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## Heavy Oil in Fractured Reservoir: Evaluation with Advanced Gas Chromatography and High Resolution Imaging while Drilling

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### Summary

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Heavy oil production in Panuco field comes from fractures in the late Cretaceous carbonates. Integrated workflow has been developed to identify fractures in managed pressure drilling in horizontal drains while preparing FDP.



## Introduction

Carbonate reservoir of Panuco field is complex in terms of structural geology, and fluid facies. Heavy oil production in this field comes from fractures in the late Cretaceous carbonates. Integrated workflow has been developed to identify fractures (with high density LWD imaging tool) and zones with heavy oil signatures (reservoir fluid type with gas chromatography) in managed pressure drilling (MPD) in horizontal drains while preparing well plan and FDP.

## Method and/or Theory

Surface fluid signature were recorded in real time to get fluid composition from drilling fluid. GOR, alkanes and aromatic components were plotted on global models to understand fluid chemistry and their relationships.  $C_1$  and  $C_2$  were found main driver controlling fluid GOR. First half the horizontal drain showed lighter fraction ( $C_1$ - $C_5$ ) in mud gas data. Heavy oil indicators  $C_7^+$  and  $C_7H_{14}$  were absent in this part of well. High resolution image log while drilling showed that this part of well is fractured but no heavy oil shows on gas data. Image log indicated that presence of sealed fault in the middle of horizontal drain and calculated displacement is 7m. Soon we crossed the fault, heavier fraction of gas data started flowing  $C_7H_{14}$  which is indicator of heavier oil. The length of the horizontal drain was extended parallel to this layer where we have heavy oil shows. Image log interpretation shows that this part of reservoir is fractured and fracture aperture is high in this interval.

## Conclusions

Early assessment of reservoir fluid is key objective in well planning and FDP. Innovative gas chromatography technology in MPD drilling environment and high resolution imaging in real time provide efficient and cost effective integrated workflow. This workflow provides possible fluid type and structural attributes (fracture orientation and faults) and serve as helping guide for quick decision making while drilling.

## References

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