Title: Dealing with Unique Minerology in Petrophysics Logs

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**Abstract:** XXXXX

**One-Sentence Summary:** This paper aims to discuss the petrophysical considerations that need to be made for unique mineralogy that is sometimes seen in logs, like tuffs and volcanics, oplaines, CO2 and helium

**Introduction:**

Most petrophysical models are built with an understanding that the most oil and gas deposits are found in basins that have an underlying mineral system that is sedimentary in nature. These sedimentary basins are primarily composed of minerals that are either silicates (), such as quartz, feldspars, micas and other clays, or carbonate ( (chalk, dolomite, limestone), and while the nature of the petrophysical properties and reservoir type varies across sedimentary basins (homogeneous, heterogeneous, tight sands), our main petrophysical equations are designed to deal with these basket of minerals.

However, we know from both individual as well as collective industrial experience that there are instances where unique minerals are encountered in fields drilled around the world. In Indonesia [1] and Australia [2], for instance, pyritic sandstones are encountered in some hydrocarbon bearing reservoirs. These have some interesting effects on the logs, from having high densities to low resistivity responses. Kennedy and Clavier et al both discussed the impact of pyrite (FeS2) on modern logs [1, 2] and noted that while pyrite has a variety of effects on resistivity and nuclear tools, such that measured values can be drastically different from those typically encountered, the fundamental petrophysical equations derived for volume of shale (VSH), porosity (f) and saturation (Sw) apply, so long as appropriate corrections/ calibrations are used. In the Gulf of Mexico (GOM) [5], in fields offshore Brazil [6] and Egypt [7], salt (anhydrite, halite) layers can overlie depositional basins or be present within producing reservoirs. These minerals have a deleterious effect on logs;

As salts are often non-porous, these are effectively treated as non-net and thus

Low resistivity, low contrast pay is also sometimes encountered in reservoirs that have unique clay types, such as glauconite.

In this paper, we will discuss some of the unique mineralogies observed in our work and how they are quantified for petrophysical applications. We will discuss wells that have intersected (a) tuffs and volcanics, (b) opalines, and wells where the pore fluid is primarily (c) CO2 or (d) helium. We will explain how we have addressed such petrophysical challenges, and discuss which tools are perhaps the most reliable in discriminating potential mineral signature.

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Figure 1: Schematic illustrating the process of Data Integration

**Key Logging Properties to Consider:** XXXX

XXXXXXX

**Petrophysical Approach:**

Table : Blah Blah

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| *Moo* | *Moo* |

Figure :Moo Moo

***Discussion and Implications:***

***AAA****:*

***BBB:***

***CCC:***

***DDD:***

***EEE:***

**Limitations of Study and Conclusions:**

# **References**

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