Estimation Risk Related to Drillhole Location – are you sure that the global histogram of your drill hole data matches that of the resource? Some case studies.. .

J Moore1, D Corley2 W Randa3 and M Grant4

1.Chief Geologist, Oceanagold, Brisbane Qld 4101. Email: Jonathan.moore@oceanagold.com

2.Group Geologist, Oceanagold, Brisbane Qld 4101. Email: doug.corley@oceanagold.com

3.Principal Geologist, Oceanagold, Brisbane Qld 4101. Email: [wesly.randa@oceanagold.com](mailto:wesly.randa@oceanagold.com)

4.Senior Geologist - Resource Definition, Oceanagold, Macraes NZ. Email: [matt.grant@oceanagold.com](mailto:matt.grant@oceanagold.com)

Keywords: estimation risk, drill hole location risk, moving point-of-origin, pre-mining, post-mining, sensitivity estimates

# ABSTRACT

At the completion of open pit mining, multiple moving point-of-origin resource drill hole data sets were extracted from exhaustive grade control data. Sensitivity analysis of resource estimates generated from the data sets was undertaken (two or more OceanaGold case studies will be discussed):

• Actual 5m x 5m open pit grade control sample data was extracted onto a 35m x 35m grid to generate a single resource drill hole data set. The grid origin was then shifted 5m east and another extraction completed. Forty-eight consecutive east and north shifts ultimately resulted in 49 unique 35m x 35m drill hole sets being created. Note that the 49 drill hole data sets sum to the original exhaustive grade control data set.

Comparison between the 49 equally possible drill hole sets identified a significant risk of selecting a 35m x 35m drill hole data set that did not globally represent the resource that was being modelled.

• To quantify the potential impact of this, 49 recoverable resource estimates using Multiple Indicator Kriging (MIK) were completed, with the only changes being the input data and the indicator thresholds / means applied. Any spread in the estimates attributed solely to the underlying data.

The spread of sensitivity estimates for case studies, based on 35m x 35m drill hole spacings, was found to be globally significant.

Given that prior to mining, it is not possible to know whether our drill hole data globally represents the resource that we are modelling:

* How do we capture this risk? For instance, Conditional Simulation, a widely used risk evaluation tool, assumes a representative data set (e.g. variogram and histogram). The case-studies however, show that this cannot be assumed and cast doubt on this approach to risk-evaluation.
* How do we accommodate this risk in resource classification?

As mining advances:

* How do we interpret and understand reconciliation?
* At what point do we adjust our estimation parameters to “improve” reconciliation?

Case studies below provide a framework to answer some of these questions.