

# SPECTRAL EVOLUTION

## Can Illite Be Used as a Pathfinder in Uranium Exploration

During exploration for unconformity-type uranium deposits like those in the Athabasca basin, illite can be a reasonable pathfinder mineral. In sandstone and basement-hosted deposits, alteration halos that include clay mineral alteration features can contain illite, sudoitic chlorite, dravite, dickite, and kaolinite.

Illite types can be diagenetic (coarse grained and platy) or hydrothermal (hairy/wispy). There is a small increase in aluminum (Al) content in hydrothermal illite relative to diagenetic illite. The shift to greater Al content can be more easily seen near 2200 nanometers using Spectral Evolution's new ultra high resolution oreXpert field portable spectrometer.

Resolution at FWHM for the oreXpert is:

- ◆ 1.5nm @ 700nm
- ◆ 3.0nm @ 1500nm
- ◆ 3.8nm @ 2100nm

Resolution is achieved using three high density solid state thermoelectrically cooled photodiode arrays:

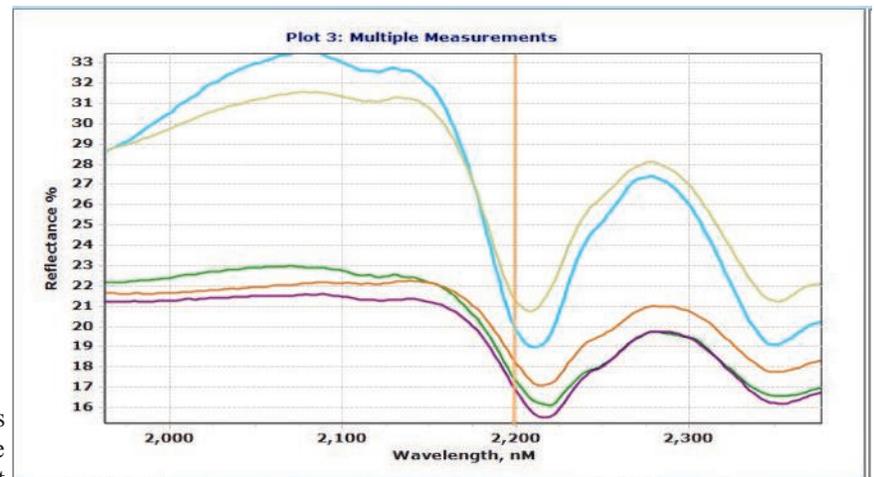
- ◆ 1024 element TE-cooled silicon photodiode array detector (VIS-NIR)
- ◆ 512 element TE-cooled InGaAs photodiode array detector (SWIR 1)
- ◆ 512 element TE-cooled extended InGaAs photodiode array detector (SWIR 2)

Using EZ-ID software with the oreXpert enables fast and accurate mineral identification of illite from other clays. EZ-ID matches the target spectra against two libraries of more than 600 minerals and 1600 spectra. It also allows you to create your own project-specific library from known samples as you scan.

Illite typically has two absorption peaks at 1400 and 2200nm. The 1400 feature is derived from the OH-overtone stretching vibration while the 2200 feature is related to the Al-OH bending combined with OH stretching. To see the shift in illite associated with uranium deposits, the hydrothermal illite will have a small but higher concentration of Al as opposed to the diagenetic illite and will show absorption features at 2190 nm and 2200 nm as opposed to the diagenetic illite which will show the absorption feature at 2205, 2210, 2220 nm. By tracking the alteration changes in illite a geologist can get a better idea of how close an ore body might be and create a more accurate mineral map prior to drilling or by scanning core after a few test holes have been drilled.



*oreXpert ultra high resolution spectrometer can be used with a 3mm Miniprobe for scanning small sample features.*



*oreXpert and DARWin SP Data Acquisition software showing multiple sample scans of illite at a site with the shift to hydrothermal*

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