# GEOBitumen

## Ensuring well profitability by accurately identifying bitumen intervals

Bitumen intervals within reservoirs can result in operational issues with a major impact on flow within formations resulting in decreased production, additional intervention requirements and significantly reduced well profitability. GEOLOG's GeoBitumen identification service allows the identification of bituminous zones whilst drilling, allowing the optimisation of completion design whilst drilling.
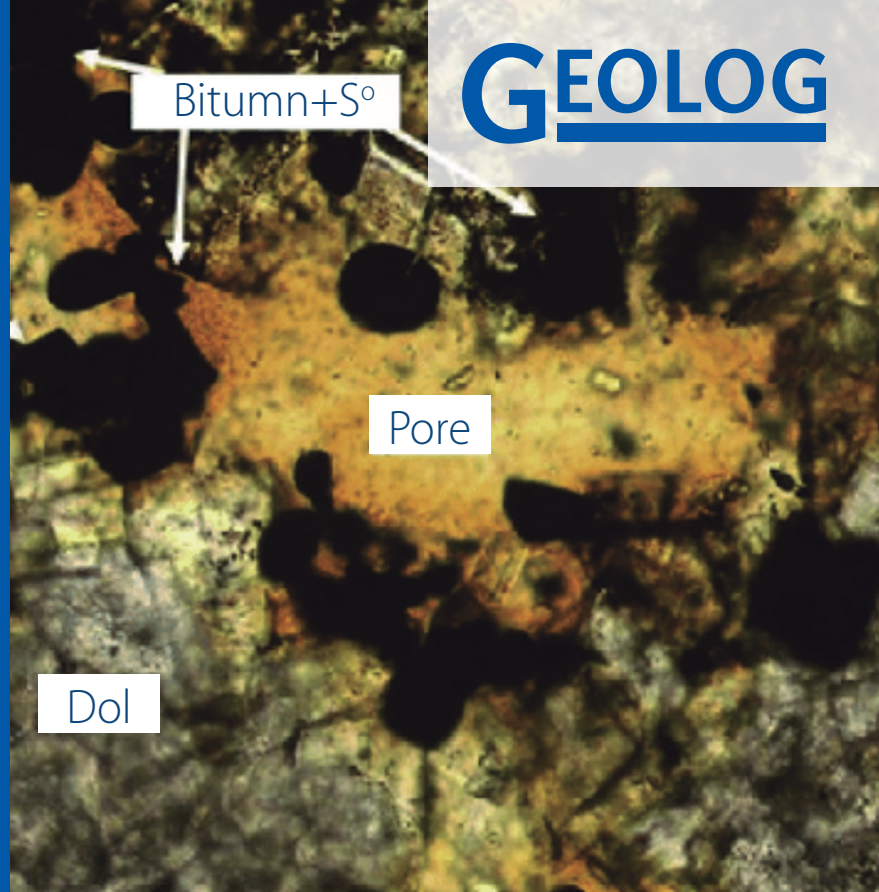


## Benefits

- Identification of bituminous horizons in near real time from cuttings
- Non-invasive surface technique: no requirement for high-cost downhole tools with complex interpretation requirements
- Identifies bitumen not easily visible from conventional petrophysical logs
- Enables completions strategies to be optimised whilst drilling, isolating bituminous zones

## Challenges and Solutions

The presence of bitumen within a reservoir can significantly reduce produceability of the formation by impeding flow pathways. Additionally, bitumens can interfere with production equipment resulting in higher workover costs. The presence of soluble and non-soluble bitumens have different impacts on operations and may require different methods to handle them.
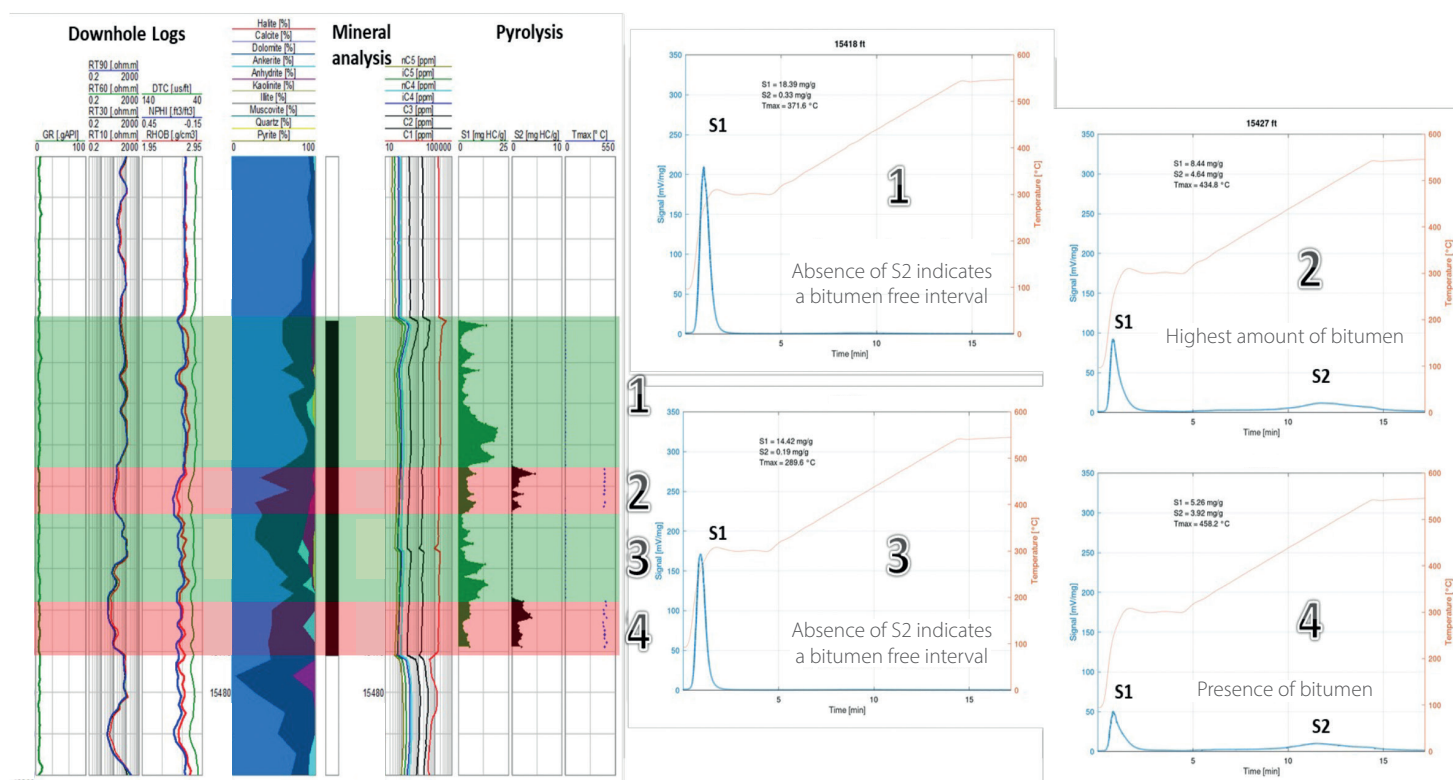Bituminous deposits are difficult to identify from conventional petrophysical well logs, potentially leading to their presence being missed or misinterpreted, with subsequent impacts on production performance and costs.

*By analysing the hydrocarbon constituents of cuttings utilising geochemical methods, the presence of bitumens can be recognised and furthermore classified via a combination of pyrolysis (S1, S2 and Tmax) readings, TOC analysis and solvent extraction techniques. Furthermore, the Geolog patented G9+ service can provide additional insight into the nature of the hydrocarbons present, as well as elemental proxies identified by the XRF. The process can be applied at the rigsite in near real-time allowing rapid decisions to be taken to isolate effected zones in completions designs, lowering costs and improving production performance.*

*NB – Bitumen detection has been validated in fifteen wells drilled with OBM and is currently being performed in additional wells to design the completion for production.*

## Applications

The technique has been successfully applied in the Mid Jurassic Najmah-Sargelu and Marrat formations in Kuwait to identify and classify bituminous zones within productive formations and to optimize the subsequent decision-making processes.

**Downhole Logs** — **Mineral analysis** — **Pyrolysis**

**15418 ft**
S1 = 18.39 mg/g
S2 = 0.33 mg/g
Tmax = 371.6 °C
**1** Absence of S2 indicates a bitumen free interval

**15427 ft**
S1 = 8.44 mg/g
S2 = 4.64 mg/g
Tmax = 434.8 °C
**2** Highest amount of bitumen

S1 = 14.42 mg/g
S2 = 0.19 mg/g
Tmax = 289.6 °C
**3** Absence of S2 indicates a bitumen free interval

S1 = 5.26 mg/g
S2 = 3.92 mg/g
Tmax = 458.2 °C
**4** Presence of bitumen

The use of pyrolysis values S2 gives a direct indication of the presence or absence of bitumen within the samples (assuming there is no kerogen present). By identifying bituminous zones, completion design can be adjusted accordingly to isolate problem zones.

*Note that the extensive e-log suite fails to identify and differentiate the presence or absence of bituminous deposits.*

## GEOLOG around the World

The GeoBitumen solution involves the application of one or more geochemical techniques to optimise the bitumen detection to the local conditions. Techniques include pyrolysis, TOC, solvent extraction, G9+ and XRF analysis.

Exact configuration is tailored to the specifics of the reservoir under investigation to allow optimised results.
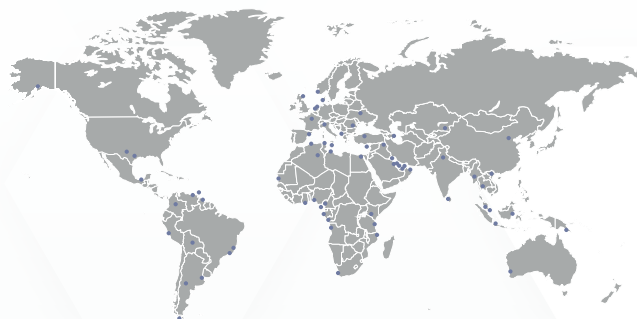
## Technical Paper References

Identification of Bitumen in Najmah Source Rock, Utilizing Organic and Inorganic Analysis:
A Case Study SPWLA 60th Annual Logging Symposium, Woodlands TX, USA, 2019

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