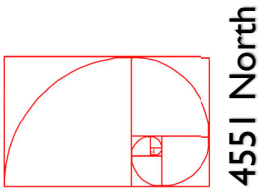

Commentary on the proposed revision to NI 43-101 regarding Mineral Resource Estimates

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In response to the proposed language in the revised NI 43-101 Item 14 (d) "a general discussion of the criteria used to classify the mineral resource, the average drill or sample spacing, the continuity of the important zones in the mineralization model and, if applicable, a relevant visual representation;"[1] presupposes that the only method used for classification is drill or sample spacing. This is an incorrect assumption and specifically excludes other valid and tested methodologies for resource classification.

Following are a number of examples of resource classification methodologies from a limited literature review that may or may not rely on drill or sample spacing. Examples are taken over a wide time frame and across multiple jurisdictions to demonstrate that the methodologies used for resource classification have been long debated and are numerous.

I'm including McKinstry (1948)[2] as a reference because his words on the subject ring true even after 75 years. According to McKinstry regarding resource/reserve classification of material "…the workings in which sampling has been done should not be more than some specified distance apart; yet no arbitrary standard can be set up, because different types of ore vary in their regularity and dependability." McKinstry then goes on to quote Hoover (1909)[3] who describes the different types of mineralization and geometry, and how highly variable the classification is based solely on geology. Hoover's resource/reserve categories used terms of "risk", "failure of continuity", and "assumption of continuity". These terms were based on "…the judgement of the individual." I cite these examples for historical context and to show that the question of methodology and uncertainty in resource/reserve classification has been a long running topic in mining.

For context, the classification methodology described by McKinstry (1948) was the method used at Newmont's Midas Mine during my time there (2003-2008). Because of the geometry of the vein, geologic continuity, grade discontinuity, and widely spaced drilling, use of drill hole spacing for resource/reserve classification was not considered appropriate by the Qualified Person. This classification methodology was described in the NI 43-101 technical reports at the time.

According to Stephenson and Vann (2001)[4] "…there is nothing in the JORC Code which requires classification to be a complicated process or to be based on a particular procedure such as the use of statistical data available from a block model estimation method (increasingly, industry appears to becoming fixed on the latter as it were somehow mandatory)."

[1] June 2025, Canadian Securities Administrators B.6 Request for Comments, Proposed Form 43-101F1, Annex B, Item 14: Mineral Resource Estimates.
[2] McKinstry, H.E., 1948, Mining Geology, New York, Prentice-Hall, Inc., 680 p.
[3] Hoover, H.C., 1909, Principles of Mining, New York, McGraw-Hill Book Company, Inc., 199 p.
[4] Stephenson, P.R. and Vann, J., Common sense and good communication in mineral resource and ore reserve estimation, in Mineral Resource and Ore Reserve Estimation-The AusIMM Guide to Good Practice, Edwards, A.C., editor, p. 13-20.

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Another valid approach to resource/reserve classification according to Moorhead (2001)[5] Cross sections were used "…to interpret broad domains of geological continuity uncertainty." In this case geologically interpreted domains were used for classification.
According to the JORC Code (2012)[6] resource classification is based on the judgement of the Competent Person and drill hole spacing is not given as a specific criterion:

- "The basis for the classification of the Mineral Resources into varying confidence categories.
- Whether appropriate account has been taken of all relevant factors (i.e. relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).
- Whether the result appropriately reflects the Competent Person's view of the deposit."

Sinclair and Blackwell (2002)[7] chapter on resource/reserve classification have a good discussion on classification systems and the "…many conflicting demands on such a system.", including the many variables and parameters that go into classification systems. Of primary importance is a well-informed geologic model, that is supported by not only sampling (including, but not limited to drill sampling), and must address the issues of geologic continuity, distance from sample(s), sample density (the number of samples that inform a given volume), geometric array of samples relative to a given volume, cutoff grades, data quality, and criteria other than grade, such as metallurgical recoveries or deleterious elements. The authors discussion relies heavily on samples for resource classification; however, samples are not the only criteria considered for classification.

I think Rossi and Deutsch (2014)[8] make a strong statement regarding resource classification in contrast what the CSA is proposing "Although the most commonly used codes have attached guidelines to them, they are non-prescriptive in all that relates to technical issues. Thus, the responsibility for the appropriateness of the disclosure is left to the technical competency of the individual(s) signing off on the resource calculations and classification, defined as the Competent of Qualified Person (CP or QP)." This was certainly the case in the 2010 CIM guidelines adopted in NI 43-101. Further, NI 43-101 "…allows classifying mineralization or other natural material of economic interest… by the Qualified Person when the nature, quality, quantity and distribution or data are such that the tonnage and grade of the mineralization can be estimated to within close limits and that variation from the estimate would not significantly affect potential economic viability. This category requires a high level of confidence in, and understanding of, the geology and controls of the mineral deposit." It's important to note here that according to the authors, based on the 2010 CIM Guidelines, the QP makes the informed judgement, based on their understanding of the geology and the mineral deposit, of what's necessary to assign resource classification.

[5] Moorhead, C.F., et al, 2001, Cadia Hill: From discovery to a measured resource-A case study, in Mineral Resource and Ore Reserve Estimation-The AusIMM Guide to Good Practice, Edwards, A.C., editor, p. 97-108.
[6] JORC Code, 2012, AusIMM, https://www.jorc.org/docs/JORC_code_2012.pdf
[7] Sinclair, A.J., and Blackwell, G.H., 2002, Applied Mineral Inventory Estimation, Cambridge University Press, 381 p.
[8] Rossi, M.E., and Deutsch, C.V., 2014, Mineral Resource Estimation, Springer, 332 p.

Rossi and Deutsch (2014) make clear that resource classification may be done by a variety of methods, the most simplistic of which is drill hole distances. They go on to demonstrate other, more robust methods are available, such as kriging variances, multiple-pass kriging, and conditional simulation. None of these other methods are considered in the proposed guidelines.

It's the opinion of this author, based on this limited literature review, that the CSA is proposing to override the expertise, judgement, and experience of the QP by requiring the use of drill or sample spacing for classifying mineral resources is unwarranted and unnecessary. As such the proposed guidelines should not be arbitrarily limited to a single, simplistic approach, but should remain the responsibility of the QP.