CSA Consultation Paper 43-401
Consultation on National Instrument 43-101 Standards of Disclosure for Mineral Projects

Dear Securities Commission Advisors, Analysts, Legal Counsel, Engineers and Geologists

I have written and presented at more than nine conferences and talks and written two articles on the reasons why mining studies tend to be overly optimistic. This work has been extensively peer reviewed. I would be very happy to hear any comments you may have. The articles are attached, I have additional PowerPoint and graphic material.

4)
5) Can the investor protection function of the current personal inspection requirement still be achieved through the application of innovative technologies without requiring the qualified person to conduct a physical visit to the project?
   a) If remote technologies are acceptable, what parameters need to be in place in order to maintain the integrity of the current personal inspection requirement?

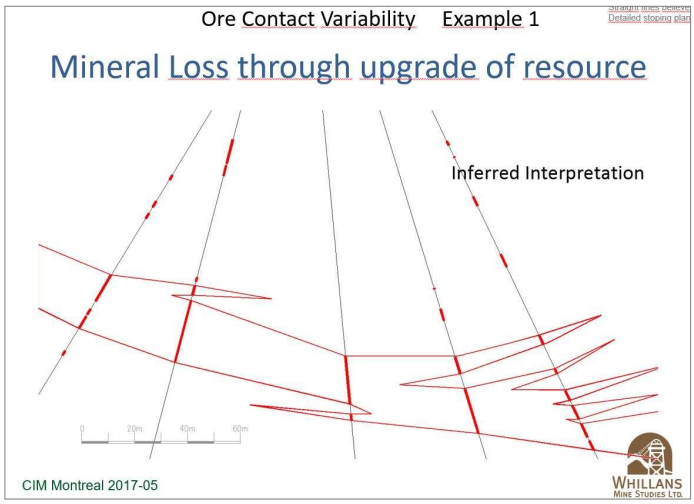
Very difficult to achieve for underground projects. Someone needs to make a site visit to make sure the property exists and the drill core is actually preserved. Generally, I am in favour of site visits because unexpected things may be seen that are material to the project. For example let us say that the failure of a waste dump is not visible from certain angles or in certain lighting that remote video might not detect. There may be signs in the local community protesting the behaviour of the mining company. Would this be visible with remote videos taken at site?

6) Is the current definition of data verification adequate, and are the disclosure requirements in section 3.2 of NI 43-101 sufficiently clear?

There needs to be language added that if a study was done by another group that was not published. The information from that study should be referenced. I have had Studies passed to other consultants not because my work was poor quality but because the numbers were not favourable enough. It is easy for mining companies to shop for consultants who give “better” numbers, sometimes learning that its better not to share all the information. When this happens the work of the previous consultancy should be referenced.

7) .
8) .
9) .
10)
11) Should we consider modifying the definition of preliminary economic assessment to enhance the study’s precision?

No! PEAs are misunderstood. It doesn’t matter how much detailed engineering is done, the report still hinges on Inferred Resources. See the following images that highlight the upgrading of a resource from inferred to measured.


Ore Contact Variability Example 1
Mineral Loss through upgrade of resource
Inferred Interpretation
CIM Montreal 2017-05
WHILLANS
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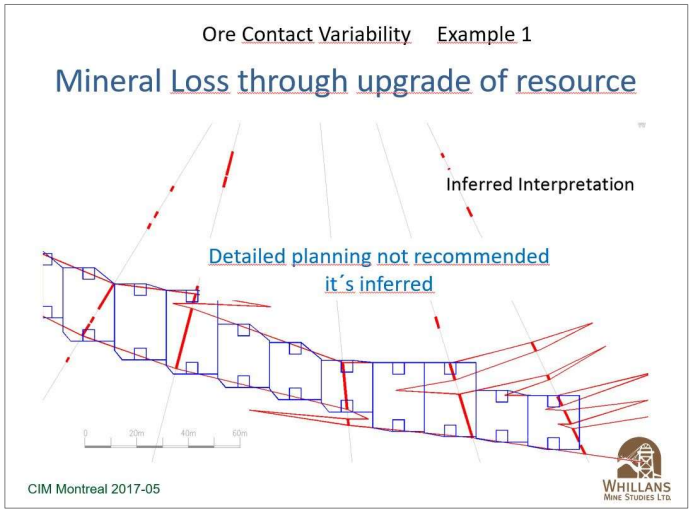
Ore Contact Variability Example 1
Mineral Loss through upgrade of resource
Inferred Interpretation
Detailed planning not recommended
it´s inferred
CIM Montreal 2017-05
WHILLANS
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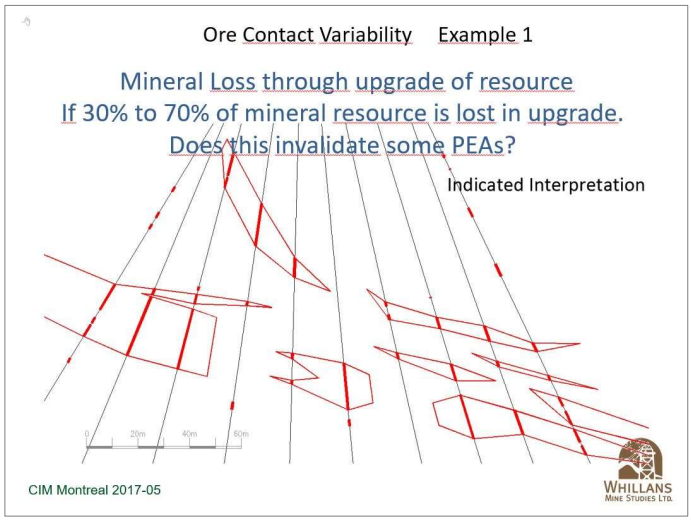
Ore Contact Variability Example 1
Mineral Loss through upgrade of resource
If 30% to 70% of mineral resource is lost in upgrade.
Does this invalidate some PEAs?
Indicated Interpretation
CIM Montreal 2017-05
WHILLANS
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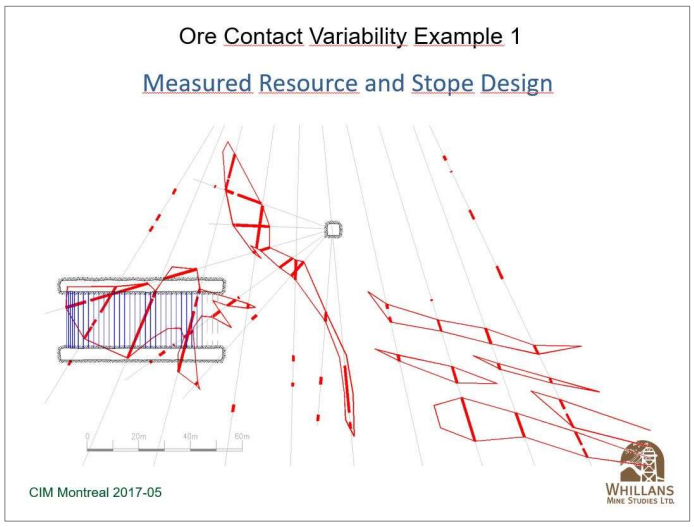

If so, how? For example, should we introduce disclosure requirements related to cost estimation parameters or the amount of engineering completed? The second image above might indicate that a lot of engineering has been done and the image actually is misleading. The third and fourth images show how the orebody changes with additional drilling. The ten plus 20 to 30 metre high stopes in the inferred resource has become a single 30m high stope. Extra detailed engineering work done for a PEA give an impression of accuracy but is actually misleading. A PEA is supposed to be accurate to +/- 50%. If 45% of the mineral resource is lost when upgrading to a reserve, then it would follow that the remainder of the report must be accurate to +/- 5%, no?

12)
13)
14)
15) Should NI 43-101 prohibit including by-products in cash flow models used for the economic analysis component of a preliminary economic assessment that have not been categorized as measured, indicated, or inferred mineral resources? What about deleterious elements like Arsenic? What happens it assays were taken of Arsenic in just a few of the drill holes and the readings were very high, but not enough assays to be classified as a resource. How is this supposed to be handled?
16)
17)
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21)
22) In a technical report for an advanced property, should each qualified person accepting responsibility for Items 15-18 (inclusive) of the Form be required to conduct a current personal inspection? Why or why not. There is currently a shortage of mining professionals and travel is now more difficult. The QP should be able to assign a person or if necessary a number of persons to conduct the site visit following the QPs instructions and returning to site if necessary to investigate additional items. The persons assigned by the QP should be members of a professional organization.
23) Do you have any concerns if we remove subsection 6.2(2) of NI 43-101? If so, please explain
24) .

25)

26)

27) Should the qualified person responsible for the mineral resource estimate be required to conduct data verification and accept responsibility for legacy data used to support the mineral resource estimate? Specifically, should this be required if the sampling, analytical, and QA/QC information is no longer available to the current operator. Why or why not? I think this would be an unreasonable request

28) How can we enhance project specific risk disclosure for mining projects and estimation of mineral resources and mineral reserves?

Report on the composite effect of different factors of increased capital costs and increased operating costs

Capital costs from Feasibility Study to Production have cost overruns for underground projects that averaged 60% in 2009. A Feasibility Study is supposed to be accurate to 10%. This is a real problem of credibility for our industry.

So many projects declare 10 to 15% dilution and 10% mining losses. Projects that declare dilution as ELOS in metres might have even more aggressive numbers. I have not yet worked at a mine where the dilution and mining losses were even close to the numbers.

Mining Losses tend to be greatly underestimated. Consideration should be give to the following:

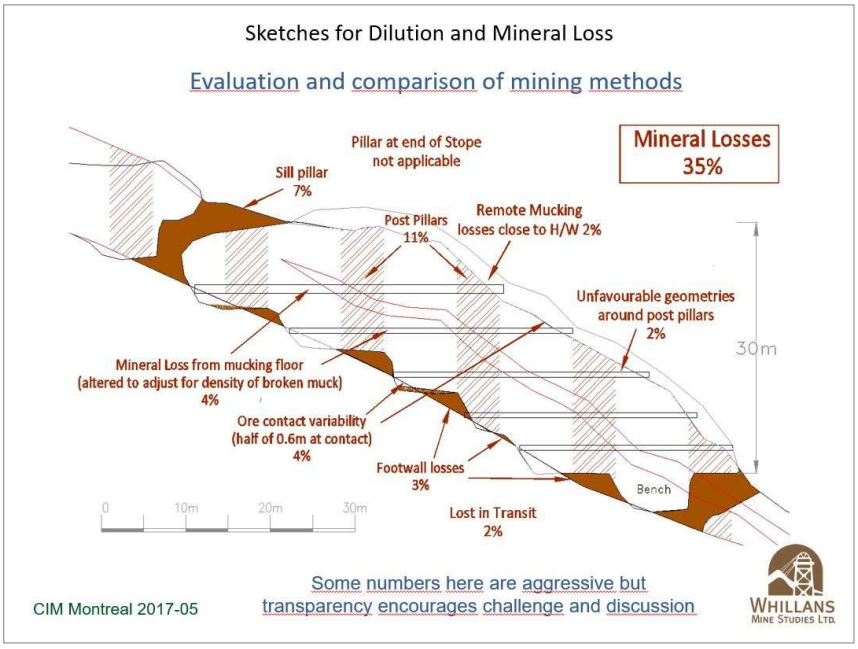
a) Increase in cut-off grade caused by underestimation of capital and operating costs;
b) Underbreak caused by problems drilling, loading, blasting
c) Sill Pillars
d) Crown Pillars
e) Rib and post pillars
f) Pillars to prevent dilution from backfill or to protect infrastructure; and
g) Cones or pillars between lower-level draw points or between chutes in the case of shrinkage stoping or sublevel cave.
h) Upgrading of resource (ie Inferred to indicated, measured, probable, and proven) This will result in a loss of tonnes but typically no change in grade.
i) Incomplete mucking of a stope (typically 5%).
j) Buried ore under waste oversize when a stope fails.
k) Irregular ore waste contacts
l) Invisible ore/waste contacts.
m) Stope Design - to make a workable stope shape may require some sacrificed ore.
n) Mucking on waste or backfill.
o) Size of mining equipment is incorrect.
p) Geological modelling.
q) Planning: Stope design.
r) Errors during tramming and re-mucking.

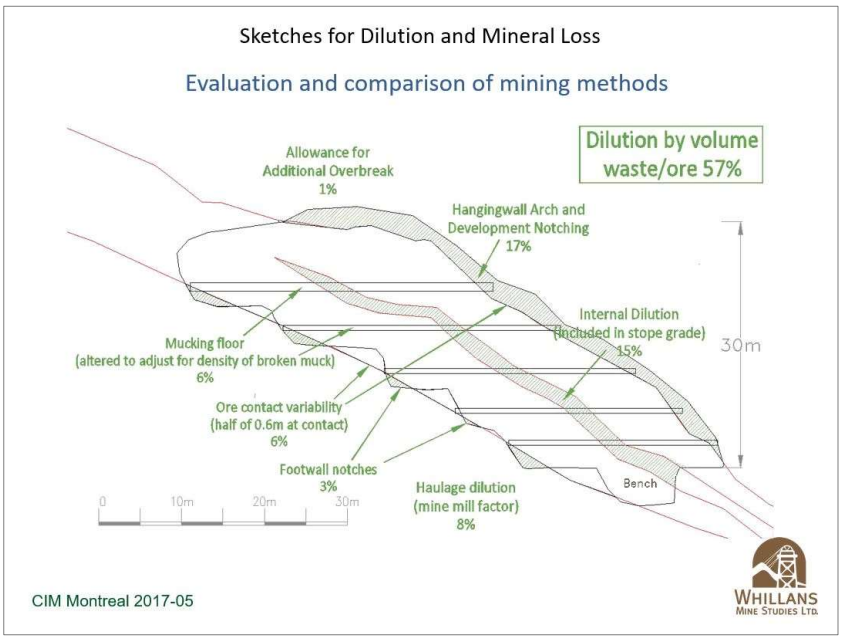
Dilution

a) Here are some contributing factors that need to be considered
b) Minimum mining width (varies with dip)
c) Planned dilution in stope design
d) Irregularity of ore waste contact
e) Visibility of the ore-waste contact;
f) Geotechnical requirements, for example, the need to design an arched stable back;

g) Over-break that may be caused by exceeding the recommended stope spans;
h) Mucking over backfill. LHDs are built to dig and not to skim a level surface;
i) Backfill sloughs from stope walls;
j) Islands of waste within the ore (which may not be reported);
k) Notching above and below sublevels (narrow vein mining);
l) Flatly-dipping structures;
m) Alternating use of raises as orepass and wastepass (some mines do it!);
n) Mining equipment too large;
o) Geological modelling:
p) Errors in modelling that might include ore model unconstrained by geologic boundaries;
q) Mine Call Factor. This factor used in many mines usually applies to the processing facility receiving a different, usually lower grade than the mine says it is producing. This may include errors in tramming, waste delivered as ore

There should be a requirement for cross section sketches to indicate how the dilution and mining losses have been calculated. Examples follow showing the type of sketch that should be required in 43-101 reports.




Sketches for Dilution and Mineral Loss
Evaluation and comparison of mining methods
Dilution by volume waste/ore 57%
Allowance for Additional Overbreak 1%
Hangingwall Arch and Development Notching 17%
Internal Dilution (included in stope grade) 15%
30m
Mucking floor (altered to adjust for density of broken muck) 6%
Ore contact variability (half of 0.6m at contact) 6%
Footwall notches 3%
Haulage dilution (mine mill factor) 8%
Bench
0
10m
20m
30m
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