

Analyzing Chemostratigraphical Data (XRF/XRD) alongside the Elemental Capture Spectroscopy and Spectral Gamma Ray Data (ECS/SGR)



Client

ENAP. Onshore, Development, Lower Eocene. Austral Basin, Chile.

Challenges

The necessity of having an elemental and mineralogical evaluation coupled with high prices assigned on the ECS (Elemental Capture Spectroscopy) and SGR Sondes, the risk of introducing a radioactive source into the wellbore, the threat of LIH some expensive tools, and the risk of being stuck which leads to a rise in the budget in an Exploratory or Development project.

Solution

The XRF analyses done by Geolog provided can quickly identify and quantify a wide range of elements, from major to trace elements from Mg to U, which can be correlated with the Elemental Capture and Spectral Gamma Ray linked to downhole tools. Moreover, the accurate evaluation provided by the XRD on the identification of the main minerals (Carbonates, Siliciclastic, Clays, and accesories), which differs from the elemental extrapolation done by the ECS sonde to obtain the mineralogy.

Results

The utilization of the GeoROX Service has shown a strong correlation between the main elemental data and the reading acquired via de ECS and SGR tool along the whole 3 levels evaluated. Additionally, it showcased its capacity to distinguish and discern the mineralogy effectively identifies quartz and clay minerals, aligning exceptionally well with the data obtained from the ECS downhole tool.

Value

The GeoROX service can be applied on-site in near real-time, at our base or postmortem, and it has a far lower cost than using more complex LWD tools. A complete elemental and mineralogical data can be obtained using the GeoROX Service.

Services used

GEOROX

Elemental (XRF) and Mineralogical (XRD) Analysis.

Case Study: Chemostratigraphical Data versus Elemental



Capture Spectroscopy Data



Fig.1, Elemental Data (XRF), SPG - special WL Logs correlation

In the Fig. #1, it was noted a strong alignment between the Computed Gamma Ray (CGR) and the downhole Gamma Ray (GR), which demonstrates a consistent trend along the intervals analyzed. Furthermore, a remarkable correlation between the downhole Spectral Gamma Ray and the elemental measurement derived from the XRF (Specifically, U, Th, and K2O). Finally, an outstanding concurrence emerges between the elemental data extracted by the ECS tool, and the main elemental oxides computed with the XRF, where we can highlight the Al₂O₃, Fe₂O₃, SiO₂, CaO, S, and TiO₂.



Fig.2, Mineralogical Data (XRD) and ECS Logs correlation

Along the 3 sections evaluated were observed a good correlation between the main Clays, Feldspars, and Carbonates minerals, highlighting that our solution can allow the clay minerals species such as Smectite, Illite, Chorite, and Kaolinite, as well as Calcite, Albite, Anorthite respectively. Extra, when comparing XRD data to ECS logs (specifically for Quartz, and Pyrite) there was an outstanding correlation. In the bottom section, a deviation in the Total Clays (XRF) versus Clays-WL, similar to Q+Feld+Mic (XRF) opposite Q+Feld+Mic which can be explained by the presence of Organic Matter (V and Mo), also confirmed with the cleaner GR values noted.

GEOLOG Office Suite 21B, Gold Tower Cluster I, Jumeirah Lakes Towers P.O. Box 336 542 Dubai, United Arab Emirates