



COMMITTEE FOR MINERAL RESERVES
INTERNATIONAL REPORTING STANDARDS





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Relationship of Modifying Factors to Geological Confidence

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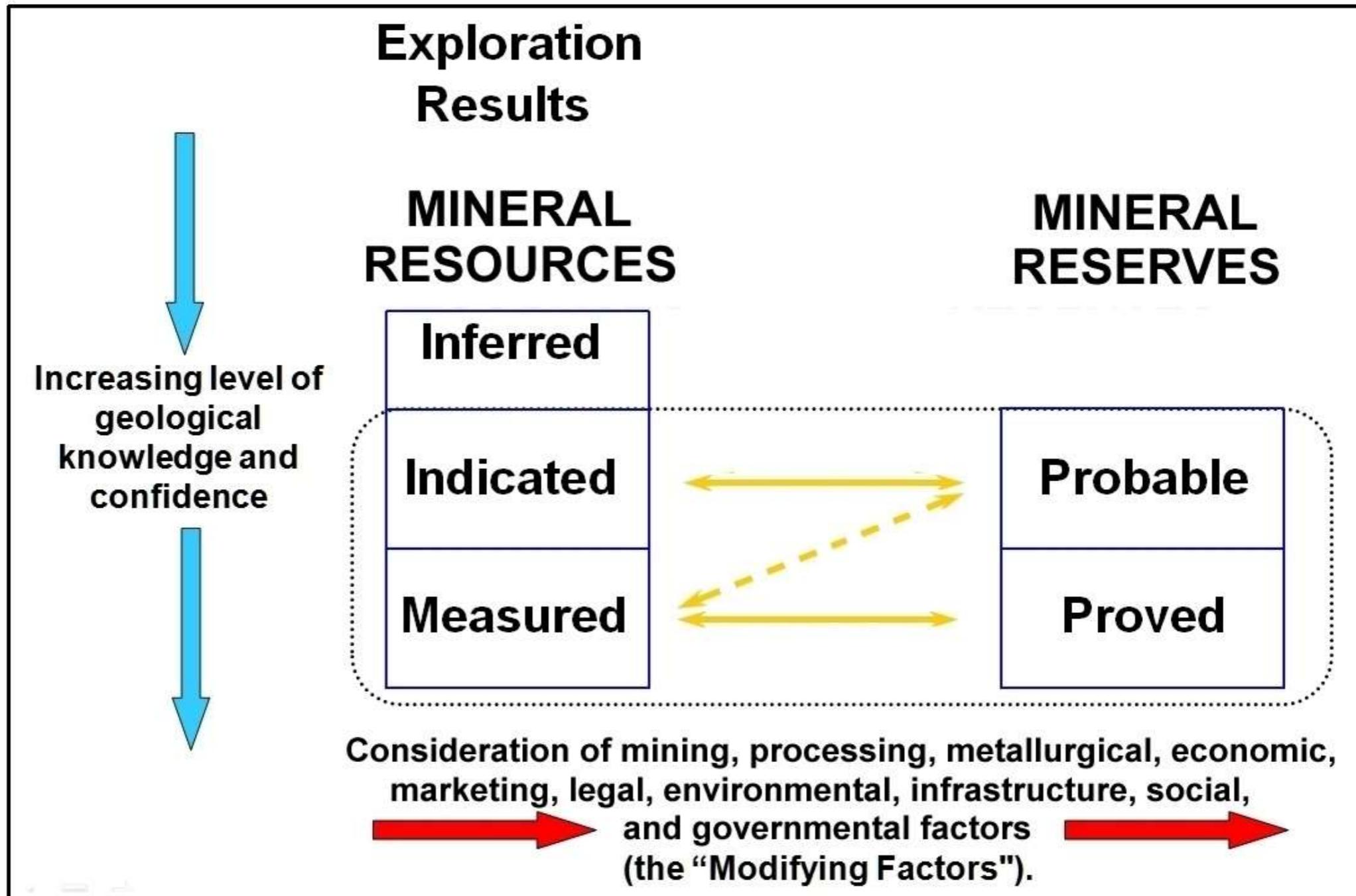
Modifying Factors and Geological Confidence

- Overview
- Examples
 - Cutoff Grades
 - Mining Selectivity
 - Production Volumes
 - Pit bottoms
 - Geometallurgical Considerations

Figure 1 has axes for Geoscientific Confidence and Modifying Factors.

- Geoscientific confidence is reflected in the classification of Resources to Inferred, Indicated, and Measured categories.
- Confidence in Modifying Factors allows categorization of some portions of Mineral Resources (Indicated and Measured) as Mineral Reserves (Probable and Proved)

However, the axes are not independent. The following slides discuss some examples of this inter-dependency and the need to consider Modifying Factors in Classification



The Cutoff Grade used to report Reserves and Resources can have a strong influence on assumptions of continuity and confidence.

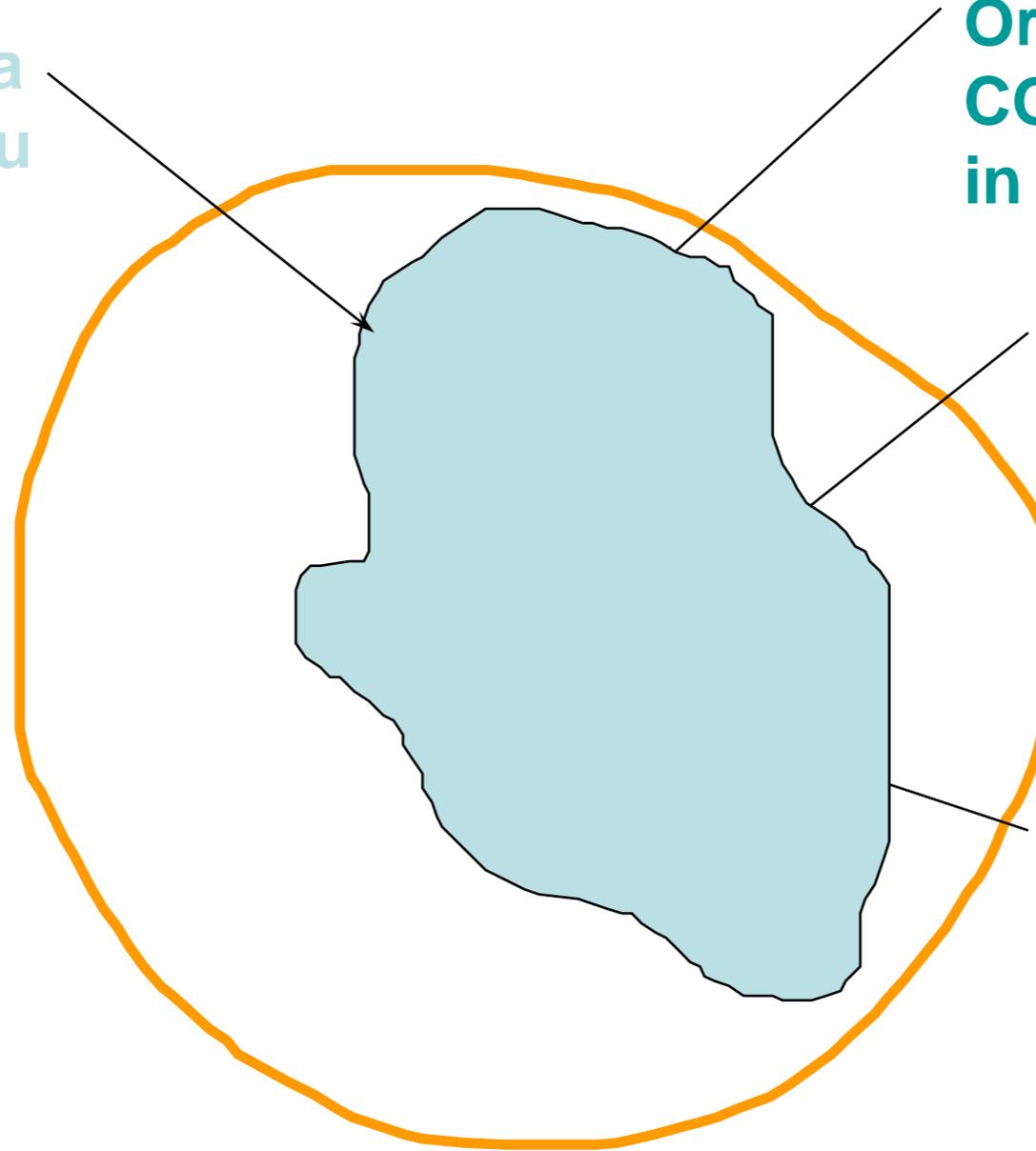
- Geological models, assumptions and classification can be completed prior to Modifying Factors being fully known
- The higher the cutoff grade, generally the lower the continuity
- Cutoff grades can change due to costs, recoveries, metal prices and other Modifying Factor changes

Ore defined by a
COG of 1.4g/t Au
in blue

Ore defined by a
COG of 1.7g/t Au
in red

Ore defined by a
COG of 2.0 g/t Au
in yellow

Ore defined by a
COG of 2.3 g/t Au
in purple



PIT OUTLINE

The data to the right shows the impact of cutoff grade and drill spacing from a deposit with both open pit and underground Resources.

Table 5: Drill Spacing Results @ 1.0Mta (3.5g/t)

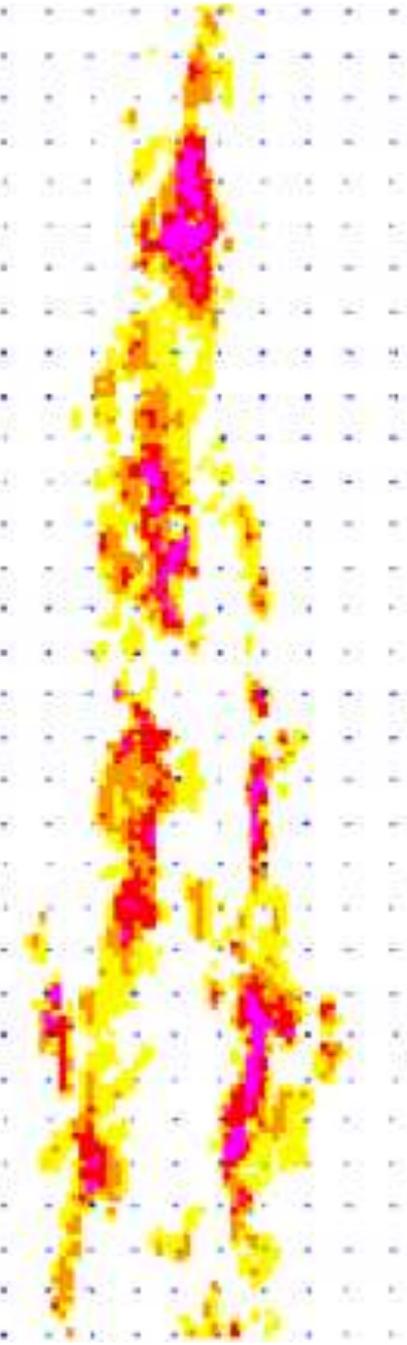
Spacing	Tonnes	Grade	Ounces
12m	100%	100%	100%
18m	100%	100%	100%
25m	95%	100%	90%
30m	95%	100%	90%
35m	95%	100%	80%
50m	70%	100%	20%

Table 6: Drill Spacing Results @ 1.0Mta (4.0g/t)

Spacing	Tonnes	Grade	Ounces
12m	100%	100%	100%
18m	90%	100%	90%
25m	85%	100%	70%
30m	70%	100%	65%
35m	65%	100%	40%
50m	85%	100%	35%

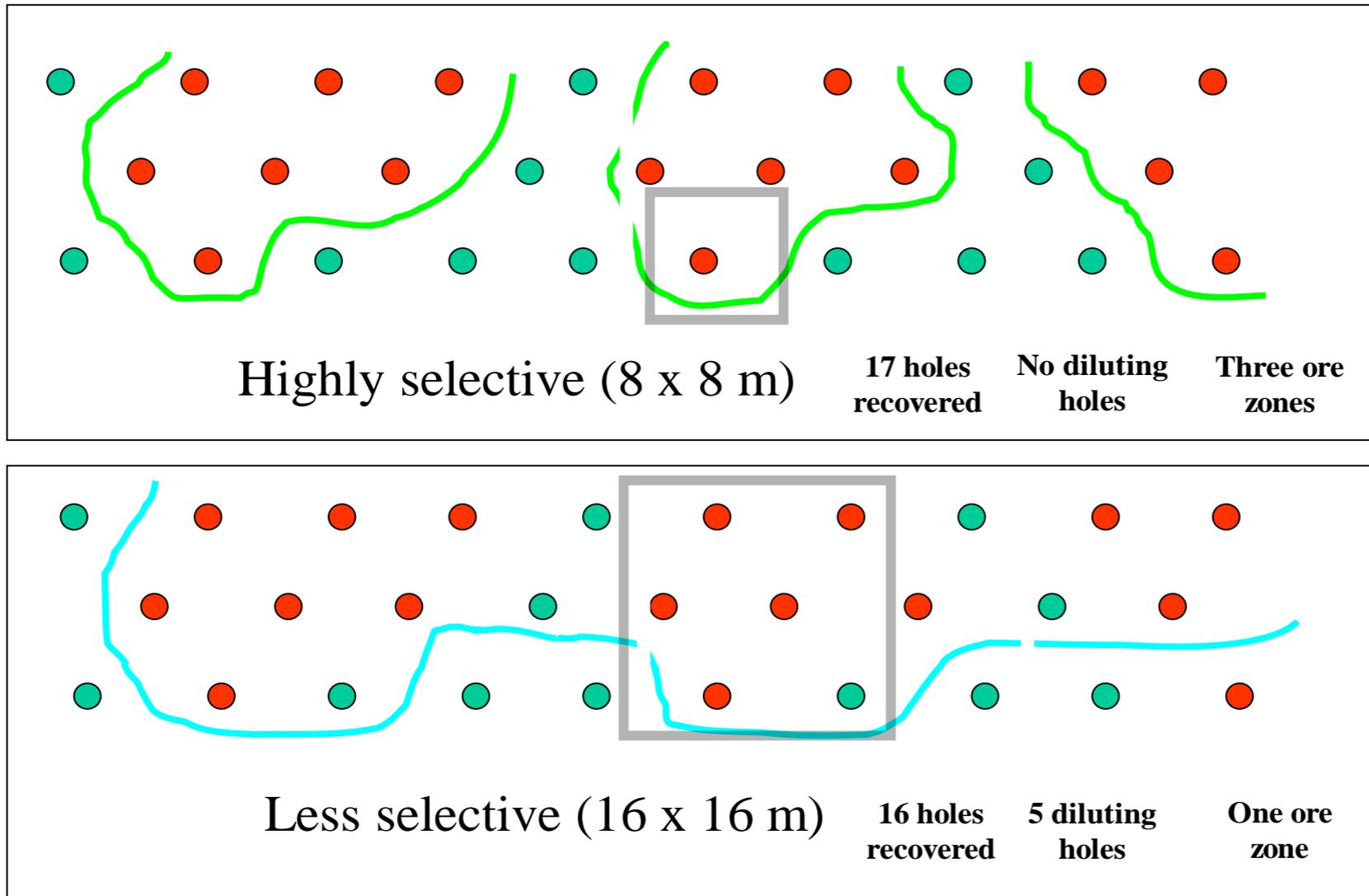
Table 7: Drill Spacing Results @ 1.0Mta (5.0g/t)

Spacing	Tonnes	Grade	Ounces
12m	75%	100%	65%
18m	70%	100%	60%
25m	40%	100%	30%
30m	15%	100%	15%
35m	10%	100%	0%
50m	0%	100%	0%



The assumptions on Mining Selectivity can also have a strong influence on assumptions of continuity, confidence and ultimately how classification can be applied.

- Reserve and Resources estimates must reflect assumptions in how the deposit will be mined.
- The more selective the mining approach is assumed, the likelihood is higher that more drilling may be required due to more discontinuities in selective approaches



- A common approach to determine drill spacing requirements for meeting classification is to determine the uncertainty that a spacing can deliver over a quarter or annual volume. For Indicated, $\pm 15\%$ uncertainty over a years volume is commonly applied.
- There is a relationship between the production rate and the spacing to achieve these targets.
- The geologist must incorporate production rate assumptions in classification

- On large open pits, the mineralization at the bottom of the pit may be of significant value in order to justify the large amount of waste needed to be removed to access the ore
- While the material may be rightly classified as Indicated or Measured, the decision to invest capital to remove the waste adds significant risk and may require additional “confidence” to be able to move forward

- While the metal of interest that is to be declared in Reserves or Resources, such as Au or Cu, may have continuities that have determined a drill spacing to achieve a category such as Indicated, there may be other parameters that should be considered in classification such as:

Penalty elements (e.g. As, Bi)

Material types (e.g. low recovery carbonaceous zones, oxidation states, process destination)

Fuel value

When considering classifying a deposit to Measured, Indicated or Inferred, the approach should consider Modifying Factors. When changes occur in Modifying Factors after classification, the classification may need to be revisited.

Questions?

Thank you