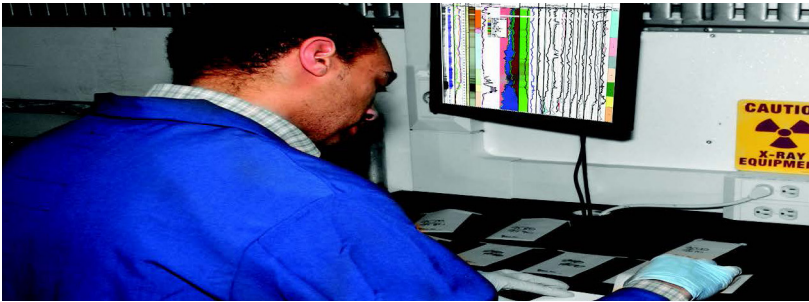


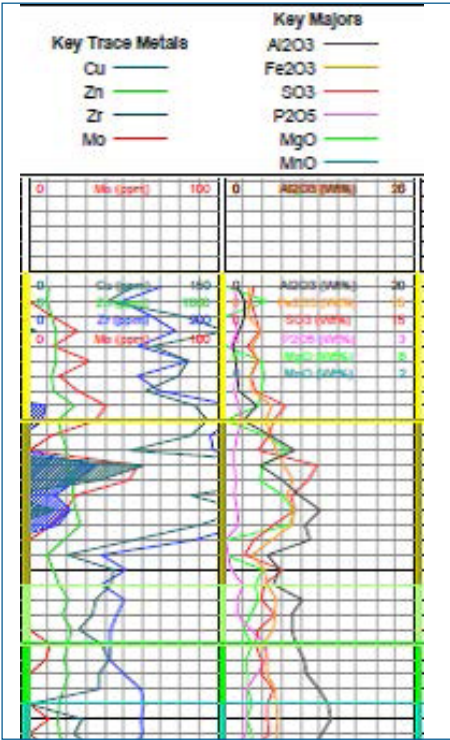
X-Ray Fluorescence for Complete Elemental Composition



Overview

Significant heterogeneity in unconventional formations require tighter stratigraphic sequencing and mapping for recognizing trends and locating most attractive target intervals for production. However, traditional wellsite tools for routine stratigraphic investigations are limited and ubiquitous at times which can complicate or even mislead correlations and critical drilling/completions decisions.

Reliable and repeatable elemental analysis (simple elemental curves and elemental ratio curves) provide the backbone for well to well chemostratigraphic correlations. Hundreds of additional curves can be utilized to identify key stratigraphic markers while drilling. Correlations of these key curves and ratios are used across multiple wells to map changes to each stratigraphic unit.



Why XRF

- Thinner, more confined lateral drilling targets require additional indicators to confirm downhole readings and maintain wellbore positioning. Elemental analysis of cuttings samples provides this rapid confirmation with low cost and no risk.
- Rapid and accurate identification of trends in both elemental concentrations and elemental ratios provide an additional "Near Real Time" stratigraphic correlation tool and technique for highly heterogeneous reservoirs.
- Accuracy of trace element analysis outside of a laboratory environment has been questionable until the most recent advancements in portable. Laboratory analysis is expensive with long turnaround times making "Real Time" applications impossible.

Features	Benefits
The Delta Premium Geochem analyzer provides the most accurate results possible over the largest range of major and trace elements (Na to U) in wt% or ppm (based on abundance).	Analyzing cuttings samples on location or in the Rapid Answer Lab maps the high levels of inorganic heterogeneity both vertically and laterally. Understanding these trends for a given well reduces risk of missing the most attractive target in a given well.
The Delta Premium is calibrated to known geologic reference standards for proper consistency, reliability and reproducibility sample to sample and instrument to instrument.	Cuttings analysis of lateral samples while drilling provides a multitude of additional curves and indicators of wellbore placement and zonal containment unavailable with traditional downhole tools.
Rapid analysis (less than 5 minutes) and low cost per sample make this ideal for wellsite applications such as stratigraphic correlations and recognition of critical drilling indicators.	Integration with the other services available in the AGS toolbox provides the most reliable and most informative reservoir characterization possible in "Near Real Time."
Surface equipment carries no risk of tool loss downhole or equipment damage.	
The analysis requires less than 100 mg of sample and results are available in less than 30 minutes after the sample has been collected from the shaker.	