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Strengthening Marginal and Mature Field Ecosystems: Technology, Innovation, and Collaboration

21–22 APRIL 2026 | KUALA LUMPUR, MALAYSIA



X FIELD INTEGRATED CO₂ TRACER AND GAS LIFT OPTIMIZATION; A MATURE FIELD STORY

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OUTLINE



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02

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FIELD OVERVIEW



X Field is a mature offshore asset dependent on gas lift (GL) to sustain production.

Two integrated campaigns (2024 – 2025) deployed CO₂ tracer interventionless surveillance to address declining efficiency and unlock production upside.

| | |
|---------------------|----------------------------|
| Location: | Offshore Malaysia |
| Water depth: | ~180 ft (shallow) |
| Status: | Mature, gas-lift dependent |
| Wells: | 24+ active gas-lift wells |

**1,000
stb/d**

Oil gain
2024

**9
MMscfd**

GL Savings
2025

**228
bbls/d**

Oil upside
2025





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GAS LIFT PERFORMANCE CHALLENGES



AGING GAS LIFT VALVE

Degraded valves -
unreliable injection

MULTIPOINT INJECTION

Gas split across
mandrels, reducing
efficiency

SHALLOW INJECTION DEPTH

Gas entry too shallow -
reduced lift efficiency

TUBING INTEGRITY ISSUES

Leaks diverting lift gas

SAND ACCUMULATION

Above SSSV causing
Flow restriction -
lost ~300 bbls/d

LIMITED DOWNHOLE SURVEILLANCE DATA

Insufficient data
for GL redesign



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CAMPAIGN PHASE 2024 - 2025



MAY 2024

Coverage
25 strings

Tools
CO₂ tracer + acoustic fluid level survey

Scope
Tubing and A-annulus acoustic trace survey

Objective
Diagnostic baseline

AUG – SEP 2025

Coverage
22 strings (20 wells)

Tools
CO₂ tracer + acoustic fluid level survey survey + Multi-rate Testing (MRT)

Scope
Full interventionless survey

Focus
Optimization & GL redesign



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INTEGRATED SURVEILLANCE & OPTIMIZATION STRATEGY



STRATEGY

ACTIONS TAKEN

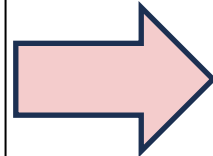
- **Surveillance:** CO₂ Tracer campaigns 2024 - 2025
- **Diagnostics:** Verify lifting depth, liquid level, & SBHP estimation
- **Optimization:** MRT, well tuning, & surface optimization program
- **Intervention:** GLVCO candidate identification

- **CO₂ Tracer** - Interventionless diagnosis
- **Acoustic Surveys** - Fluid level identification & SBHP estimation
- **Dual-shot Acoustic Survey** - Tubing integrity investigation
- **GL Metering** - Surface gas rate metering
- **Multi-rate Test (MRT)** - Real-time GL tuning



FINDINGS

- **Multipointing:** 3 wells identified
- **Shallow entry:** SPM #2 vs SPM #4



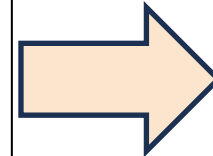
ACTIONS

Interventions

- GLV changeouts + dummy valves: 3 wells

Optimizations

- Injection rates tuning
- Deeper POI redesign: 1 well
- GL optimization: 8 wells



OUTCOMES

- **+1,000 stb/d** incremental oil
- **-9 MMscfd** gas lift savings
- **-62%** cost
- 1 day vs 3 days turnaround
- Less personnel exposure



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2025 EXPANDED CO₂ TRACER CAMPAIGN



20
wells
surveyed

89
bbls/d oil
realized

2.3
MMscfd gas
saved

228
bbls/d oil
upside

9
MMscfd total
savings

FINDINGS

- GLV redesign
- Full GLV redesign
- CHP reduction
- Wellbore cleanout
- GL tuning

ACTIONS

- Leaking valve
- Failed PPO
- Multipointing
- Sand restriction
- Unstable multipointing



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RESULTS AND KEY FINDINGS - CASE STUDY A



GAS LIFT REDESIGN: SUBOPTIMAL VALVE CONFIGURATION

HISTORICAL DATA

- All 5 mandrels PPO — shallow injection
- High gas lift — no oil benefit

SURVEILLANCE APPROACH

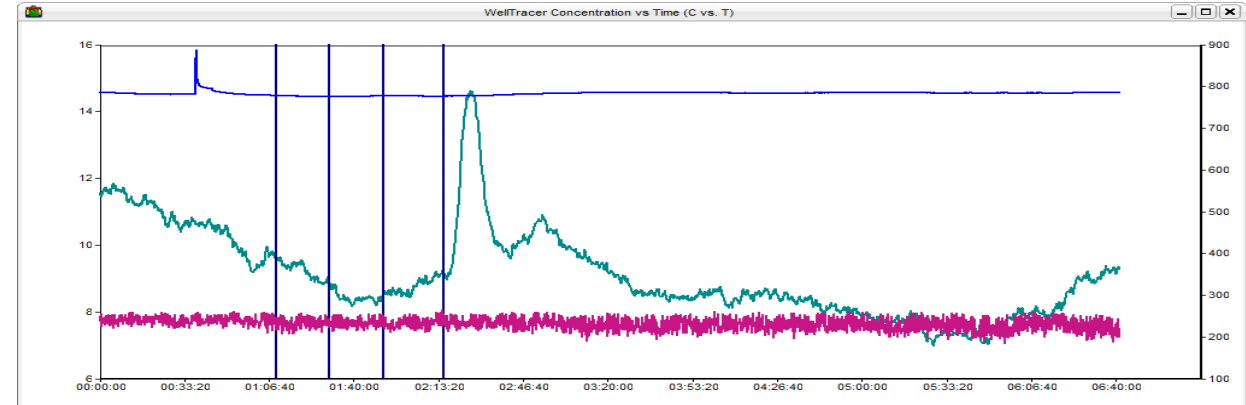
- CO₂ Tracer: injection at failed SPM 4

POST-SURVEY (PROPOSED REDESIGN)

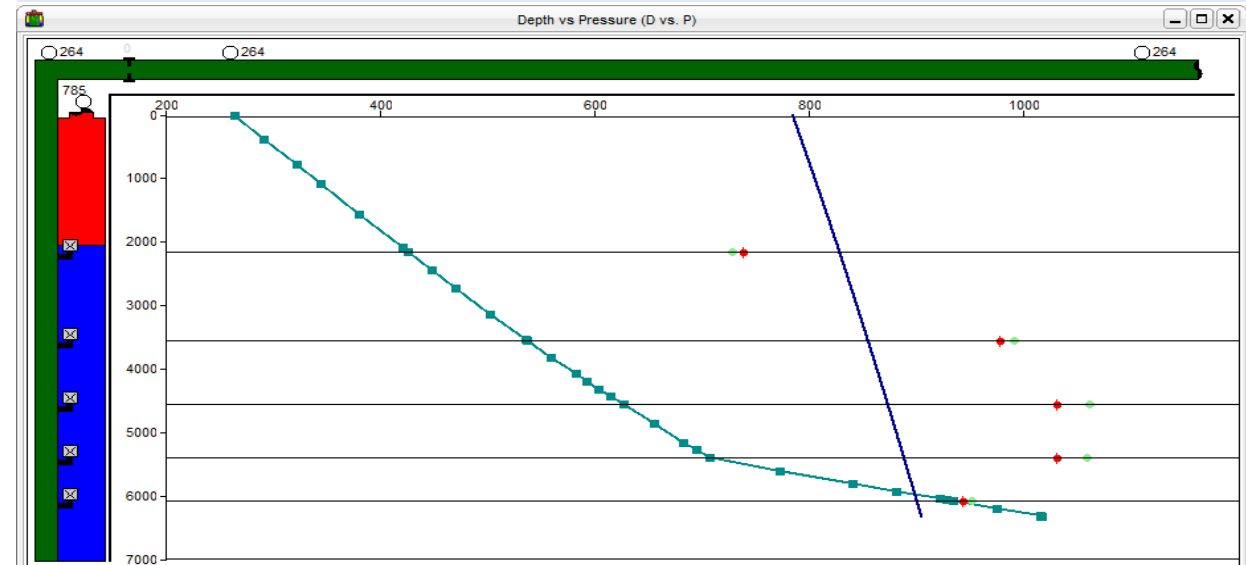
- Deeper injection → efficient gas use

+75
bbls/d
oil realized

1
MMscfd
gas saved



CvsT Plot: One (1) CO₂ Return was observed



DvsP Plot: Expected flowing pressure traverse



RESULTS AND KEY FINDINGS - CASE STUDY B



WELLBORE RESTRICTION: SAND ACCUMULATION

~300
bbls/d expected recovery

HISTORICAL DATA

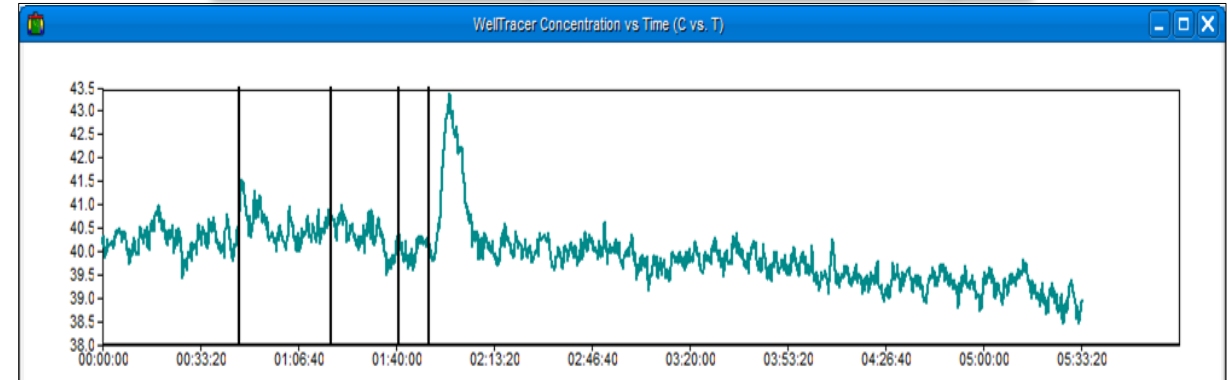
- Sand accumulation above SSSV
- ~300 bbl/d production loss (1 yr)
- Root cause unclear — GL suspected

SURVEILLANCE APPROACH

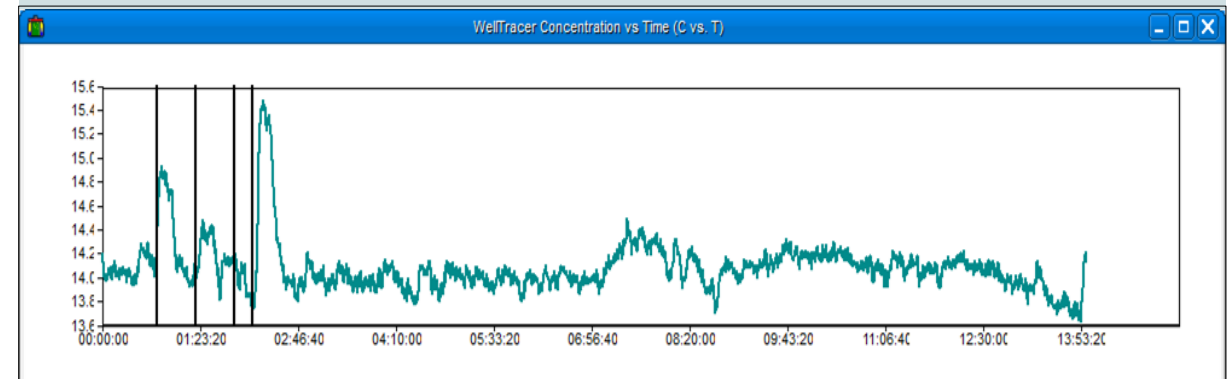
- Dual-condition CO₂ Tracer: isolate injection behavior
- Drawdown: Confirmed severe restriction

POST-SURVEY (DIAGNOSIS & RECOMMENDATION)

- Sand — not GL — confirmed root cause
- Action: Wellbore cleanout



**1st CO₂ Tracer survey (Aug 2025):
SPM 1 IPO leaks + SPM 4 Orifice**



**2nd CO₂ Tracer survey (Sept 2025):
SPM 2 IPO opened, multipoint injection confirmed**



KEY LEARNINGS & WAY FORWARD



01

INTERVENTIONLESS SURVEILLANCE

- -62% cost vs slickline
- 1 day vs 3 days turnaround
- Less personnel exposure

02

MULTIDISCIPLINARY TEAMS - SAME-DAY RESULTS

- Ops + tech + service providers
- Real-time GLV correction
- Immediate production gains

03

SCALABLE MODEL FOR MARGINAL FIELD

- Continuous monitoring
- Applicable across GL-dependent assets

X Field demonstrates that systematic CO₂ tracer surveillance, paired with agile optimization, can unlock significant value in mature fields - without heavy intervention.



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