



# **'In-Situ Gas Lift' and 'In-Situ Gas Injection' Successfully Improve Oil Recovery in Arthit North Field**

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# 'In-Situ Gas Lift' and 'In-Situ Gas Injection' Successfully Improve Oil Recovery in Arthit North Field



Innovative and low-cost recovery improvement strategies implemented in PTTEP-Arthit North field oil rim

Generate a monetary benefit with a high profit to investment ratio

- do not require compressors and injection facilities
- little cost of perforations and a few days of operations
  - improve oil recovery factor twofold

Trouble-free speedy solution for engineers

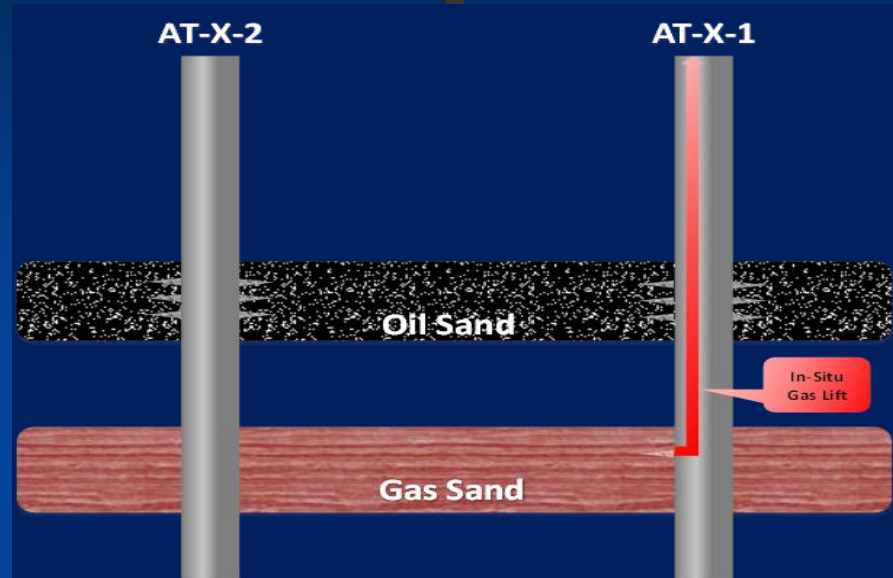
- reactivate idle oil well and increase production
  - minimum operational downtime
- no obstruction for well intervention operation

# 'In-Situ Gas Lift' and 'In-Situ Gas Injection' Successfully Improve Oil Recovery in Arthit North Field

## In-Situ Gas Lift

(gas lifting energy to reinstate oil production from idle well AT-X-1)

- a one-shot perforation of a selected gas sand interval
  - supplying gas rate of 1.3 MMSCFD at bottom section of the well
  - aiming for an optimal producing GOR (1000-1400scf/stb)
  - **enhancing lift performance to revive the idle oil well**

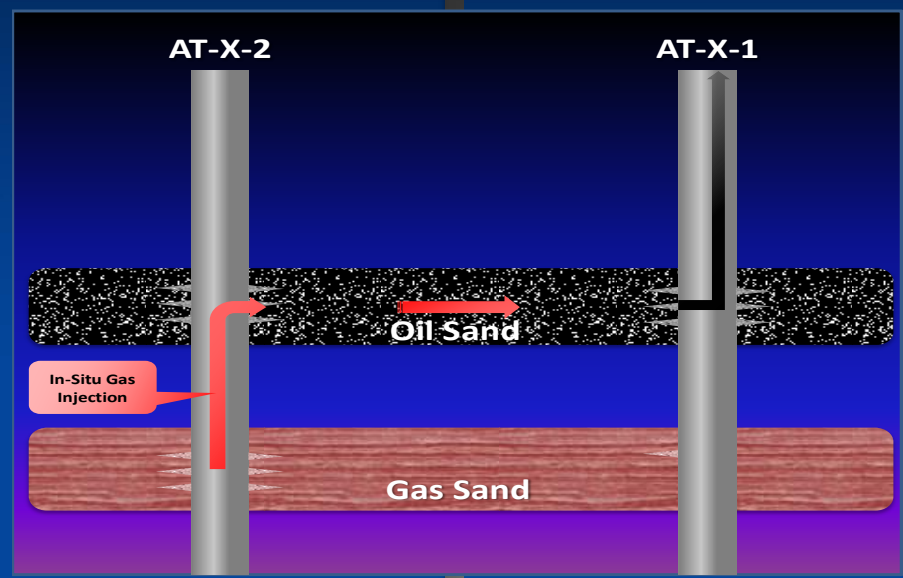


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## In-Situ Gas Injection

(maintain pressure and improve recovery efficiency from a partially depleted oil sand)

- 440 meters distance from the in-situ gas injection source well (AT-X-2) to the producer well (AT-X-1)
  - correct flow rate of inflowing gas into the oil sand from a higher pressure gas sand

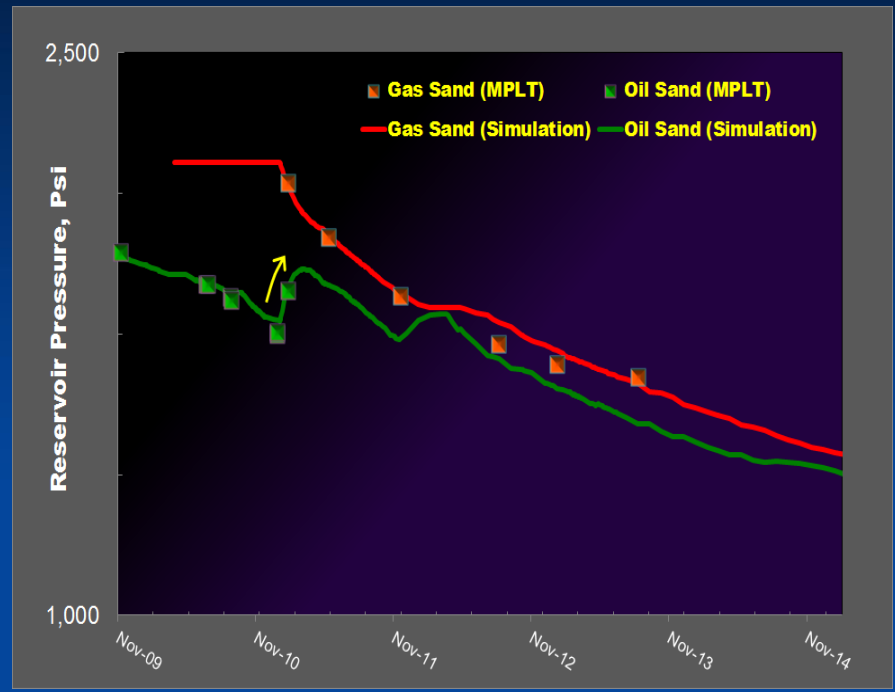
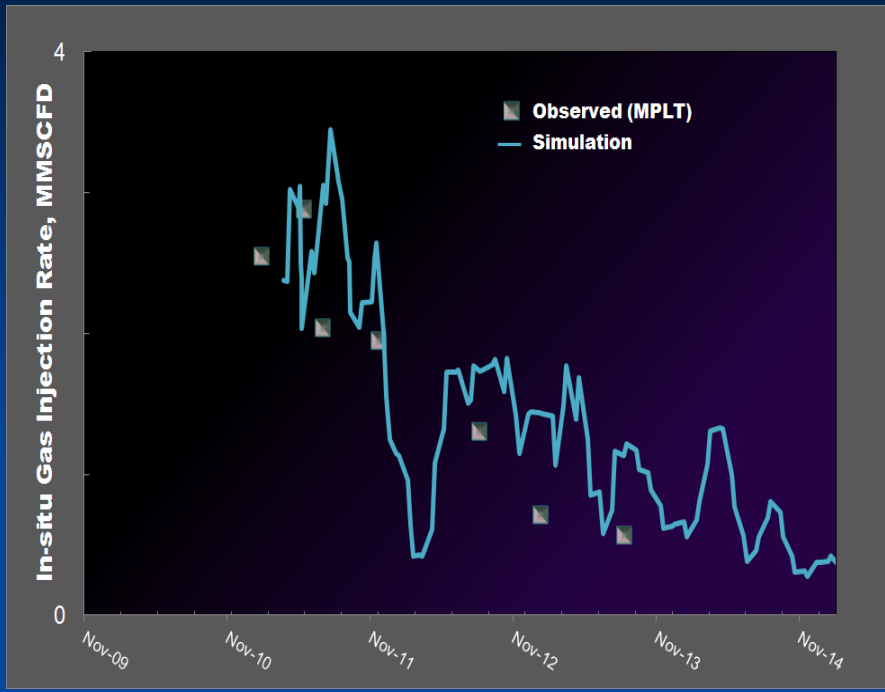


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## In-Situ Gas Injection

- correct flow rate of in-situ gas injection into the oil sand
  - 3 MMSCFD and decline

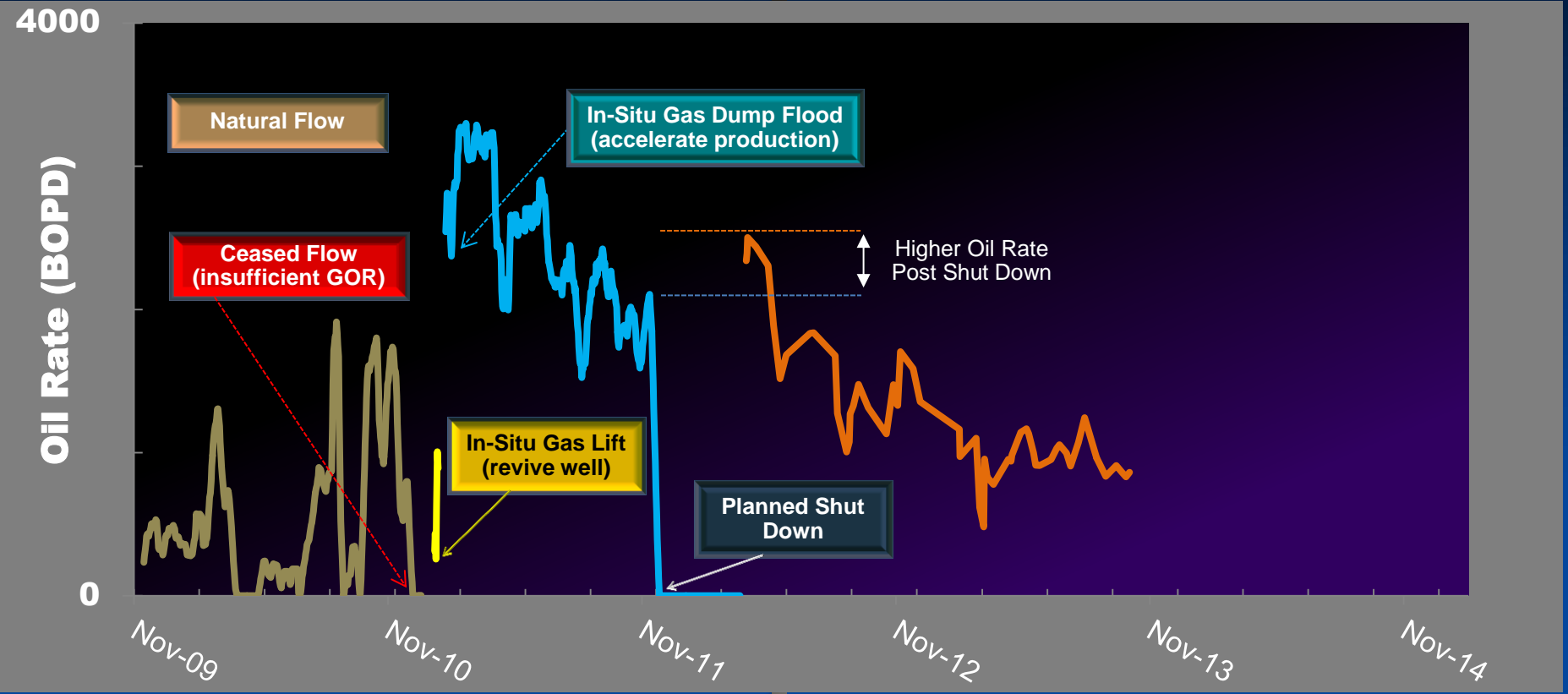
- increase reservoir pressure
  - by 110 Psi after 30 days
- minimize pressure drop



# 'In-Situ Gas Lift' and 'In-Situ Gas Injection' Successfully Improve Oil Recovery in Arthit North Field

## Importance for well AT-X-1 performance

- reactivate idle well
- accelerate production rate
- preserve energy and improve oil recovery factor





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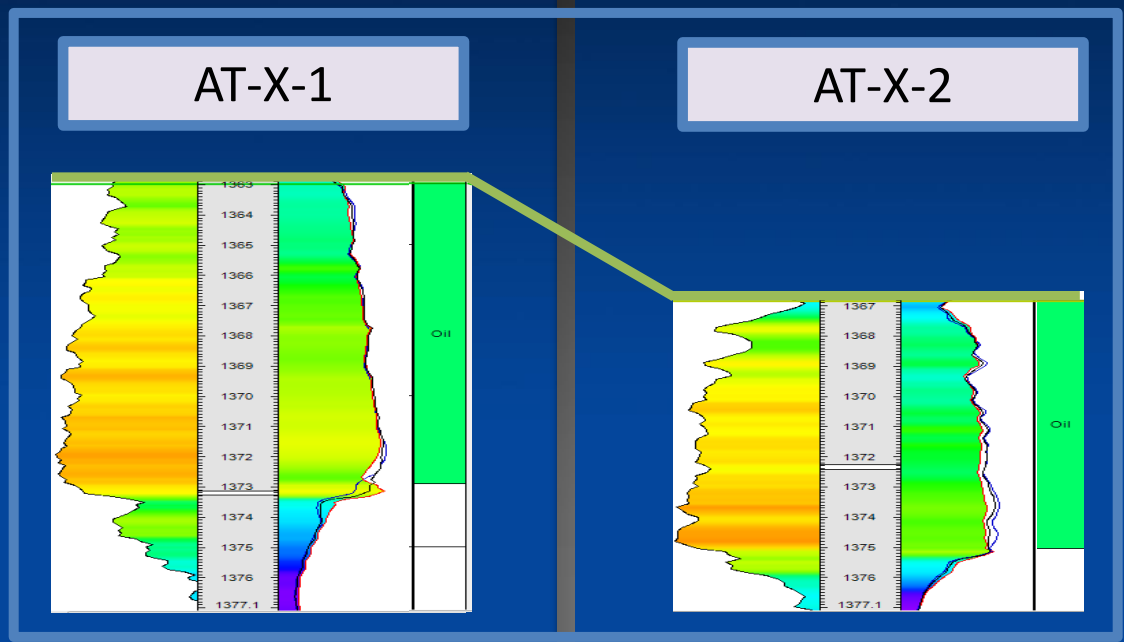
## Contributing factors for successful oil recovery improvement (field case of well AT-X-1)

- a useful source for in-situ gas lift
  - one-shot perforation of a selected gas sand interval with a correct in-situ gas lift rate that revives the well
  - gas injection point that is deeper than the oil sand
- discontinuous in-situ gas lift favorable for moderate well PI and a pressure supported oil sand with high remaining oil in-place

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## Contributing factors for successful oil recovery improvement (field case of well AT-X-1) (cont.)

- permeable channel sand that exhibits a relatively better quality at bottom and poorer quality at top that is good for in-situ gas injection





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## Contributing factors for successful oil recovery improvement (field case of well AT-X-1) (cont.)

- correct flow rate of in-situ gas injection that fits for
  - partially depleted oil sand with solution gas drive mechanism
  - oil gross-bulk volume of under 10,000 acre-feet with high API oil
  - 440 meters distance from AT-X-2 to AT-X-1
- in-situ gas injection as external gas drive that
  - supplements reservoir pressure and minimizes pressure drop
  - improves displacement efficiency by gravity segregation mechanism



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## Conclusions

- preserves energy and enhances gravity segregation drive efficiency in a solution gas drive oil sand that accelerates oil production
- innovative, simple and low-cost strategy that reactivates idle well and improves oil recovery thus is constructive and valuable to E&P industry in Thailand

# 'In-Situ Gas Lift' and 'In-Situ Gas Injection' Successfully Improve Oil Recovery in Arthit North Field



Thank You

