

M. Stephen ENDERS, 2014. Applied Geometallurgy: A Common Sense Approach. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 1272.

Applied Geometallurgy: A Common Sense Approach

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It just makes common sense for the geological and mineralogical characteristics of ore deposits to be fully integrated with metallurgical properties and mineral processing indices. This is not a new concept. Georgius Agricola first commented about processing methods for different ores and regions in *De Re Metallica* in 1556. Ransome and Irving (*Economic Geology* Vol. 1, No. 1) both mention the need for mining engineers and metallurgists to have an understanding of economic geology as it related to the profitability of mining operations. Even in the 1950's and 1960's, geologists learned ore dressing and metallurgists learned geology and mineralogy. By the 1970's, however, the various disciplines fell into a silo pattern, which wasn't corrected until early in this century. Yet some companies were already focusing on geometallurgical studies by then.

At the 2003 AMIRA Exploration Manager's Conference, this author urged AMIRA to initiate research projects that benefited the mine geologist and mine operators rather than focus solely on exploration, and he strongly urged them to consider geometallurgy as an important topic. AMIRA project P843 (2005-2009) was their most successful single project ever and resulted in major advances in the development of tools and tests that can be used to better characterize the geometallurgical characteristics of ore deposits. Subsequently, AMIRA has gone on to develop follow-on projects, there have been

several GEOMET conferences, there are now five or six full professors of geometallurgy in Universities around the world, and several commercial laboratories are now offering geomet services.

Geometallurgy is simply a holistic description of ore deposits relating physical, chemical and mineralogical characteristics of ore types to metallurgical, mining and geophysical properties. The objective of these studies is to build deposit models and production forecasts based on the concept of "delivering the right material, to the right place, at the right time" such that mining and processing operations can be optimized to yield the highest metal recoveries at the lowest cost, which maximizes the profit from and extends the life of a mining operation.

Cupric Canyon Capital, LLC's Khoemacau Cu-Ag project in the Kalahari Copper Belt in Botswana is an excellent example of a common sense approach to geometallurgy. The company realized that getting the resource and geometallurgical models right were critical to the success of its feasibility study. This involved structural, sed-strat, geochemical, and geophysical studies along with drill-hole logging, assaying and other analytical testing, QemScan, and a suite of metallurgical tests. The result was six integrated ore body models of lithology, alteration, oxidation, structure, mineralogy, and grade. These can be further improved with additional detail and studies once mine operations start up.

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