Case Studies of ADR Experience

Case Study 3 – Onshore/Offshore UK, coal oil reservoir mapped

- Adrok trained on 1 driled well locations
- Stratified reservoir
- Portland Sst reservoir:
  - Surface terrain
  - Located in Weald basin mudrocks, between the coals and between the sandstones at known depths determined from the exposed four separate onshore sites and one offshore location in central Scotland. At each location, the ADR oil and gas operations.

The ADR scanner measures atomic permittivity non-invasively and generates a virtual wellbore log of lithology from the ground surface to depths as normally experienced during drilling. Field training (or typecasting) is conducted in a similar manner, but by training on borehole data live.

Thresholds are set by training ADR signals on core samples and hydrocarbon samples either in our laboratory, in core stores or at remote locations. Thresholds are set for the ADR scanner to recognize a hydrocarbon zone.

The ADR Virtual Wellbore Log output provides 2D areal content using spectral analysis techniques. The ADR Scanner output typically represents subsurface information of the type:

- Showing lithology and depths
- Accurate borehole type
- Typecasting differentiation
- Thin gas horizons accurately identified than AVO techniques
- Composite Log comparing ADR Scanner results with Seismic AVO and downhole tools showed that Thin gas horizons (less than 2m thick) were more accurately identified than AVO (given data).

ADR Conclusions:

- AVO Boundaries recognized at 30m depths from ground level
- Typecasting differentiation of different rock types
- Fault recognized
- Accurate borehole type
- ADR log to 30m depth
- Data Collection was quick, easy and operational
- No HSE accidents

Results of ADR Scanner compared with Seismic

Case Study 2 - Onshore N. Africa, thin gas horizons

- Survey Area located in North Africa
- Adrok trained on 3 drilled well locations
- Surface terrain comprised low lying hills and scrubland
- Tortonian sand reservoirs
- Gas horizons were very thin (less than 1m thick)
- Prospects were 40m thick offset from wellbore location
- The results of the ADR survey were compared to the actual drilling results (Adrok presented ADR results before drilling commenced).

- Adrok produced ADR virtual borehole log charts
- No HSE accidents

Results of ADR Scanner compared with drill and well location

Case Study 1 - Onshore UK, oil reservoir mapped

- Site discovered by BP in 1980s
- Located in flood basin of SE England
- Surface terrain comprised chalk
- Jurassic, shallow shelf rocks consisting of limestones and sandstones overlain by marine transgression. (Kimmeridge Clay)
- Portland fan reservoir of shallow marine shelf with channel sands
- Stratified reservoir
- Adrok trained on 1 drilled well location

ADR Results compared with Seismic

ADR Prognosis to 1km depth

Case Study 3 – Onshore/Offshore UK, coal

During a technical due diligence exercise, independently commissioned by Prof. J. McMillan, Adrok demonstrated that the ADR technology added value in accurately image and classify hydrocarbon reservoirs at multiple Jurassic and Cretaceous coal reservoirs. The ADR Scanner signal return repeatedly showed consistent anomalies between the limestone, between the mudrocks, between the coals and between the sandstones at known depth determined from the exposed quarry face.

From the work preliminary databases had been established for the principal igneous, metamorphic and sedimentary rock types of Scotland. These databases, which have been confirmed by comparison with new scanned sections and driven boreholes, offer considerable potential for future geological exploration.

Adrok Hydrocarbons Mapping Services

- NON-ONSORE
  - Appraisal
    - Field characterization and gas volumetrics
    - 3D drilling location identification and confirmation
  - 2D structural surveying
  - Infill drilling location identification and confirmation
  - Field delineation and gross volumetrics
- APPRAISAL
  - Reservoir monitoring & management
    - Development & further testing
    - Large scale Exploration - requires increased application database and ADR sensor training to increase confidence levels.
  - Reservoir monitoring & management
  - Field delineation and gross volumetrics

SHORT TERM - OFFSHORE & AIRBORNE

Adrok development and construction of shuttle platform for marine applications.

Adrok scanner will also require gravel rinsing development & further testing

FUTURE

- Large scale Exploration - requires increased application database and ADR sensor training to increase confidence levels.
- Reservoir monitoring & management
- Field delineation and gross volumetrics
- Development & further testing

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ADR Output

ADR Substructure Classification

Quality checked by geologist

ADR Image output

ADR Conclusions:

- SCO Reservoir recognized at 20m depth from ground level
- Typecasting differentiation of different rock types
- Fault recognized
- Accurate borehole type
- ADR Log to 30m depth
- Data Collection was quick, easy and operational
- No HSE incidents

ADR Results compared with Seismic

ADR Prognosis to 1km depth

Case Study 2 - Onshore N. Africa, thin gas horizons

Results of ADR Scanner compared with drill and well location

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