

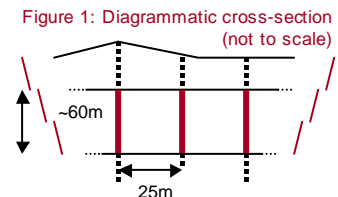
Case History: Mining Selectivity and Equivalent Block

Business Context

In the early 80's, Cogema undertook on behalf of Somair, its subsidiary in Niger, a reconciliation study aimed at assessing the benefits that geostatistics could bring to the mine resource-estimation and strategic-planning practices. Several *global* geostatistical estimates of a mined-out area representing about *1½ year's production* were developed and compared to the *pit production figures*.

Background

This sedimentary, flat-lying uranium deposit (Fig 1) is mined on 3m-high benches. The grade-control crew uses 5m x 5m grade maps and a hand-held radiometric scaler to assist the dozer in producing heaps of ore as homogeneous in grade as possible (Fig 2). These heaps are then loaded into 25t-trucks while new ones are formed. Each truck is scanned. The grade derived from the radiometric reading serves to dispatch the truck either to the mill or heap-leach pad and establish the mine production figures.

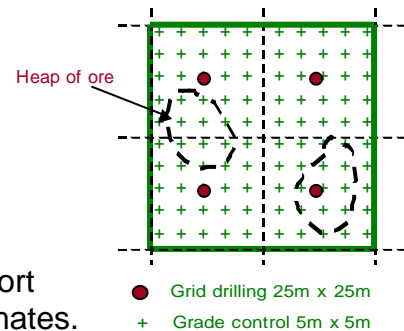


Methodology

The study did not involve the grade-control data. H Sans implemented the following methodology:

1. Variography of the 25m drill-hole data.
2. Modelling the composite-grade histogram using the gaussian anamorphosis technique.
3. Computing dispersion variances for a suite of SMU's (SMU= Selective Mining Unit).
4. Implementation of the discrete gaussian change-of-support model to produce the various global grade-tonnage estimates.

Figure 2: Typical blast lay out (plan view)



Findings

Table 1 shows that grade-tonnage predictions made using the **7.5m x 7.5m x 1.5m SMU** were close to the production figures (Actual). The high and low cut-off grades refer to the ore sent respectively to the mill and the heap-leach pad.

Table 1: Actual / Predicted Ratios

Cut-off grade	Grade	U metal	Ore
High	1.02	0.96	0.94
Low	0.99	0.93	0.94

Interpretation - Benefits

- This SMU or *equivalent block* encapsulates the concept of *effective selectivity*. It conveniently *measures* the combined effect of the *mining and grade control practices*, on the resource. All aspects of the "information effect" are incorporated into this SMU.
- *It is fascinating* to see that applying a cut-off grade to a modelled histogram of *real* SMU grades - *a straightforward approach* indeed - *did provide a good estimate of what the mine delivered over 1½ year*.
- This SMU is the *SMU to use in strategic mine planning* based on the 25m data. Global estimates can be readily prepared using the methodology outlined in this paper. The equivalent block is also easy to incorporate into a 25m x 25m block-model.

The *equivalent block* as a *tool* can serve many purposes e.g. to understand an *actual - predicted* gap, measure mining performance and develop sound mine planning strategies.

H Sans gratefully acknowledges the permission of Cogema to make public this paper.