FLEET

Comet™ mineralogy model, Valeriano Cu-porphyry project

Client

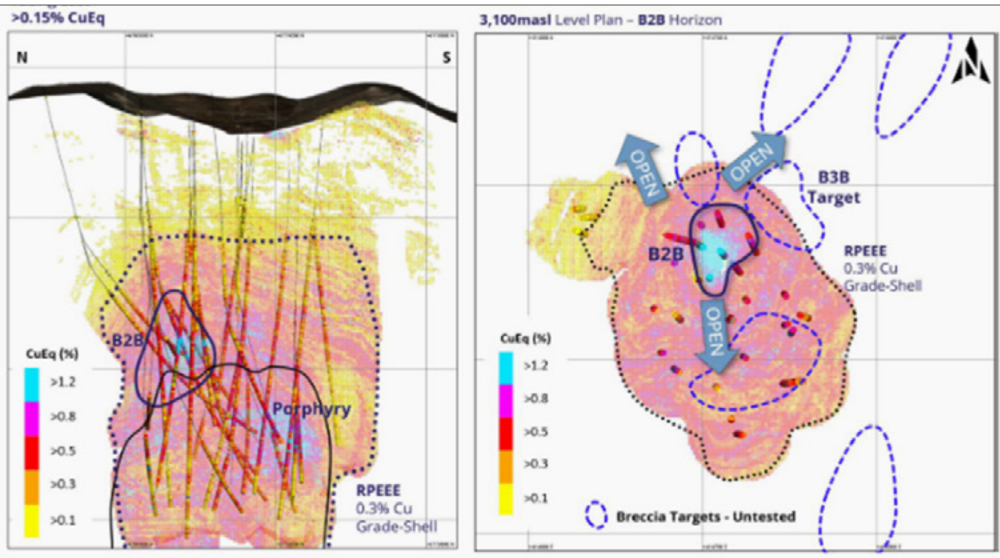
ATEX Resources is exploring the 100% owned Valeriano copper-gold project located 125km east of Vallenar city, within the Link Belt, in north-central Chile. Valeriano hosts a large copper-gold porphyry Mineral Resource.

Overview

Valeriano is a textbook copper porphyry system with a deep potassic alteration zone giving way to shallow phyllic alteration and a related lithocap. Each of these domains contain specific gangue mineralogy that impacts exploration decision making as well as metallurgical domaining of the orebody.

Valeriano is currently being drilled out by Atex Resources, who recently announced a resource statement with an Indicated Resource of 475 Mt at 0.88% CuEq (0.58% Cu, 0.25 g/t Au, 1.39 g/t Ag and 70.4 g/t Mo) at a cutoff grade of 0.35% Cu, and an Inferred resource of 1,511 Mt at 0.75% CuEq (0.50% Cu, 0.20 g/t Au, 1.16 g/t Ag and 70.6 g/t Mo) at a cut-off grade of 0.35% Cu.

Using Comet ™, a part of Fleet Space's ExoSphere platform, we have developed a modal mineralogy model of the available drill hole samples based on assay data to help guide decision making for exploration and mining at Valeriano.



Cross section and plan view (3100masl) view of the Valeriano ore body published by Atex Resources https://atexresources.com/_resources/news/nr-20250923.pdf

Valeriano
Atacama region, Chile

ATEX Resources

Challenge

A whole of deposit mineralogy model is difficult to acquire. Visual logging is subjective and not quantitative. Geologists easily miss fine grained minerals and are poor at estimating mineral abundances.

Spectral methods are excellent for identifying phyllosilicates but they are not quantitative and require another round of instrumental analysis, adding both time and cost to a program and have specific analytical requirements and limitations.

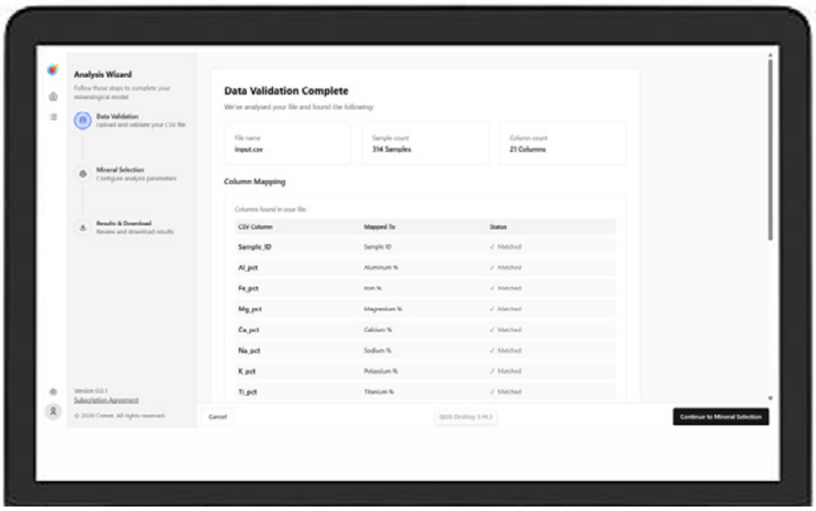
Solution

Comet™, a part of Fleet Space's ExoSphere platform, provides a thermodynamically constrained mineralogy model across the entire deposit.

Comet™ is a mass balance calculation system that estimates mineral percentages from whole rock assay data.

The required input is 4 acid digest ICP or fusion XRF data. The user interface asks for an ore deposit type (eg porphyry Cu with advanced argillic alteration, low sulfidation epithermal) to construct a list of minerals present in your system.

Selection of appropriate minerals is critical to obtaining a reliable mineralogy model. The output is a csv file with estimated mineral percentages ready to load into any mining software package.



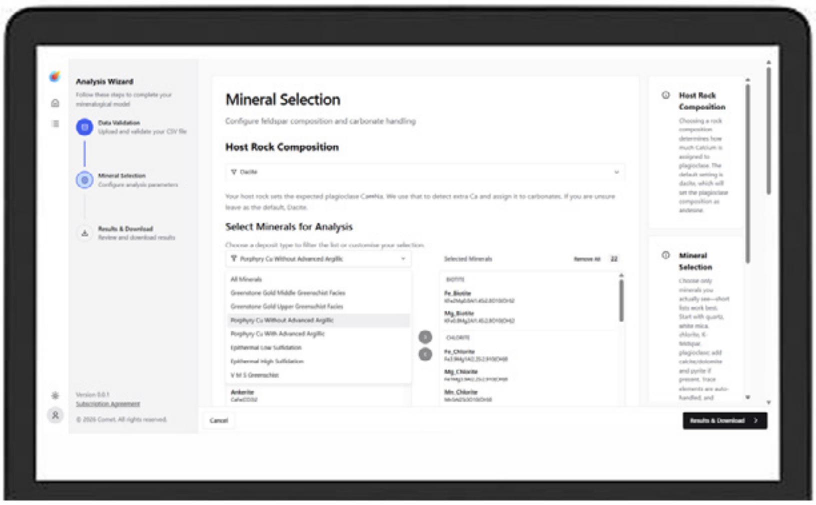


Figure Caption

Screenshots from the Comet™ app. Once the uploaded data has been validated by Comet™, the user is able to select a mineral deposit type from which a pre-populated list of minerals will be selected. Careful curation of the mineral list is essential to obtaining a plausible solution through Comet™.

Results

A plausible mineralogy model has been returned from Comet™ modelling.

Total feldspar content increases towards the orthoclase-albite tie line on the K/Al vs Na/Al diagram, and is more abundant at depth across the porphyry system, in line with geological analysis.

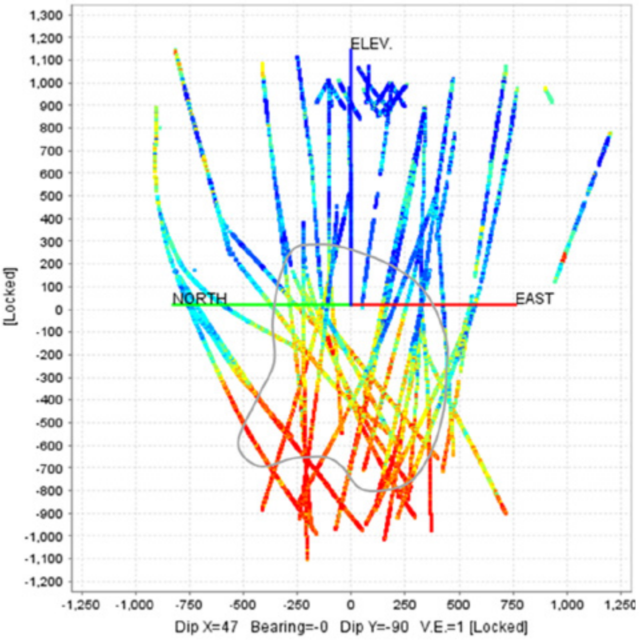
White mica shows a high abundance around the muscovite node, and is spatially correlated with the phyllic alteration zones.

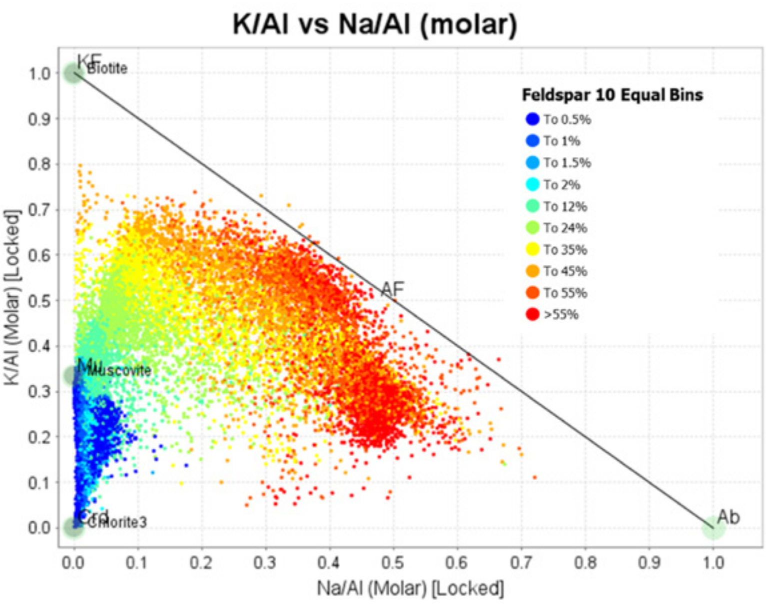
Even though SiO2 is not reported with a 4 acid digest method, Comet™ modelling is designed to provide an estimate of quartz content. The results show high quartz abundance in the advanced argillic zone, which is geologically plausible.

Pyrite content decreases in all directions away from the pyrite node, indicating the model is plausible and when plotted spatially shows a clear correlation with phyllic alteration zone and a depletion in the potassic core.

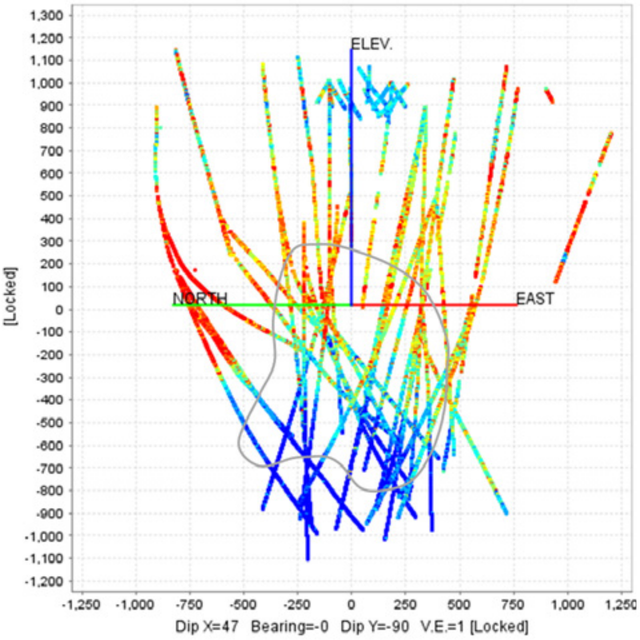
Finally, the percentage of anhydrite is also given in the Comet™ model. Anhydrite is strongly associated with the high-temperature, magmatic–hydrothermal core of porphyry systems and the Comet ™ model clearly delineates that anhydrite occurs in the deeper, potassic core of the Valeriano system.

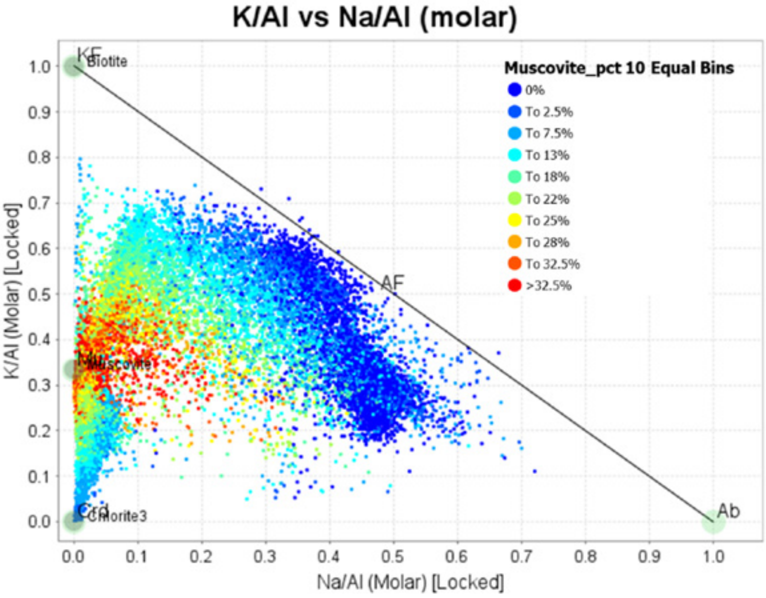
Total Feldspar



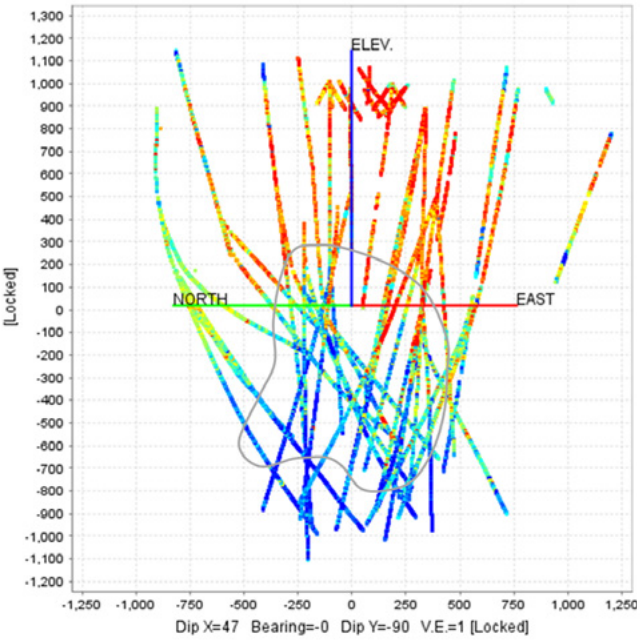


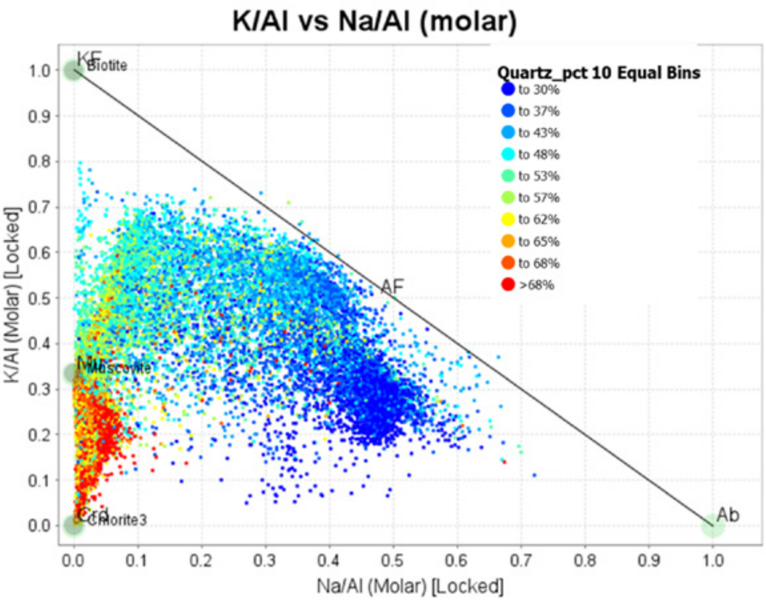
Muscovite



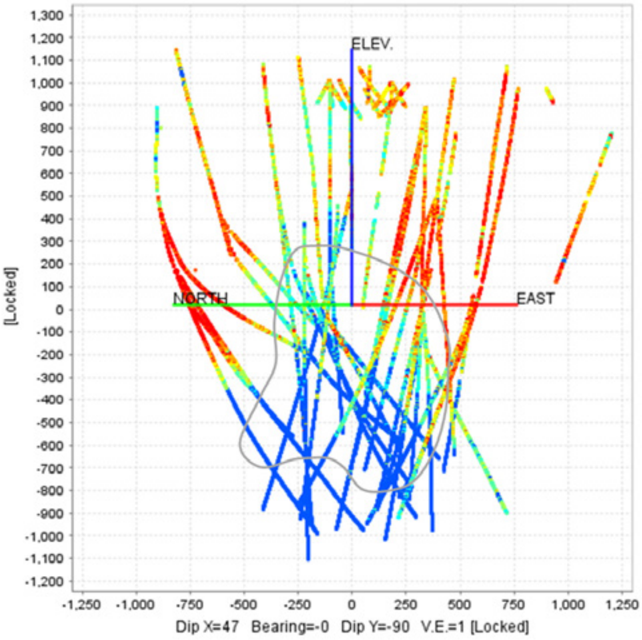


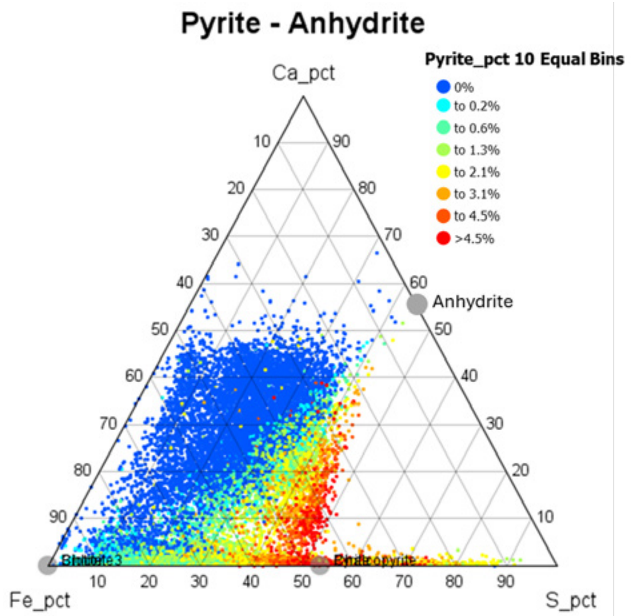
Quartz



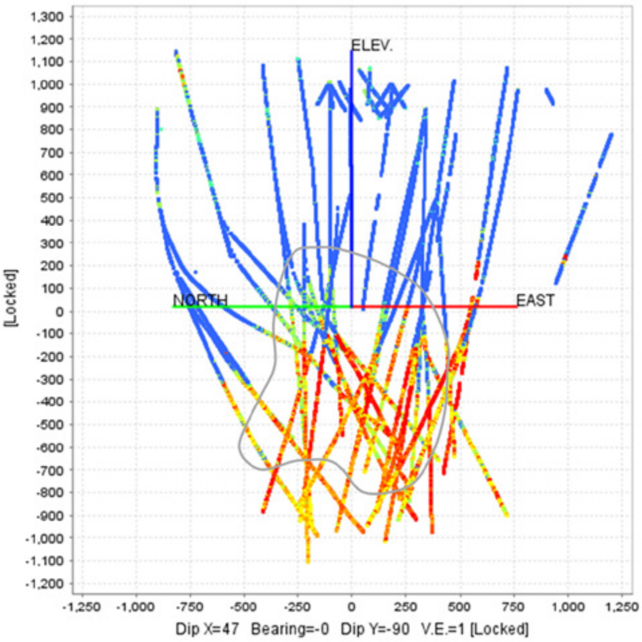


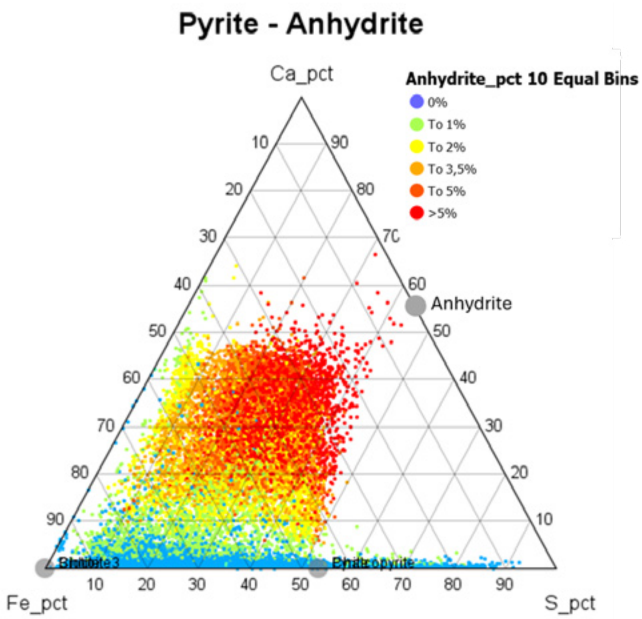
Pyrite





Anhydrite





Impact

Mapping and understanding the spatial variability of mineralogy from your drill holes is an important part of exploration.

It is also a critical part of orebody modelling. Understanding processing costs and rates, recoveries and waste management all hinge on understanding the distribution of minerals across the orebody.

The Comet ™ modal mineralogy model from Valeriano has returned a plausible mineralogy model. The Comet model can now be used to domain the orebody gangue assemblage to guide metallurgical test work. In particular, we can see that pyrite occurs in a shell that is generally external to the copper ore body, although not universally. Likewise, muscovite white mica is zoned, with the upper portion of the copper orebody showing higher muscovite percentage than the lowermost, which has implications for how the orebody will behave during processing in different stages of the mine life.

Furthermore, the muscovite abundance calculated from assay results by Comet™ can be used to show the direction of fluid outflow from the porphyry intrusion, and thereby provide spatial vectors towards further mineralised zones in the local area.

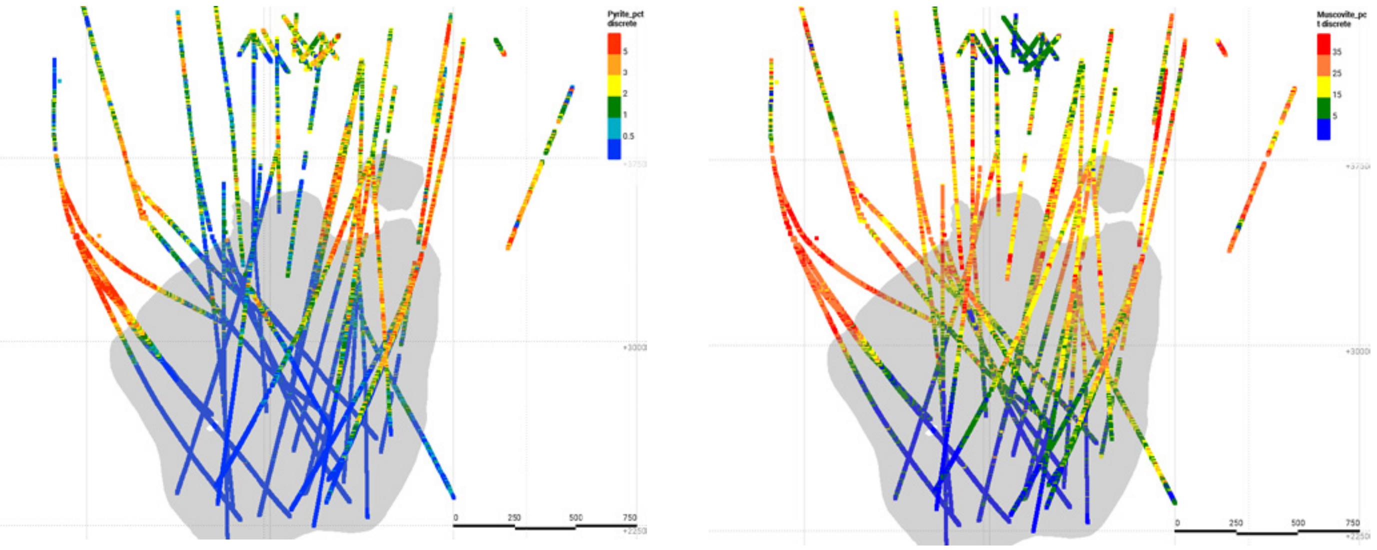


Figure Caption

Long section through the Valeriano deposit showing the Comet™ mineralogy models for muscovite and pyrite along with the 0.2% CuEq grade shell.