

EXPLORATION MODELS: YOU CAN FLIRT WITH A MODEL; YOU SHOULDN'T MARRY ONE

Ken Maiden
International Base Metals Limited

ABSTRACT

When designing our exploration programmes, we depend heavily on models. Such models may be either -

- Empirical - where we establish the relationships between known deposits and the host rocks, then search for repetitions of those geological relationships. The problems with this approach are that we might not focus on the critical controlling factors and furthermore we don't necessarily see the entire range of possible mineralised environments; or
- Conceptual - where we establish how we think known deposits form, then apply those concepts in our search for other deposits. The problem with this approach is that our theory may be wrong or incomplete, leading us to focus on controls on ore localisation which may be invalid.

The paper examines case histories from four sediment-hosted copper districts -

- The Mount Gunson area in the Stuart Shelf of South Australia;
- The Klein Aub area in the Kalahari Copperbelt of Namibia;
- The Mount Isa and Lady Annie areas in the western Mount Isa Block of Queensland;
- The Kopermyn area in the Kaoko Copperbelt of Namibia.

In all cases, early syngenetic models have proven inadequate to explain the distribution of copper and have been replaced by diagenetic (basin compaction) models and increasingly by epigenetic models involving flow of copper-bearing fluid during compressive deformation. The choice of model affects the design of exploration programmes: diagenetic (basin compaction) models focus on stratigraphic controls on ore localisation whereas epigenetic models encourage a focus on structural controls.

From an exploration perspective, it is important not to be wedded to a specific model. Multiple working hypotheses not only encourage us to test different controls on metal concentration but also open the mind to other possible mineralised settings ("ore niches") that might not yet have been discovered.