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A history of the appraisal and development of Shell's Block 5c acreage

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Theme: HR: Hydrocarbon field appraisal case studies

Key Words: appraisal, development, shell, 5c, bounty, endeavour

Shell's Block 5c off the east coast of Trinidad contains the Bounty and Endeavour gas fields. Following their discovery 2008/9, a comprehensive appraisal campaign was conducted, including seismic and a well. This led to development drilling in 2020 and first gas from the block in 2021. The exploration wells were drilled based on legacy streamer seismic acquired in 1999. This was followed by another survey in 2012, and ocean bottom seismic in 2018. With each successive survey, improvements in acquisition and processing technology gave greater insights into the structure and fluid fill of the traps.

Full waveform inversion was applied in 2016, helping to improve the image through the complex overburden consisting of shallow gas and faults with significant velocity contrasts. The ocean bottom seismic increased the offsets and gave wide azimuthal coverage, improving control on anisotropy. The reservoir is moderately faulted, creating multiple compartments with different gas water contacts.

Formation pressures acquired from the exploration and appraisal wells were critical in understanding the plumbing of the reservoir. Fault seal analysis was conducted to understand the potential baffling within the structures, and informed the development planning. In addition to shallow gas and faulting, the overburden contains multiple pressure ramps and regressions created by disequilibrium compaction.

The combinations of complex pressures and faults meant that careful consideration needed to be placed on the location and trajectory of the development wells. The complex overburden also created challenges for depth prediction. Variations in shallow gas and pressures resulted in significant uncertainty that needed to be incorporated in the development planning.

The safe and successful development of these fields demonstrated the value of applying technology and integrating across disciplines to account for multiple factors and uncertainty