

SEG 2023 Conference: Resourcing the Green Transition

It's Never Too Early for Geometallurgy – Geometallurgy in Exploration

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Most geologists would agree that geometallurgy is the integration of geological and metallurgical data to build a model that predicts the mineral processing response of all domains in an orebody. Metallurgical testwork data are key to such models, but there is still much that can be done in terms of geometallurgy well before the first metallurgical test samples are selected. From the first exploration drill hole into significant mineralization, we can start to think about the geometallurgical characteristics. As more drill holes are completed, geometallurgical domains can be interpreted. To do this we need to understand the geology, geochemistry, and modal mineralogy of the mineralization and interpret the mineralogy data in terms of mineral processing options.

At the exploration stage, for base (\pm precious) metal deposits, we are looking at whether the mineralogy would be suitable for metal recovery via flotation-based mineral processing or leaching. From a flotation viewpoint, we can use mineralogy data together with the known flotation response of the various sulfides (and other minerals) to assess the applicability to our mineralization. We can also predict likely trace metal credits and penalties. The grade alone cannot tell us if a metal is likely to be a penalty or a credit; we need to look at what minerals the trace metals are hosted by and their association with the major ore minerals. From a leaching viewpoint, we can use the presence or absence of leachable ore minerals and acid-consuming gangue minerals to assess whether this option would be economic.

Understanding mineralogical variability across an orebody and its potential implications on metallurgy at the exploration stage makes for a rapid transition from exploration to the studies phase. At this stage metallurgical testwork can be combined with steadily increasing geological, geochemical, and mineralogical knowledge to build a truly predictive geometallurgical model.