Cutting or Capping of High Assay Values

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Toronto Denver London
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Overview

- Why cut or cap high assay values?
- Emphasis on gold
- Cutting curve for producing mines
- Methods for non-producing projects
- What not to do
- Conclusions

Grade Cutting

Why cut or cap high assay values?

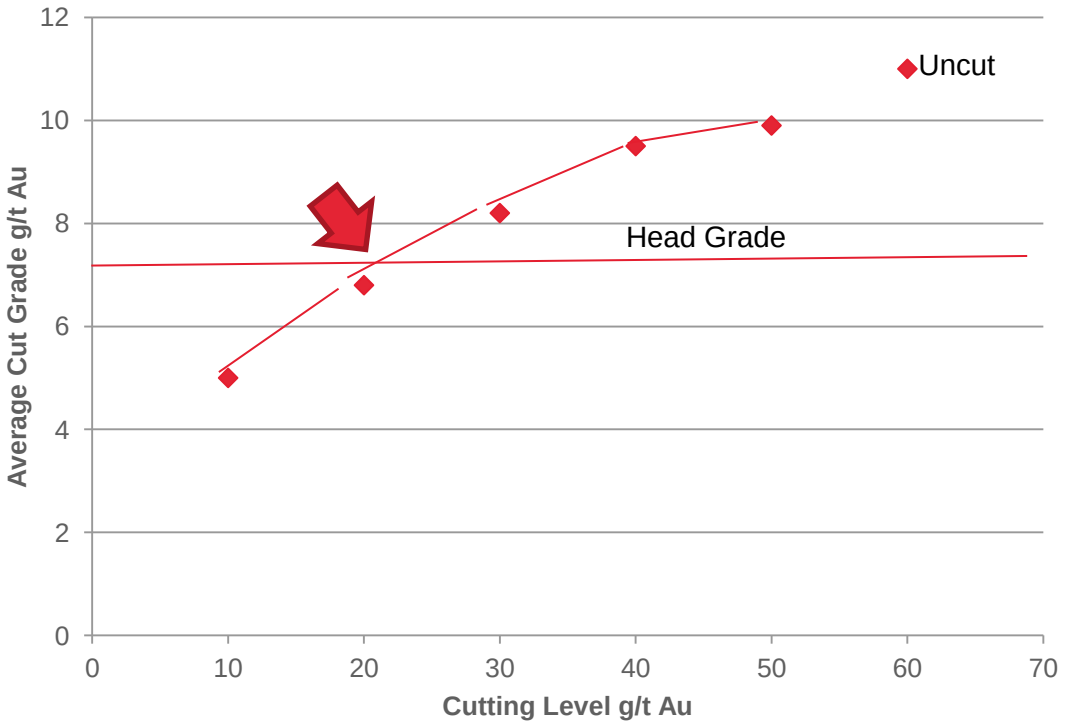
- Assay grade distributions tend to be strongly skewed
- Dominated by low values with lesser high values
- Range can be several orders of magnitude
- For gold, distribution can have an erratic tail
- For coarse gold, erratic high values can be caused by presence of a gold particle
- High assay values can have a disproportionately large influence on the average grade
- High values must be treated to reduce their influence
- Most common treatment is cutting or capping

Grade Cutting

Producing Mines

- Cutting curve – a graphical approach
- Plot average cut grade vs cutting level
- Use samples that represent material mined and processed from a specific volume or volumes
- Use calculated head grade for the same volume or volumes of material mined and processed
- Determine cutting level from head grade plotted on cutting curve
- Use a minimum of 500 or 1,000 samples

Grade Cutting – Cutting Curve



Grade Cutting

Non-Producing Projects

- Zoom in to high end of simple histogram to identify erratic tail
- Cumulative probability plot to identify erratic tail
- Decile plot to assess effect of capping on highest percentile of data set
- Cutting curve to assess effect of capping on average grade

Grade Cutting

Univariate Statistics of Gold Assay Data Set

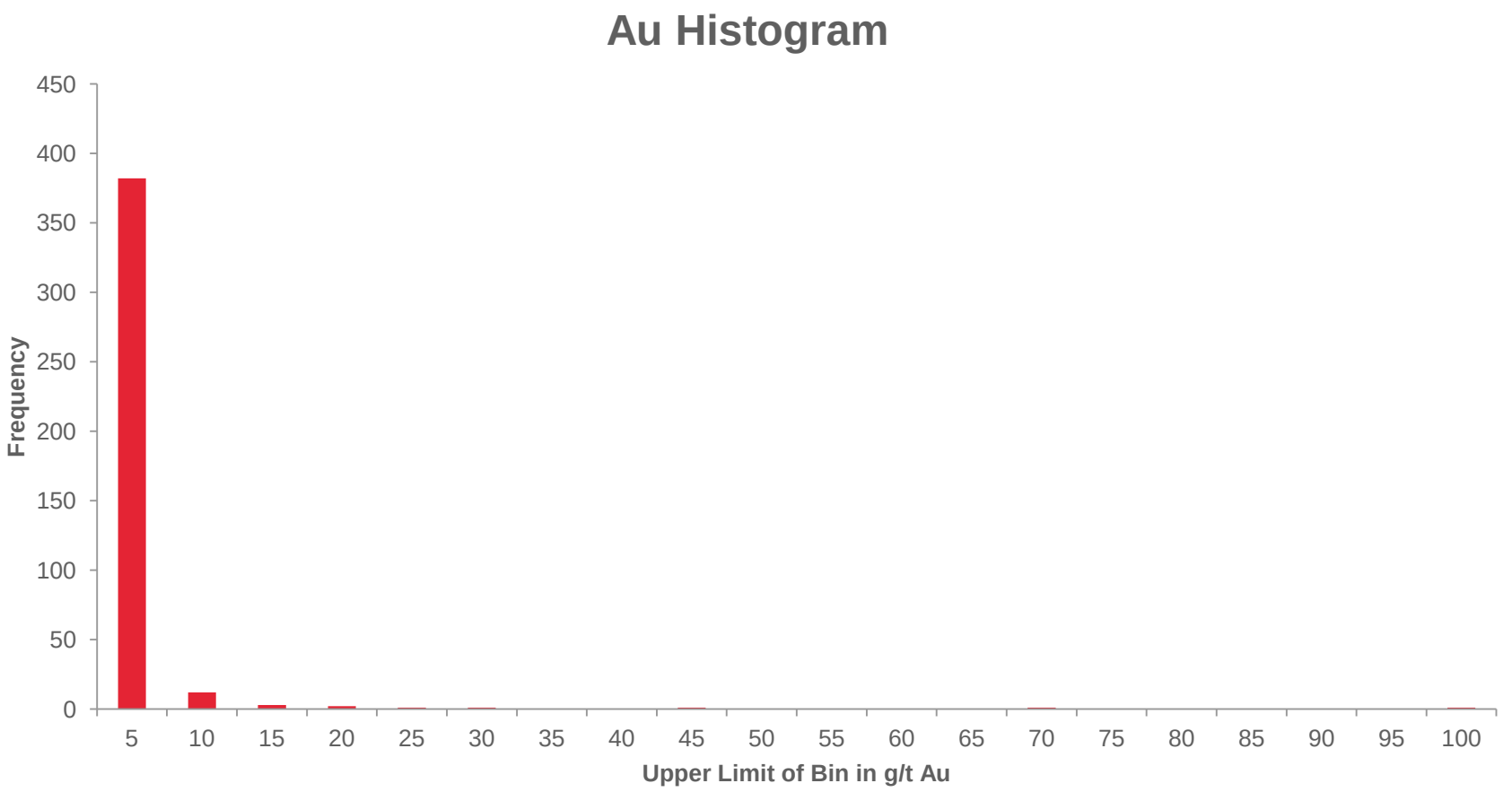
- All sample lengths 1 m
- N = 404
- Mean 1.57 g/t
- Median 0.30 g/t
- Maximum 99 g/t
- Variance 44.74
- Standard Deviation 6.69
- Coefficient of Variation 4.26

Grade Cutting

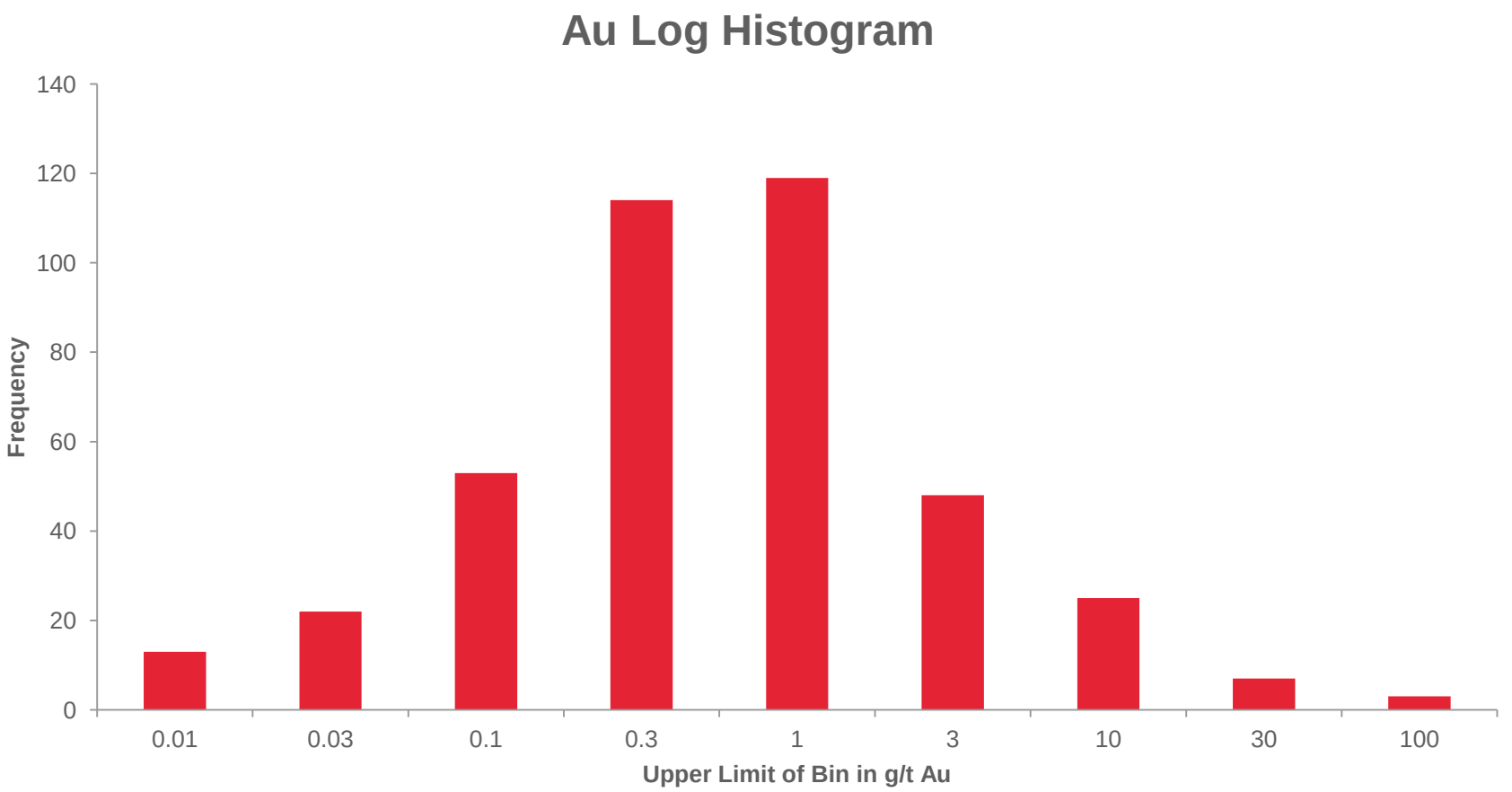
Gold Assay Data Set – Highest 15 Values in g/t

99.00
65.29
40.73
26.92
23.10
19.34
15.50
12.90
12.00
10.30
9.79
9.79
9.13
8.13
7.80

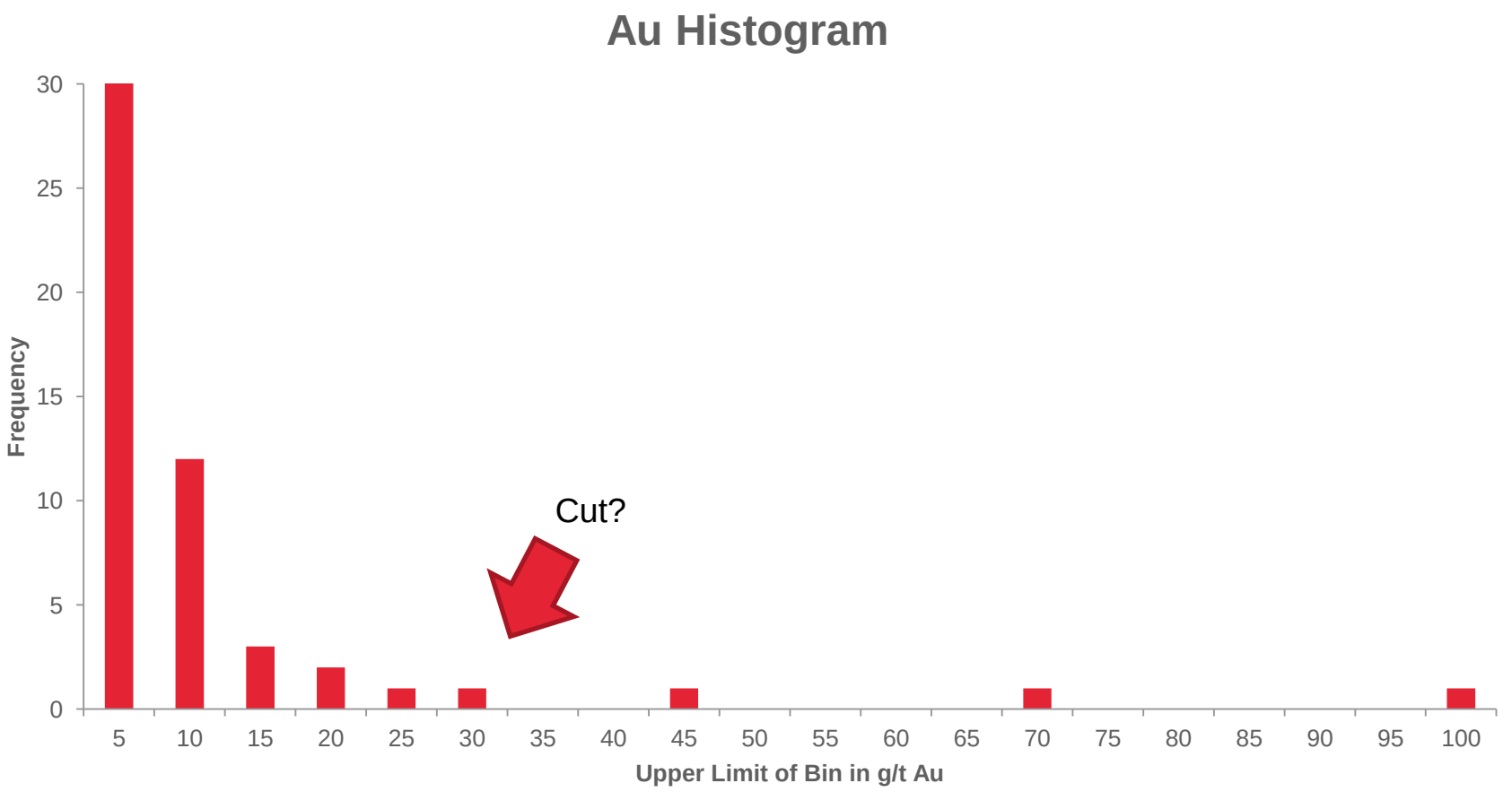
Grade Cutting



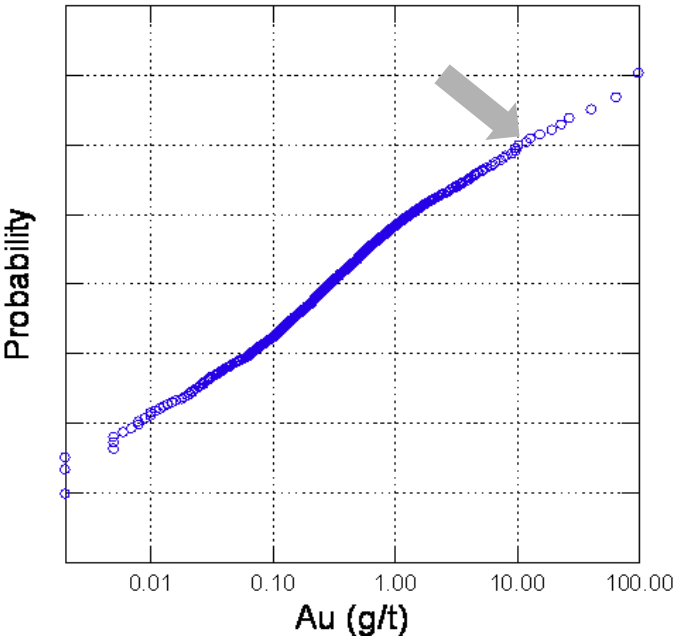
Grade Cutting



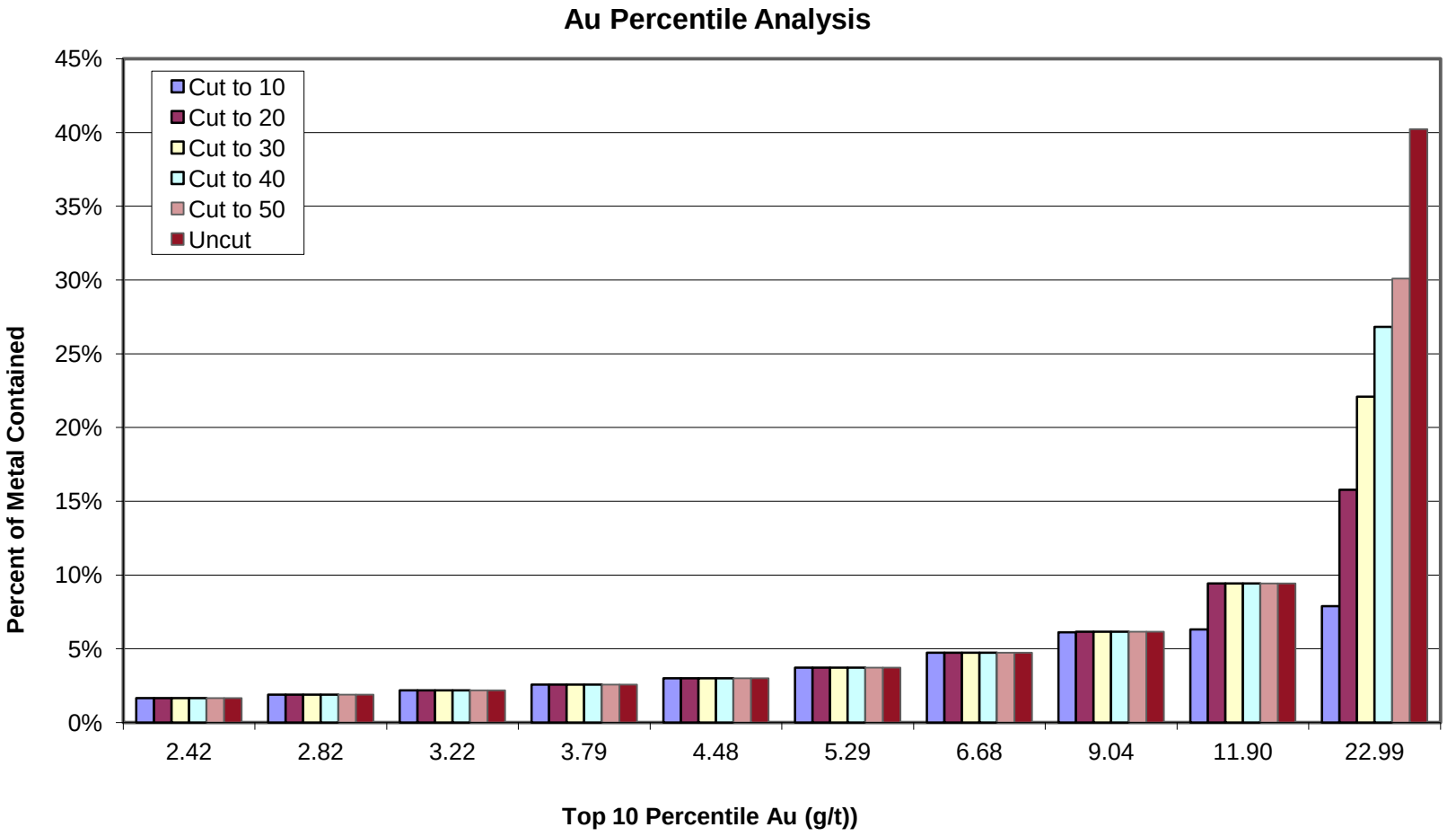
Grade Cutting – Zoom on Histogram Tail



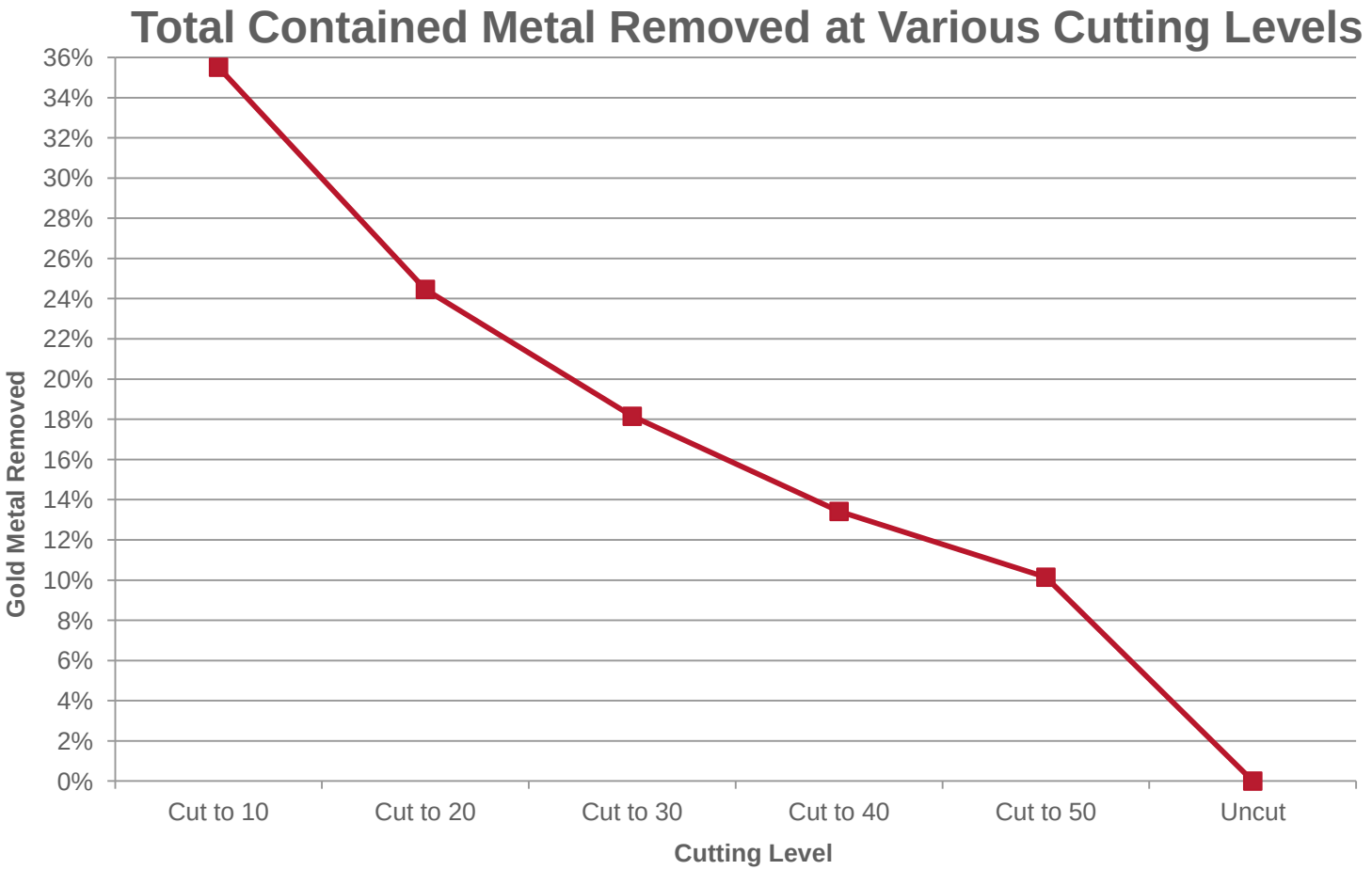
Grade Cutting – Log Probability Plot



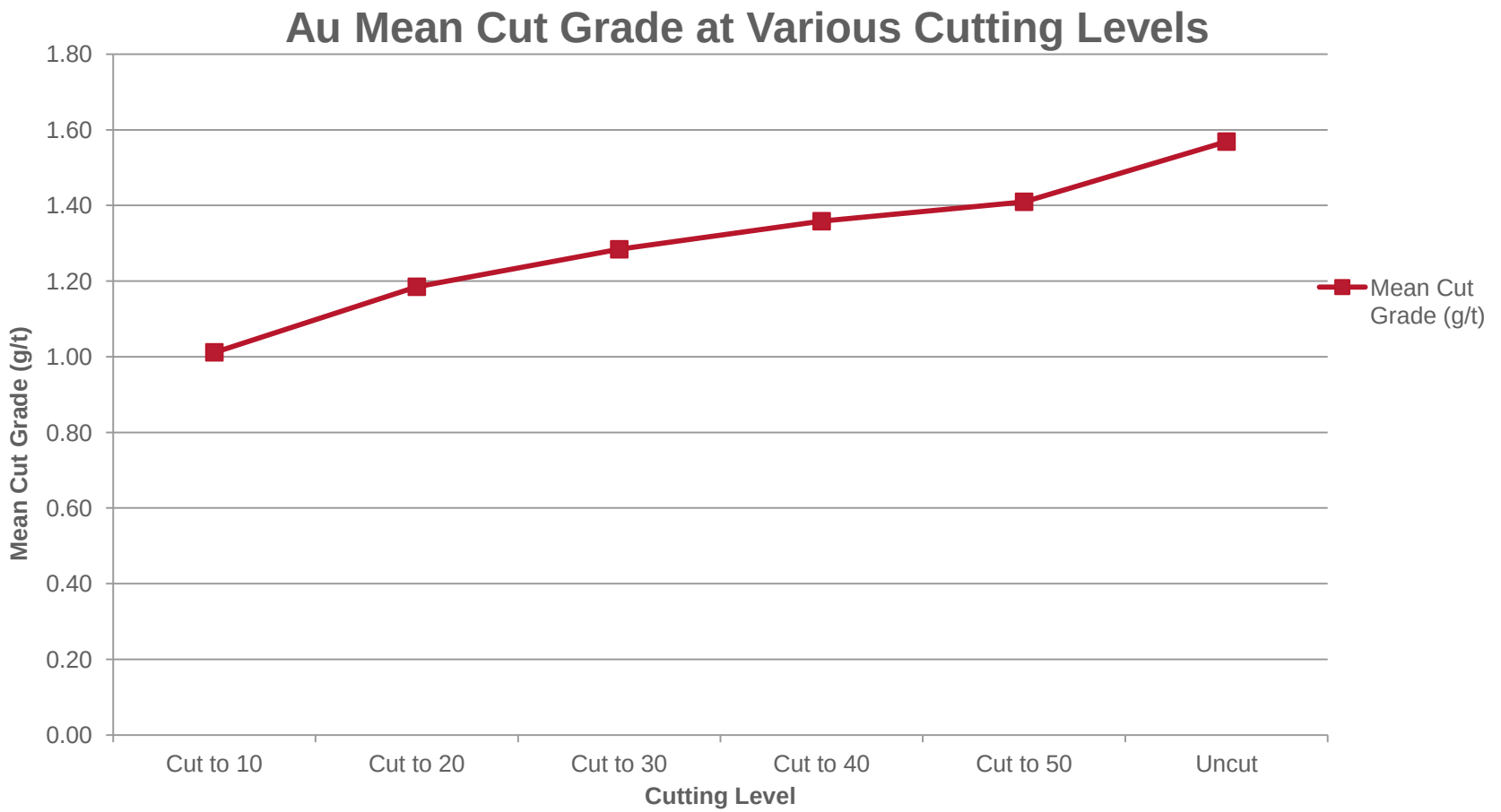
Grade Cutting – Decile Analysis



Grade Cutting



Grade Cutting – Cutting Curve



Grade Cutting

- Histogram suggests 25 g/t cutting level
- Log probability plot suggests 10 g/t Au cutting level
- Decile analysis suggests 15 g/t cutting level
- Recommend 20 g/t cutting level

Grade Cutting

DO NOT:

- Use a certain percentile of the data set such as 95%
- Use the log histogram – no detail on erratic tail
- Use too many bins in the histogram – too much detail
- Cut or cap composites instead of assays
  - High assay values can get smeared out in the composites

Grade Cutting

Conclusions

- Choose a cutting or capping level with care
- Use more than one method if possible
- For producing mines, make sure the sample data represent the mined volume
- Review the effect of cutting on the average grade and contained metal
- Consider alternate methods of reducing the influence of erratic high assays on the mean resource grade
  - Be aware that these may not have the same effect as capping

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