UNDER THE PATRONAGE OF H.H. SHEIKH KHALIFA BIN ZAYED AL NAHYAN, PRESIDENT OF THE UNITED ARAB EMIRATES

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SUPPORTED BY
Azimuthal Sonic Data Enables Safe Landing in Very Thin Carbonates Reservoir of Lower Cretaceous
OUTLINE

• OBJECTIVE

• MAIN CHALLENGES

• SOLUTION

• CASE STUDIES

• CONCLUSION
Land a well in a **4-ft reservoir** with absolutely **sourceless** porosity tool for proper well placement in **10,000-ft** horizontal hole.
OBJECTIVE
MAIN CHALLENGES: Super Thin

- Very thin & heterogeneous → 4ft thin
- Land at 89 degree → no margin of error

Landing Point in R1

2 ft thin
MAIN CHALLENGES: Non-Radiative

- Default: Density-Neutron
- Long trajectory + high diff. pressure → stuck → environmental concern
- Alternatives?
- NMR or Sonic
SOLUTION: Azimuthal Sonic

Real Time Azimuthal Sonic

- Single-axis, focused unipole transmitter
- Directionally sensitive receivers

Diagram:
- Directional Receivers: 6 in.
- Attenuator: 6 ft.
- Unipole Transmitter
SOLUTION: Azimuthal Reading
SOLUTION: Azimuthal Concept

Azimuthal Unipole Concept
- Azimuthally focused
- 10 – 15 kHz
- No centralization

Standard Monopole Concept
- Radially symmetrical
- 6 – 15 kHz
- Run centralized
**SOLUTION: Sensor Orientation**

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![Sensor Orientation Diagram]

- **Fast**
  - DTC = 50
  - DTS = 95

- **Slow**
  - DTC = 80
  - DTS = 150

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**SOLUTION: Depth of Detection**

- Depth of Detection (DOD)-distance when the tool detects a nearby bed”

- \( F = \) formation’s velocities & densities

- Approaching a faster formation, DOD is greater
SOLUTION: Depth of Detection

- Depth of Detection (DOD)-distance when the tool detects a nearby bed

- A function of formation’s velocities & densities

- Approaching a faster formation, DOD is greater

- Approaching a slower one, DOD is smaller
CASE STUDIES: Real Time 1st Well

- **Real-time** averaged sonic
- **Recorded memory** azimuthal sonic data
- **Slower DTC** at top reservoir
- **Porosity increased** from 1 PU to 8 PU

(Real Time Log)
CASE STUDIES: Memory 1st Well

- 16-bin memory data were processed
- Images of DTc & DTs were created from memory
- Clear deflection between the up & down DTc & DTs
CASE STUDIES: 2\textsuperscript{nd} Well Success

- Transmitted Real Time \textbf{Up} and \textbf{Down} DTc and DTs

- Down quadrant slowness detected soft porous layer \textbf{before} penetrating it

(Real Time Log)
CASE STUDIES: 2nd Well Success

SUCCESS!

Starting deflection
CONCLUSION

We used **Real Time Azimuthal Sonic** for well landing in a **4-ft reservoir**.

It allowed proper well placement in **10,000ft** horizontal hole.
The authors wish to thank the management of Abu Dhabi National Oil Company (ADNOC) and Abu Dhabi Company for Onshore Petroleum Operations Ltd. (ADCO) for their permission to publish this work. The authors also wish to acknowledge the support of their colleagues in ADCO and in Weatherford for their valuable feedback.
QUESTIONS