



Gas Field Development - Challenges and Current Best Practices to Maximise Value

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A Successful Story of Development of High Contaminants Gas Field: Best Practices from Malaysia-Thailand Joint Development Area

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Agenda



- 1 Objective & Introduction
- 2 Subsurface Overview
- 3 Best Practices
- 4 Conclusion & Way Forward

1. Objective & Introduction

Objective

To present an informative paper about best practices from Malaysia-Thailand Joint Development Area (MTJDA) on Successful Story of Development of High Contaminants Gas Field

Location

Malaysia-Thailand Overlapping Area

First Gas Delivery

February 2010

Products & Present Production

Natural Gas: 300 mmscfd
Liquid HC (Condensates and Crude oil): 10,000 stb/d



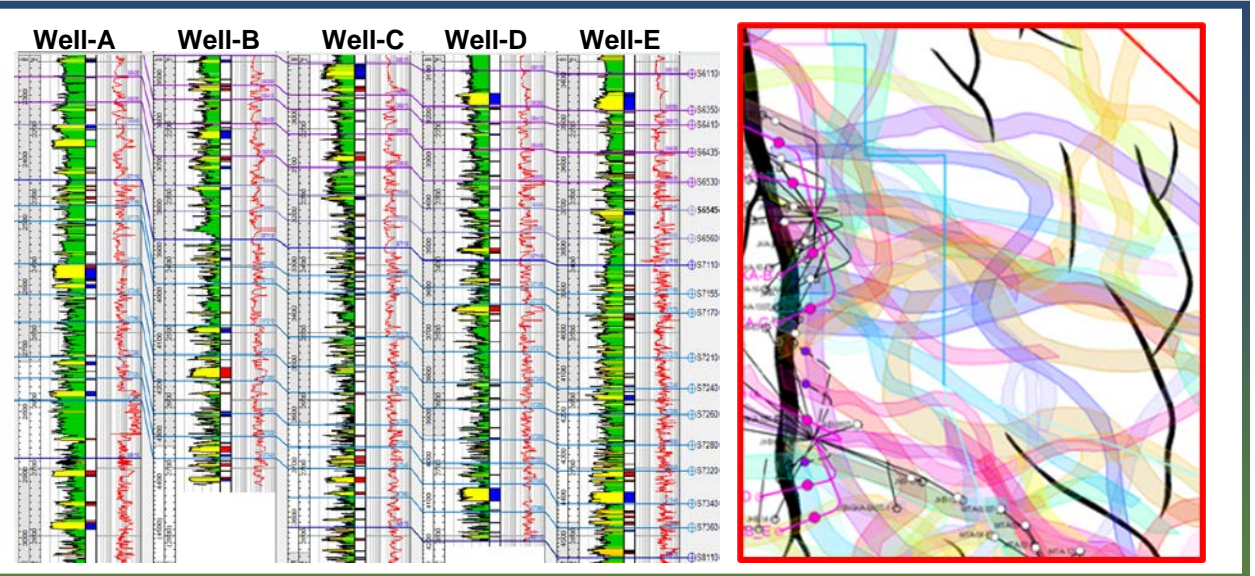
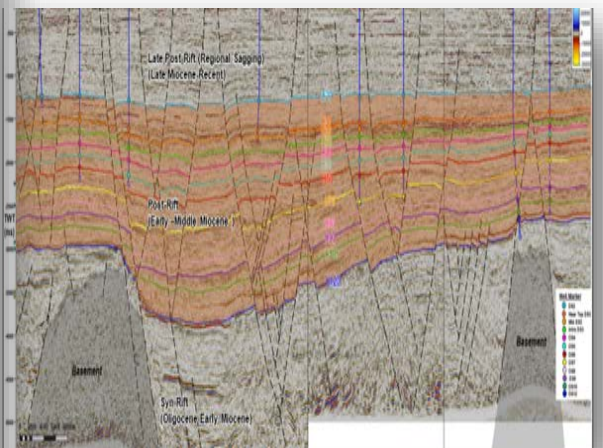
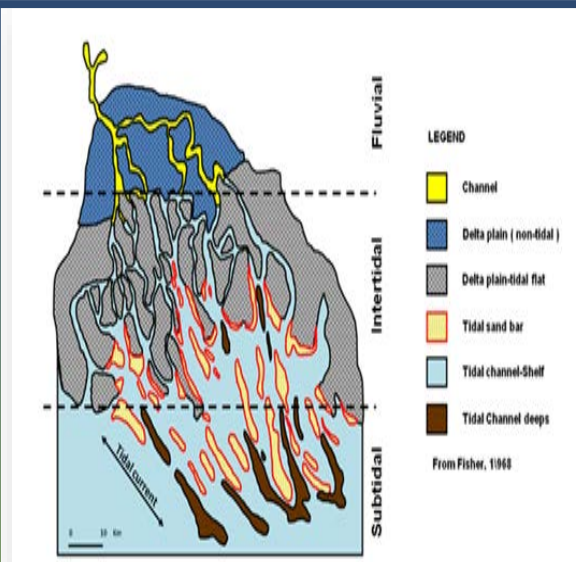
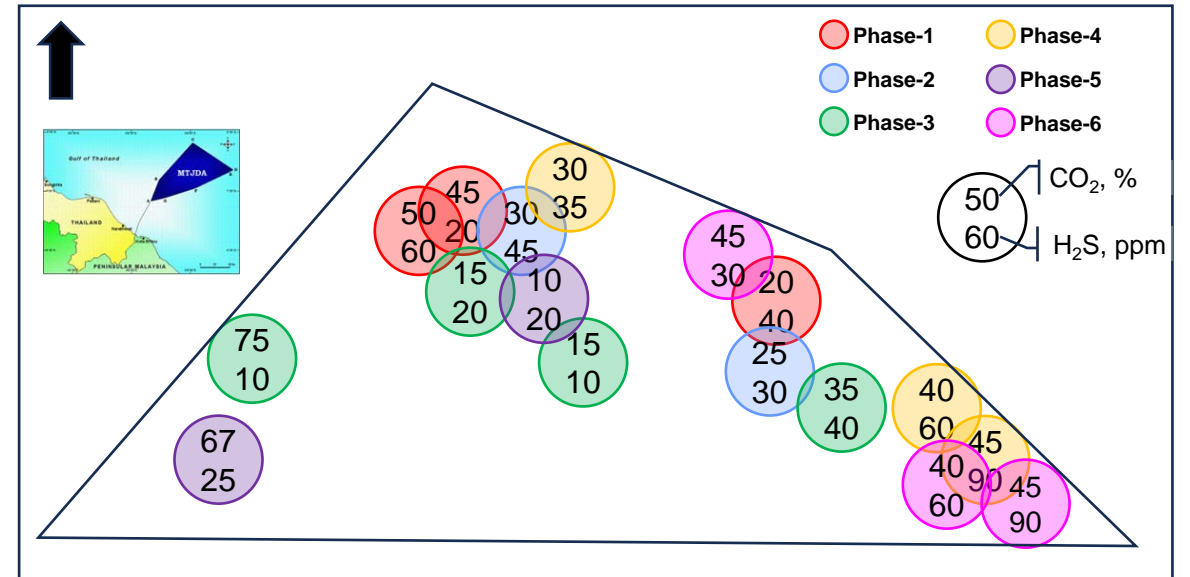
Reservoir Data

Reservoir Type	Clastic with fluvio-deltaic setting
Water Depth,m	60 - 70
Reservoir Depth, mTVDSS	1,000 – 4,000
Reservoir Pressure, psia	1,200 – 7,000
Reservoir Temperature, degC	80 – 220
CGR, bbl/mmscf	2 – 100
CO ₂ , %	1 – 90%
H ₂ S, ppm	1 - 200
Hg, ppb	1 - 500

2. Sub-Surface Overview

Geological Nature & Development history

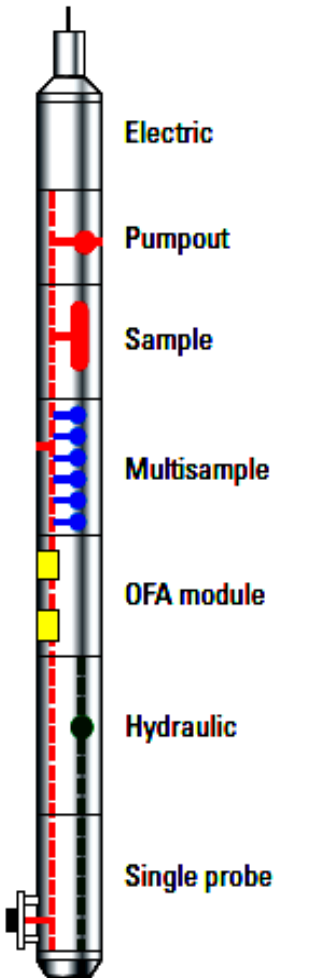
- Reservoir deposited: Tide dominated coastal plain
- Multiple channel complex
- Shallow reservoirs in post-rift section, while deeper in deep syn-rift section
- Development Phases since 2010 (14 years):
 - 16 offshore Wellhead Platforms installed
 - 230 development wells drilled with 100% discoveries
 - The average produced contaminants:
 - CO₂ 10 – 75%; H₂S 10 – 90 ppm; Hg 10 – 100 ppb



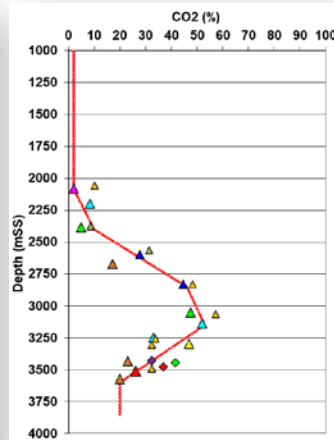
3. Best Practices

3.1 Data Acquisition

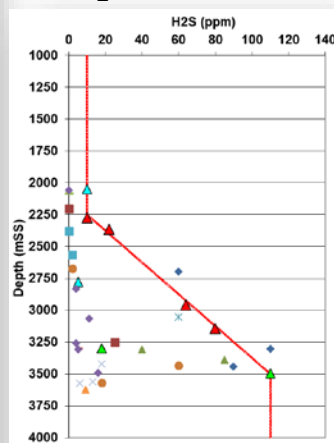
WFT Tool



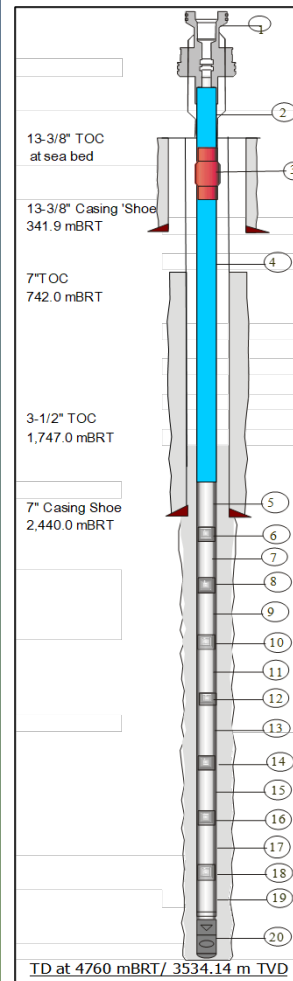
CO₂ Trend



H₂S Trend



3.2 Cemented Monobore Completion

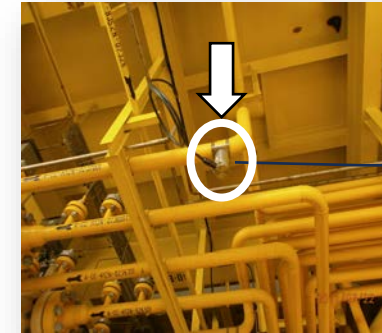


Well intervention

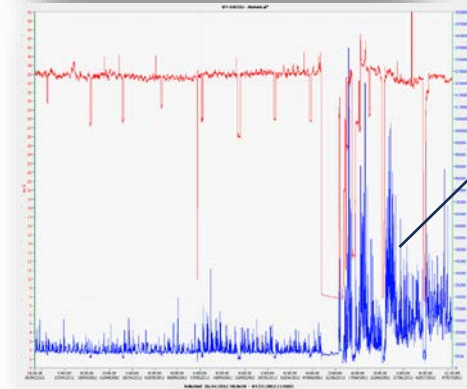
operability:

- a. Slim-hole monobore
- b. Sizes: 3.5" and 2-7/8"
- c. Capacity: 10-15 mmscfd
- d. Primary well intervention activities: Perforation, MPLT, SGS/FGS, and WSO
- e. Commingle production with selective bottom-up

3.3 Passive Sand Management



Clamp-on sensors

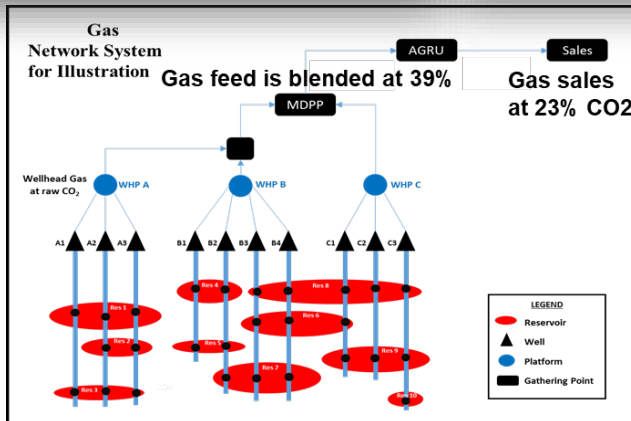
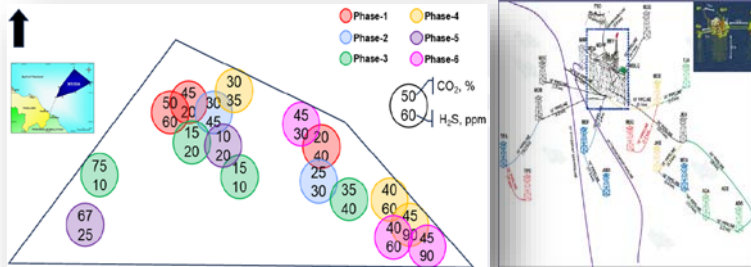


Indication of Sand Production

- a. ClampOn sensors are used to identify sand production
- b. Rate exclusion strategy is applied to set up maximum sand free rate

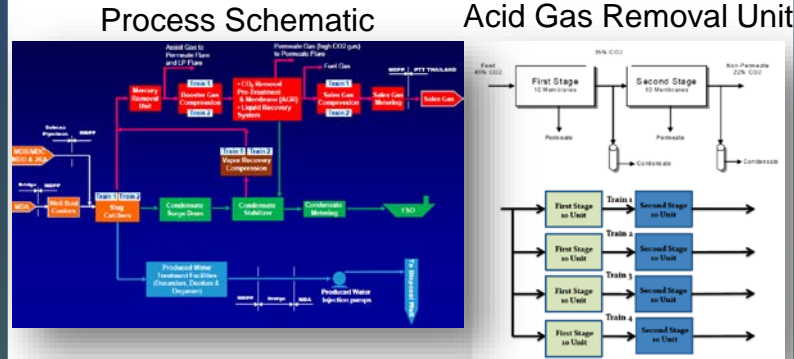
3. Best Practices (Cont'...)

3.4 CO2 Blending Strategy

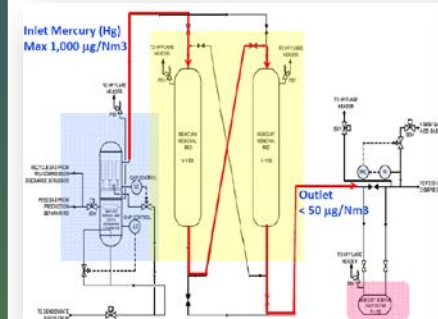


Maximizing recoverable volume through blending low and high CO₂ gas reservoirs to meet sales gas with reduced GHG emission

3.5 Surface Facility



Mercury Removal Unit



Mercury Removal Bed

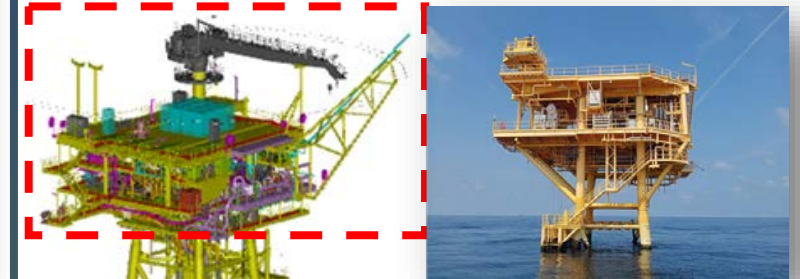


- a. AGRU: Remove CO₂
- b. MRU: Remove mercury out of gas

AGRU: Membrane



3.6 Top Side Re-use



- a. Highest Facility integrity
- b. Comply with drilling operation requirements
- c. Minimum modifications
- d. Within contractor refurbishment scope of work

Conclusion and way forward

CONCLUSION:

- Applying best practices supported with reliable historical data demonstrate a proven fit-for-purpose development of challenging gas fields with contaminants

WAYFORWARD:

- Sustain current Operational Excellent delivery through prudent and & fit-for-purpose development concept
- Continue acquire lessons learnt from past development projects as well as keep up on new technology available in market to ensure future operational is at Cost effective, Faster delivery, Higher outcome attainability, while incorporating sustainable practices



Acknowledgements



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- **PC JDA** Limited
- **PTTEP** International Limited
- Carigali-PTTEPI Operating Company Sdn Bhd (**CPOC**)