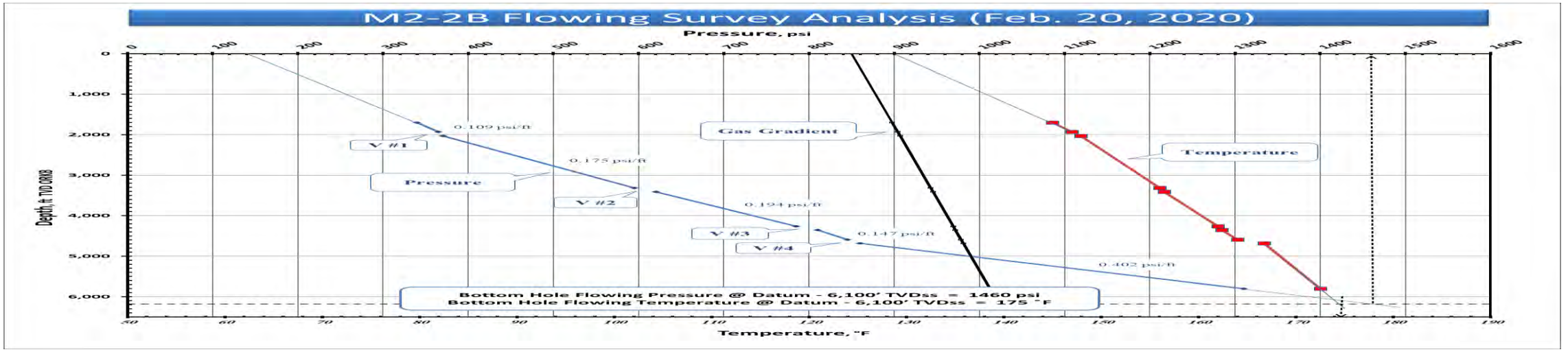
Results :

- The job had succeeded in The first well has been outstanding with 3000 BFPD and 62% WC

- it has been noticed that there is some surge in the well head pressure so It has been decided to run with a flowing survey with the need to Backload E-line and WM slick line (conventional operation)

- Flowing survey followed by Gas lift valve change as per survey results and stable production performance has been achieved





Summary

Safely unlock 1000 BOPD Through intervention in two wells using Digital Slick-line with cost saving of More than $1.0M than the conventional approach

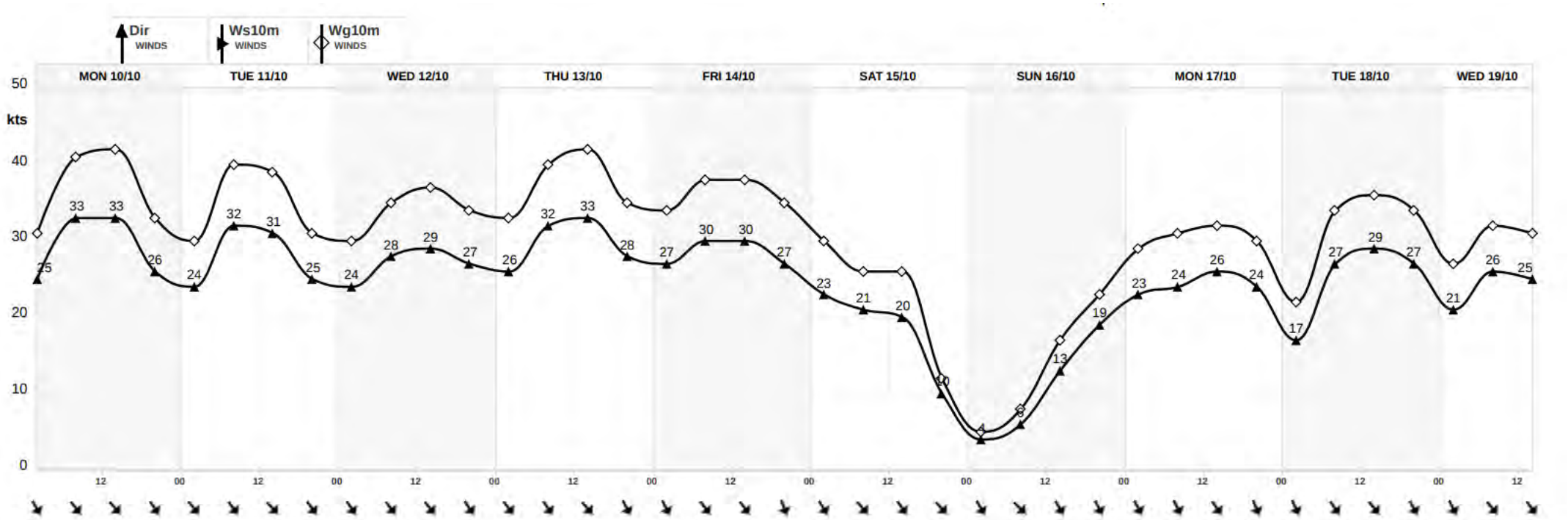
Well	Estimated Cost "Conventional Approach"	Actual Cost "Digital Slickline"	Gain, BOPD
Well X	$570 k (Barge Assist)	$80K	750
Well Y	$520 k (Barge Assist)	$65K	250

Platform with DSL Rigged Up

Value :

- Less Weight, dimension, provide accessibility to platforms with structure limits, minimize using Barge & Rigs for interventions
- Cost Saving & Testing New targets at low cost
- DSL Allows Jarring while perforation
- Real Time Pressure / Temperature measurements while perforation that saved flowing surveys and PLT.
- DSL can perform slick line scope that minimize logistics and simplify operations and minimize losses from frequent Rig up & downs
- Improve WW efficiency and outcomes

Early Production – Easy Logistics



Weather Conditions :

- Varies from Winter to Summer & Year to Year.
- Summer Working days 2 days / Week
- Winter Working Days 4 Days / Week

Logistics:

- Winch Moves
- Personnel Transfer using boats.
- Competition of Priorities during good weather.
- Slickline to Drift / Eline to Work

Single Move

Single Rig Up

One Day is Enough

Slick – Eline

Summary

Reduce costs & Increase Barrels

Minimize Risk

- ✓ SL minimize risk in Live Well ops
- ✓ Less equipment & Less lifts
- ✓ Less people

Reduce Costs

- ✓ Less Rig ups
- ✓ Faster RIH & POOH
- ✓ Assurance

More oil in the Tank

- ✓ Proven to reduce days/intervention
- ✓ Maximize Efficiency
- ✓ More days to add oil to the tank

Conclusion

#

$

14 Wells

Saved + 1500,000 $

Added + 2000 BOPD

Rigless + Efficient + Early Production

Acknowledgement

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Q&A

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