APPENDIX 2

GEOINFORMATICS REPORT

Probabilistic Targeting Using MOCA (Monte Carlo Targeting Software

Probabilistic targeting is a model-driven method of targeting for mineral deposits using Monte Carlo (MOCA) probabilistic algorithms. It uses a petroleum systems approach that divides the mineralizing system into components that could include source, host, pathway, focus and trap. The major advantages of probabilistic targeting over other methods are:

- uncertainty and risk are incorporated into the targeting procedure
- a wide range of scores are generated for a small number of input layers making only a few key layers necessary
- reduction to a few key input layers demands rigorous geological assessment of the deposit / exploration model and critical evaluation of the input datasets, which improves the integrity and fidelity of targeting
- it employs a multiplicative probabilistic scoring method in contrast to additive methods used by most other targeting methods, thereby reducing the number of false positives by eliminating areas that lack any of the key features
- it provides an effective method of ranking targets and, if employed consistently, should allow for comparison of targets across projects

The key parameters for 3D MOCA targeting are the interpreted **fundamental controls on the targeted mineralization systems and three-dimensional modeling of structural and lithological features** to enable spatial location of the generated targets.

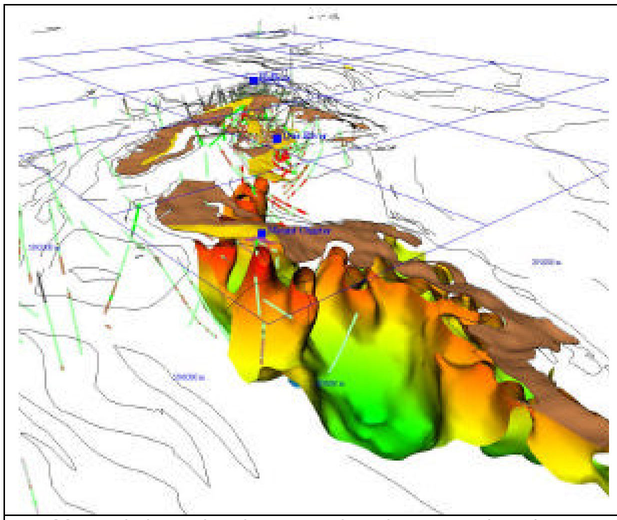
The controls on mineralization are derived from study of published literature, field observations, and observations made by other exploration companies released into the public domain.

Three-dimensional modeling of geology is constrained using geophysical data at both the local and regional scale. Magnetic and gravity inversions are coupled with available geological mapping and drill-hole data to create detailed local scale models whereas regional scale models incorporate analysis of the broader geophysical datasets.

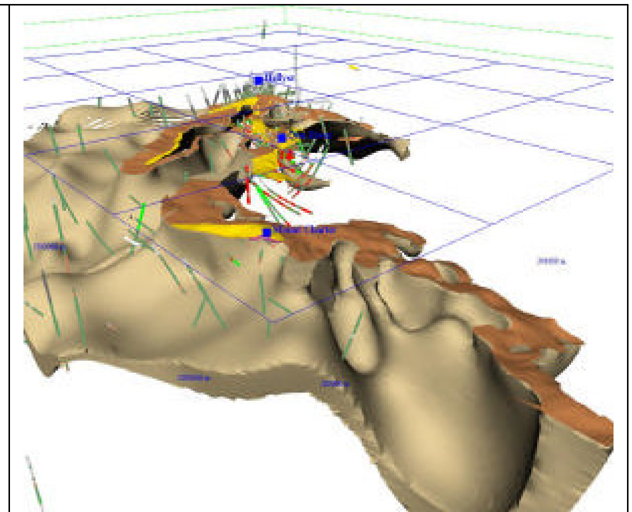
In order to construct the 3D probability grid, a number of probability and uncertainty parameters must be applied to the modeled features.

Each geological feature modelled has an associated **probability and uncertainty that the feature exists (Pex and Uex)**. Pex and Uex account for uncertainties in data quality and interpretation. The probability is related to how many other possible interpretations there are for the data. For example, if you have a small round anomaly in a magnetics survey you could have a small intrusive body, a zone of magnetite alteration, or even a building. If these three possibilities are equally likely, the Pex of an intrusion is 0.33. If there were mapped intrusions in this area, the Pex would be increased to reflect the higher likelihood of the magnetic anomaly being an intrusion. The uncertainty accounts for the quality of data being used for the interpretation. For example, an intrusion picked from a magnetic survey with 400m line spacing would get a higher uncertainty than one picked from a survey with 50m line spacing.

Each feature also has an associated **probability and uncertainty that the feature has the desired effect (Peff and Ueff).**



Magnetic inversion, interpreted geology at surface from mapping, and geological log-data in drill-holes



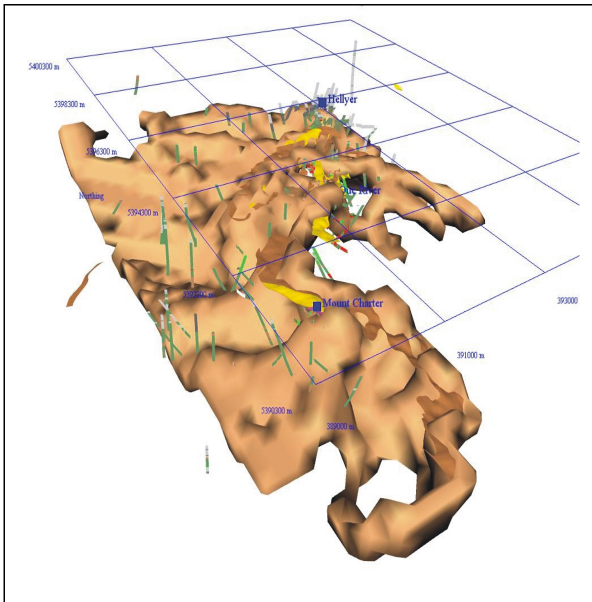
Resulting 3D geological model constructed by combining all available data types

For example, when trying to estimate the probability that a certain fault is a pathway for mineralising fluids, Pex is the probability that a fault is present and Peff is the probability that the fault carried mineralising fluids. In this case the Peff could be higher for faults in a dilational syndepositional orientation (e.g NNE) at the time of mineralisation or it could be higher for faults with evidence of geochemical anomalies. The Ueff is an estimate of how well we can constrain the Peff. The Peff and Ueff are often subjective and it is unlikely that they will be correct values. However, relative estimates of these values should be possible. This implies that the actual values for the final probabilities for each layer and the probability of success will be approximate but that relative values should be valid.

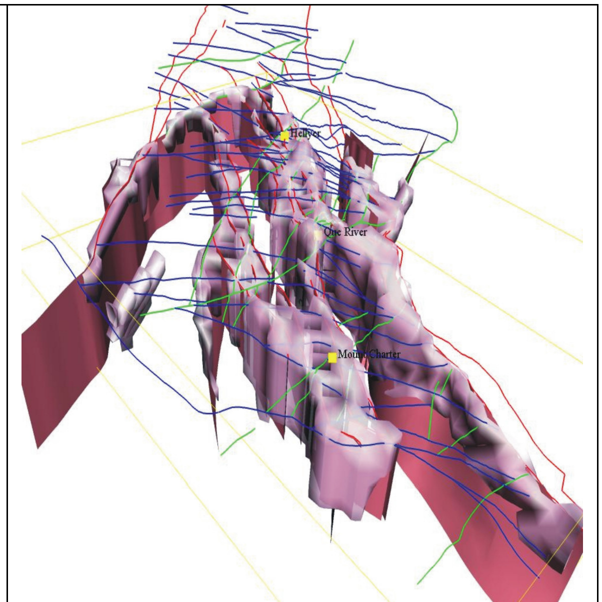
An area of influence (AOI) is a buffer that is applied to each object when it is placed on the final output grids. This is applied because a given feature could influence a larger area than its mapped extent. For example, a fault on a map may actually comprise a structural zone with a wider influence on surrounding host rocks than suggested by a simple line on a map. The slope is the amount of probability to drop per kilometer after the AOI. This reflects the decreasing effect of an object as you move away from it and also tries to account for spatial uncertainty. The slope is reported in units of per km because the probability does not have any units. So a slope of 0.5/km indicates that the probability will be zero 2 km away from the AOI. The slope for an object is not constant because the spatial uncertainty is dependent on how well constrained an interpretation is. So if a unit that is pierced by drill holes will have a steeper slope near the drill holes and a broader slope away from them. Results from the MOCA targeting are presented on 3D probability grids. The targeting uses output probability grids with a 100m and 200m grid cell size.

To generate three-dimensional targets, the geological framework and probability grid is interrogated based on the four components of **host, pathway, focus, and trap**.

From earlier compilation of published interpretations and interpretations of the open-file data, the key **host** rocks to particular mineralization systems are identified. The probability grid can be filtered to show areas of higher probability that the host stratigraphy is present.



Pex of 50% for modeled host stratigraphy



Pex of 50% for fluid pathways defined by structures

Similarly, key structures interpreted as fluid conduits for mineralizing fluids are assigned buffer zones or areas of influence. Intuitively, areas of intersection of these **pathway** zones with host stratigraphy are the broader target areas.

Other features interpreted as integral in the localization of mineralization such as cross-cutting faults or folds are also assigned areas of influence and each structure continues to retain it's original Pex/Peff. This represents the **focus** input layer.

The **trap** input layer incorporates evidence that the target metal/sulfides were precipitated within a preferred host horizon. The primary consideration for the trap site is therefore the recognition of geological, geochemical, and/or geophysical evidence for metal precipitation.

Three datasets respectively were chosen to test for trap sites;

- Drilling data with recorded evidence of sulfide precipitation, either directly observable or reflected in assay analyses,
- Surface geochemical data including C-horizon soil sampling, MMI analyses, rock-chips or stream sediment sampling,
- Ground and airborne electromagnetic (EM) data to test for coherent massive sulfide material providing sufficient electrical continuity and conductivity to directly indicate a VHMS trap environment.

Both the drilling and geochemical data can be considered discontinuous datasets and not amenable to the production of ubiquitous gridded coverage across the modeled region. Consequently, these data were used adjunctively to test for multivariate metal anomalism at each Host-Pathway-Focus (HPF) site generated by the 3D MOCA targeting algorithm.

Probabilities of existence and effect are multiplied as such to give a probability of success for each given target area. These are directly comparable with other targets and the method thereby acts as a transparent ranking tool in terms of prospectivity.

Modified from a description of the Geoinformatics Inc. MOCA process supplied by Dan Core and Graeme Cameron from that company.