Interpretation: Narrow Lode Deposits

Introduction

Unravelling geological controls within a narrow lode deposit is often a daunting task, complicated by multiple drilling directions and clustering of geological information. Long section interpretation simplifies the geological interpretation phase into a workable solution that can assist with drill hole planning, grade control duties and mine planning tasks.

Narrow Lode Deposit (NLD)

A narrow lode deposit is a mineralised system where the geological continuity in two of the three dimensions is significantly larger than the third dimension and typically, mining selectivity is not achievable across the third dimension. NLD's are generally tabular in form and include massive sulfide deposits, shear-hosted deposits, narrow vein deposits, skarn deposits and lateritic deposits.

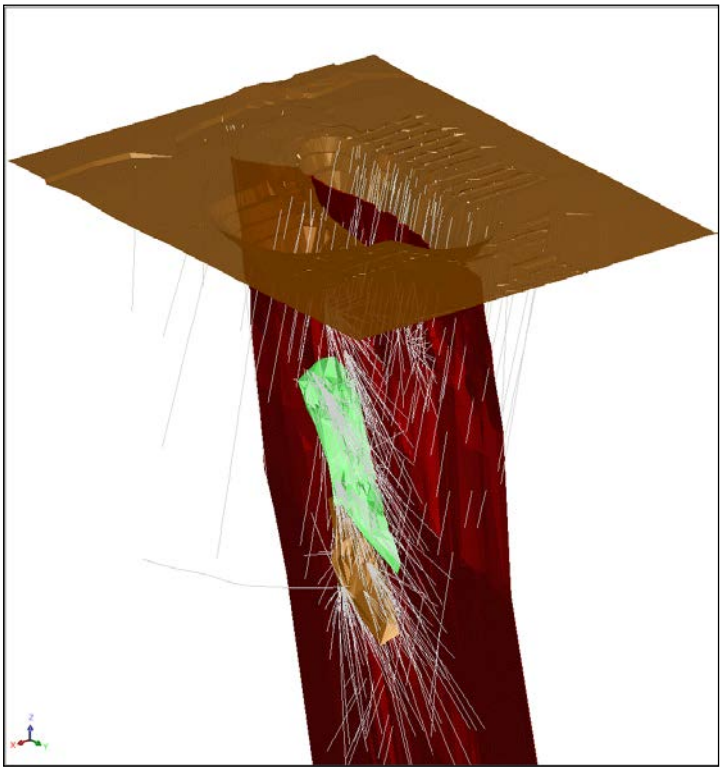

Figure 1: An example of a high grade, shear hosted gold deposit from the Yilgarn Craton, Western Australia.

Workflow

Interpretation of a NLD on long section simplifies the interpretation process by presenting or plotting geological data onto a single plan or projection. Determining what information should be plotted is dependent on the geological environment and may include mineral species percentages, lithology, alteration type and intensity, quartz vein percentages, grade variables, thickness, and geological structures or features, such as intersection of faults and vein arrays.

The workflow consists of 5 key steps:

1. Three-dimensional interpretation and wireframing of the narrow lode deposit. The interpretation could be constructed via snapped polygons or draping a surface over the interpreted hanging and footwall locations;
2. Compositing of the sampling interval over the entire interpreted width defined in Step 1;
3. Projection of the composited intervals onto a reference plan. For example a mineralized system dipping steeply towards the west would be project onto a north-south vertical plane;
4. Calculation of the interpreted width [t(x)] perpendicular to the projected reference plan. The accumulation [a(x)] variable is calculated by multiplying the interpreted width [t(x)] by the variable of interest [z(x)]:

$$a(x) = t(x) * z(x); \text{ and}$$

5. Plotting the variables of interest, such as thickness and accumulation variables onto the reference plane.

Practical Applications

The benefits of using long section interpretation for NLD's are outlined below:

Geological Interpretation:

Assisting with identifying geological continuity trends and controls on mineralization. For example, the thickness and grade tenor trends of a shear-hosted deposit were thought to be associated with the intersection (i.e. intersection lineation) of two footwall splays. The long section (Figure 2), in this example, demonstrates that the dominant trend was instead dipping steeply towards the north and the footwall splay had limited influence on the grade tenor of mineralisation;

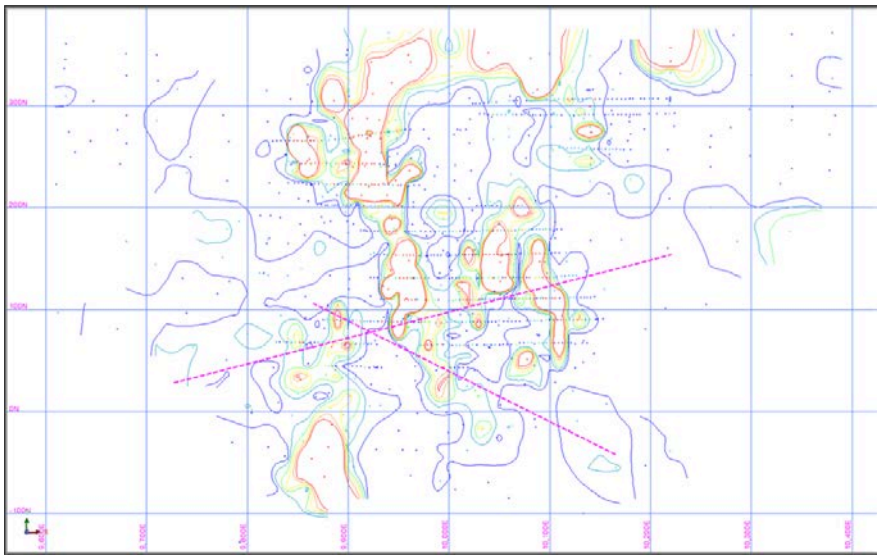

Figure 2: Long section with grade contours and intersection trace of footwall splay structures (pink dashed lines).

Drill Hole Planning and Management:

Assisting with drill hole planning by identifying areas within the project that are under-drilled with respect to a nominal drill hole spacing and can ensure efficiency of future drill hole targets by highlighting dominate trends requiring testing.

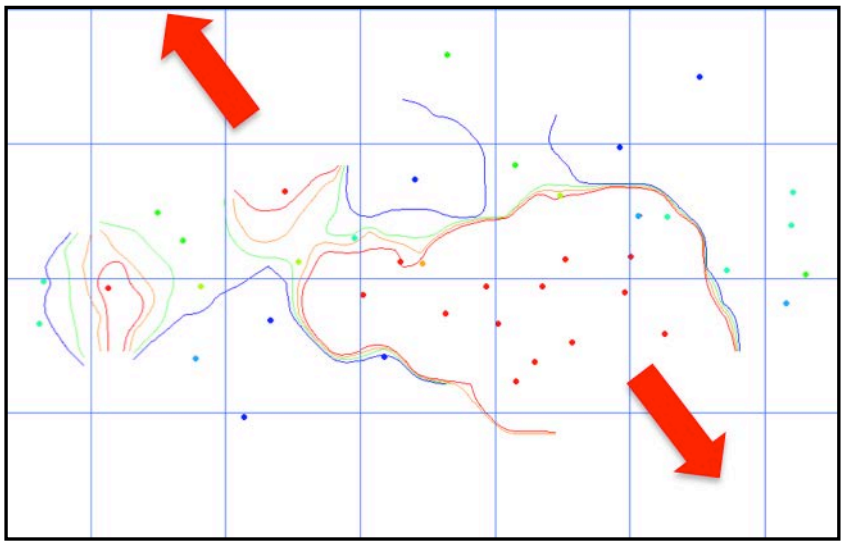

Figure 3: Long section outlining the requirement for extension drilling, as indicated by the red arrows.

Daily Grade Control:

Plotting drill hole and daily face sampling of production headings can assist with material classification and decisions regarding the extension or termination of development headings.

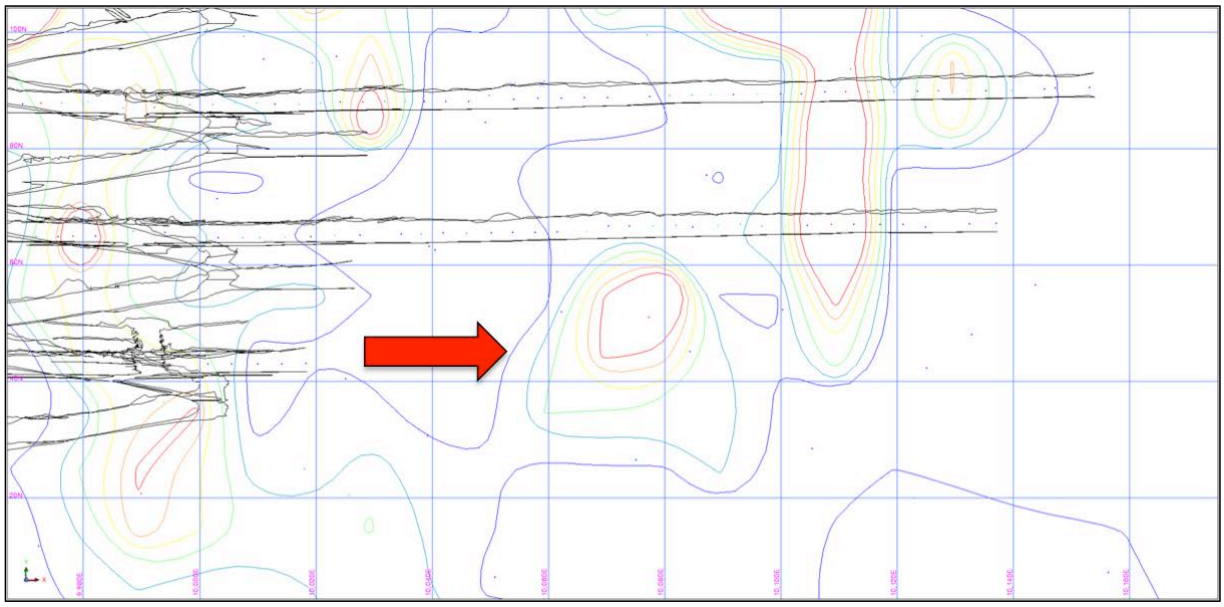

Figure 4: Development decision-making processes simplified with long section interpretations. Red arrow indicates drive development is likely to encounter 40m of low grade material before entering higher grade material.

Resource Estimation:

A lode variable thickness is characteristic of most narrow lode deposits and poses a unique problem when selecting suitable composite lengths (i.e. support) for estimation. Two-dimensional estimation techniques overcome the support and additivity concerns by estimating the accumulation and thickness variables. In these instances long section interpretation can assist with identifying zones of statistical homogeneity suitable for estimation.

Cube Consulting and Narrow Lode Deposits

Cube Consulting has worked collaboratively with clients for over 10 years, undertaking interpretations, estimations and mentoring in narrow lode deposits within Australia, Asia, Africa and South America. Utilising long section interpretations in combination with 2D estimation techniques has proved of particular benefit for nickel NLD's of the Kalgoorlie-Kambalda region, where producing clients often experienced improved reconciliation and geological control on development drives.

Some clients who have worked collaboratively with us in developing and honing NLD estimation techniques are:

- Telfer Gold Mine, Red October, Tom's Gully, Castle Hill, Wilber Mine, Blair Nickel, Long Nickel Mine, Miitel, Wannaway, Mariners, Redross, Rosie Nickel, Savannah Nickel, Lennard Shelf Lead-Zinc - Australia
- Gosowong Gold Mine - Indonesia
- Siana Gold Mine and Medusa Gold - Philippines
- Caspiche Project - Chile