



# Mass Spectrometry Service

## Hydrocarbon and Water Indicator Overview

### Introduction

Mass Spectrometry (MS) allows us to look at a wide range of organic and inorganic gases that are not available with traditional hotwire, IR, or FID chromatography. Like the use of XRF to discover in detail the elemental/chemostratigraphic make up of the formation, the use of MS gives a more detailed picture of the formation gases and fluids. However, unlike the elemental interpretation of cuttings which is less open to interpretation, MS data can often raise more questions and offer a greater range of interpretations from a single data set.

### Case Example

The plot on the right from a West Texas lateral, will be used to highlight one or two benefits of using MS data for formation evaluation.

#### Track 1 includes

- ROP – Grey
- Aromatics – Blue
- C1 - Red
- C4 & C6 – Green & Orange

#### Track 2 includes

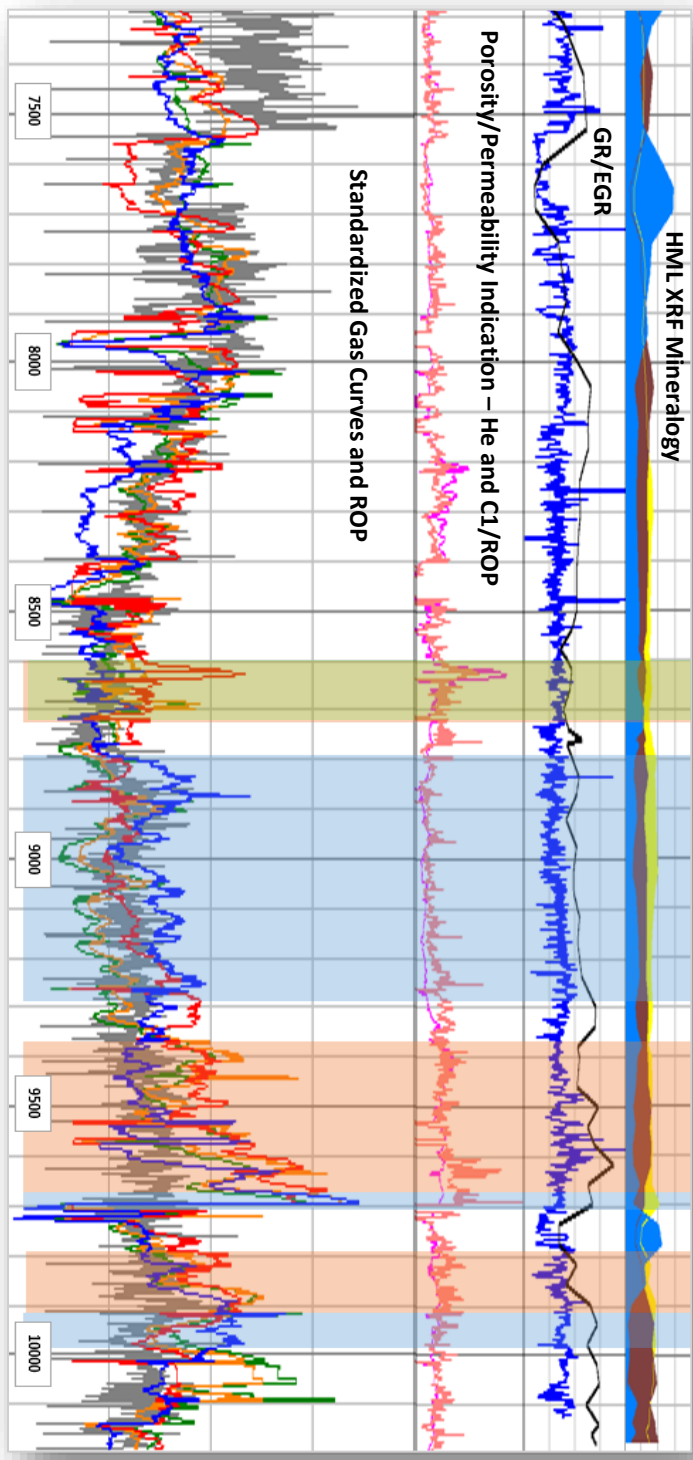
- Helium – Pink
- Normalized C1 – Orange

#### Track 3 includes

- MWD-GR – Blue
- Elemental GR – Black

#### Track 4 includes

Bulk mineralogy



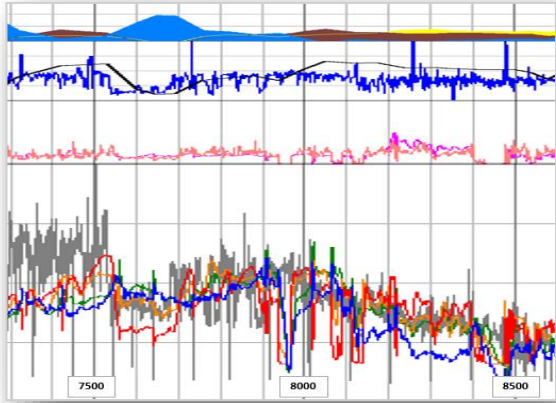


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### Figure One

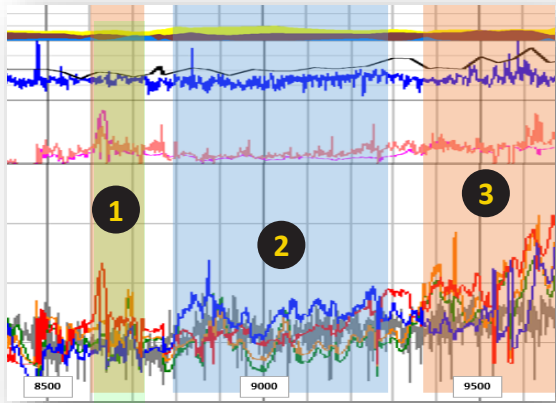
Using a technique suggested by 'Crown Geosciences', the curves in track one are scaled so that gas and ROP 'overlay' one another. In the plot, we see that the gas values roughly correlate with the varying ROP which is the behavior we expect. Over and or underperformance is something to be investigated further.



### Figure Two

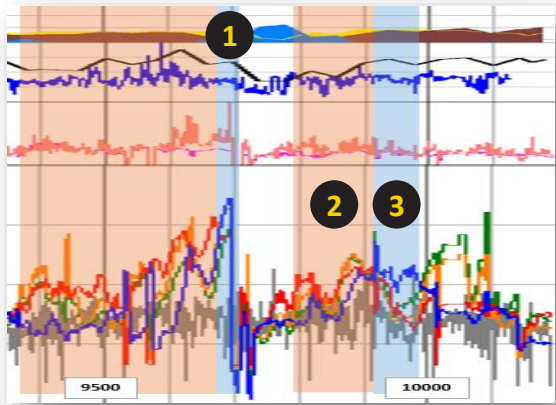
There are several things to note in this section. And several interpretations to be made.

1. A spike in the helium, C1/ROP and C1 gas curve in the green section could indicate a fault or fracture zone.
2. The aromatics in the blue section are overperforming the other gas. This indicates a higher water presence.
3. The tan section shows the HC gases overperforming. This can indicate zones of HC interest.



### Figure Three

1. This shows a spike in aromatics, a spike in helium and a change in GR. It might indicate water presence, but also possibly a fault.
2. HC zone of interest is indicated based on higher HC gases.
3. Higher presence of water based on aromatic overperformance.



*Note that the gas data must not be looked at in isolation. Gas indicators are simply that – indicators.*



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