Located in Northern Saskatchewan and Alberta, Canada, the Athabasca Basin is the world’s primary source of high-grade uranium. The basin covers roughly 100,000 square kilometers (38,610 square miles) with a surface consisting mainly of ancient (Paleoproterozoic) sandstone sediment that unconformably overlies hydrothermally altered basement granites and metasediments. Mineralization occurs at, above or below the unconformity and within the structurally-disrupted crystalline basement. These unconformity-type uranium deposits account for about 28% of the world’s primary uranium production. The ore grades are high, typically grading from 2% to 20% U3O8.

One of the exploration keys to success in the Athabasca basin is identifying the alteration clay mineralogy along the mineralized zone. Broad alteration halos in the region grade from various species and mixtures of kaolinite to illite to ore zone chlorite. Characterizing these alteration halos is important to ore zone definition. As a result, mining companies operating in the region need a fast, reliable method for determining mineralogy and differentiating between clay constituents.

ASD TerraSpec® Mineral Analyzer Opens New Uranium Exploration Potential in the Athabasca Basin

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Boulder, Colorado, 80301, USA
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ASD TerraSpec 4 Mineral Analyzer - The De Facto Technology for Mineralogical Analysis

As the exploration of mining sites and potential uranium deposits has grown within the Athabasca Basin, the ASD TerraSpec 4 mineral analyzer has become a critical piece of analytical equipment. Recognized as the de facto technology for field mineralogical analysis, the TerraSpec instrument is a rugged, portable mineral spectrometer that has been optimized for real-time mineralogical analysis in a variety of field environments. The TerraSpec analyzer provides rapid identification of alteration minerals that provide geologists with vectors to economic mineralization. With a Hi-Res 6 nm model and a Standard-Res 10 nm configuration, the TerraSpec analyzer can be applied to a range of mineral exploration applications, including deposit mapping, as well as various mining production measurement applications. The TerraSpec analyzer’s ability to rapidly identify and differentiate between clays, in particular, is why it is so widely used in the Athabasca area.

Recently, the TerraSpec 4 instrument helped Uravan Minerals, Inc. assess the mineral content of drill cores taken along a five kilometer (3.1-mile) east-west corridor within the Athabasca Basin. Specifically, the analyzer helped Uravan map the spatial distribution of clay mineralogy through the cored sandstone intervals, which supplemented Uravan’s surface geochemical project and direction for future investigation.

TerraSpec’s Important Role in the Uravan Exploration Program

In September 2012, Uravan completed an exploration program on its Halliday property in the Athabasca Basin. The technical program consisted of five diamond drill-holes and an infill-surface geochemical sampling program capitalizing on the results from earlier reconnaissance drilling by project partner Cameco.

The new drill-holes were positioned to test the potential occurrence of uranium mineralization at depth along a prominent five-kilometer-long, east-west trending corridor. This corridor was initially defined by a linear clustering of anomalous surface geochemical signatures that were coincident with a major EM (electromagnetic) geophysical conductor and a linear magnetic low.
While no economic Uranium mineralization was found in these drill cores, the five drill-holes, representing 4,836 meters of core, were logged with a TerraSpec mineral analyzer to determine alteration mineralogy by identifying clay species present in the drill core. Illite, dickite, kaolinite and chlorite were identified by the TerraSpec analyzer. Mineralogy data obtained from the TerraSpec instrument from these five drill core, combined with data from the two of the earlier drill core, clearly showed an east to west trending of illite alteration indicative of increased hydrothermal activity westward. This can be seen in Figure 2.

![Figure 2: Halliday drill hole log section of clay alteration profiles](image)

The combination of TerraSpec spectral mineralogy data with structural interpretations and Uravan’s innovative surface geochemistry approach has allowed the company to more effectively refine high priority exploration targets on the property. While more interpretive work is required to fully understand the positive geochemical signals coming from depth as well as defining any economic deposits west of the current study area, the analytical results of the program demonstrate how the TerraSpec mineral analyzer is successfully utilized by exploration geologists to define clay mineralogy, alteration geology and determine areas of future exploration.

**References**


http://www.uravanminerals.com/properties/outer_ring_project/halliday/


About ASD

ASD Inc., a PANalytical company, is a leader in providing spectroscopy solutions for mineral exploration and ore analysis in mining production. As ASD’s premier mining exploration instrument, the TerraSpec 4 is a state-of-the-art mineral spectrometer designed to help mineral geologists target potential mining sites more quickly and more accurately. Through fast, non-destructive field scans, the TerraSpec 4 analyzer identifies key minerals, aiding in various exploration applications, including:

- Exploration targets
- Directing drilling programs
- Deposit mapping
- Core logging
- Early stage mine planning

To learn more about our exploration and mining production capabilities, visit www.asdi.com/applications/mining

For details about our latest portable mineral analyzers visit us at http://www.asdi.com/products/terraspec

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