

# SPECTRAL EVOLUTION

## Identifying Minerals Associated with Copper Exploration

Exploring for porphyry copper deposits can involve the identification of pathfinder carbonate minerals. Minerals like azurite and malachite are secondary copper minerals found in oxidized zones of copper bearing ore deposits. With an oreXpress and EZ-ID software with the USGS and optional SPECMin libraries, rock samples at outcrops were scanned and illite, azurite and malachite identified. A mineral map was subsequently created and a drilling plan set up for the project.

oreXpress is a high resolution/high sensitivity, field portable NIR spectrometer. Covering the full UV/VIS/NIR range from 350-2500nm, an oreXpress is lightweight and rugged with photodiode array design for no moving optical parts. Scans of the sample were taken with oreXpress and a contact probe. The results were analyzed on a laptop using Spectral Evolution's EZ-ID mineral identification software and matching to know samples from the USGS and SPECMin libraries.

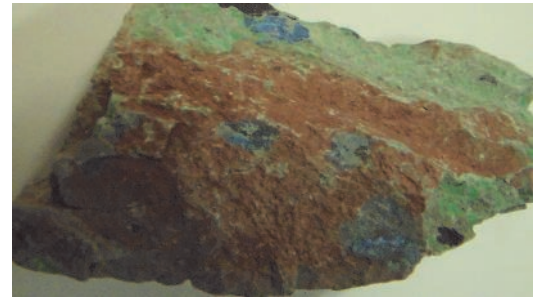
As seen in the photo of the sample the largest area of the rock is the brown portion. The spectra analyzed with EZ-ID identifies this as a clay, illite. By setting up the match regions to focus on various absorption features in our scan we have been able to fine-tune our identification of this mineral.

The green color on the sample is malachite, a secondary copper related mineral as identified by EZ-ID. Here we have focused on a distinctive doublet absorption feature to narrow down our identification to malachite.

The distinctive blue color is azurite and was the most difficult to measure due to size and position on the sample. Once again, by setting a match region at the very deep and distinctive doublet around 2241- 2420nm allows us to refine our confidence in the identification.

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Sample rock from an outcrop in Mexico



Illite clay common near porphyry copper



Malachite a secondary copper mineral



Azurite is a pathfinder mineral for copper

