

X-Ray Eyes: How Field Based XRD is Changing Mud Logging and Improving What Is Known about Unconventional Plays

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Abstract

From the humble beginnings of using a simple microscope to study the minerals in our Earth to new technologies used on the Mars rover, mud logging is on a mission to revolutionize our understanding of unconventional plays. X-rays have transversed the bounds of traditional laboratory testing and now are a powerful tool used in near-real time applications at the well-site.

Rapid mineralogical and elemental quantitative analysis of shale plays using X-rays improves what is currently observed in the logs of drilled formations. X-ray Diffraction (XRD) as a tool for geological studies is well founded and has been used for over a 100 years. Only recently, with the invention of a new method for diffraction and the miniaturization of the equipment, has XRD become possible in the field. Mudlogging is now moving past traditional techniques of observations with the naked eye and is now using X-rays as a tool to "see" into the rocks. Field-based XRD brings new attention to areas of the log that are visually homogenous, showing the minerals and elements quantitatively, finding the sweet spot for brittle zones, and fingerprinting the well with specific mineral assemblages and marker minerals and elements.