Peer Review Summary Document

(11/14/2018)

Peer Review Plan

https://www2.usgs.gov/peer_review/docs/gold_deposits_timmins-kirkland-Lake_abitibi-greenstone-belt.pdf [20 KB PDF].

Title and Authorship of Information Product Disseminated


Peer Reviewers Expertise and Credentials

Reviewer #1 holds a Master's degree in statistics and a Ph.D. in environmental science and has substantial expertise in environmental statistics, particularly related to surface-water quantity and quality.

Reviewer #2 is a physical scientist with expertise in statistical hydrology and statistical analysis. The reviewer holds Ph.D. in civil and environmental engineering, a Master's degree in environmental and water resources engineering, and a Bachelor's degree in environmental science.

Reviewer #3 holds a Ph.D. in statistics and has worked for over 20 years as a government statistician in environmental and ecological research. The reviewer has substantial experience working with monitoring data and issues of detectability, including modeling detection probabilities and adjusting estimates for detection error (i.e., imperfect or uneven ability to detect a monitored subject).

Reviewer #4 is an economic geologist and holds a Ph.D. in geology from Stanford and a B.S. in geology from the University of Texas. The reviewer’s 35-year career with the USGS has been devoted to studying economic geology and mineral resource assessments, specializing in magmatic ore deposits. The reviewer has expertise in economic geology, assessment methods, and analysis of global, national, and regional datasets needed to plan, conduct and direct research on a broad range of land-use and mineral-resource-related issues.

Reviewer #5 holds a Master's degree in geology from Stanford University. The reviewer’s 40-year career with the USGS has included conducting research on the evolution of diverse magmatic systems, particularly in the western United States, as well as in Saudi Arabia and Bolivia, conducting mineral resource assessments, and studying the economic geology of mineralized rocks that are spatially, temporally, and genetically associated with these magmatic systems.

Reviewer #6 holds a Master's degree in geology and as a USGS geologist, has conducted more than 30 years of published research on mineral deposits, including quantitative mineral resource assessments.
Reviewer #7 is a USGS geologist and holds a B.S. in biology/chemistry and M.Sc. and Ph.D. degrees in economic geology/geochemistry. The reviewer also has expertise in investigating the genesis of a variety of gold and base metal deposits types.

Reviewer #8 holds a Ph.D. in geology and has substantial expertise in the geology of gold, mineral resources, and geochemistry.

**Charge Submitted to Peer Reviewers**

The reviewers were asked to make an objective evaluation of manuscript, including the mining data, the statistical analysis of those data, and the resource predictions with the three-part method.

**Summary of Peer Reviewers Comments and Summary of USGS Response to Peer Reviewers Comments**

The summarized reviewer comments and the USGS response to them (shown in italics) are as follows:

- Reviewer #1 commented that manuscript was well written and that the references were sound and inclusive. The reviewer commented that the discussion of sampling units was confusing.
  - The discussion of sampling units was revised for clarity and moved to section entitled Discussion.

- Reviewer #2 commented that the manuscript was well-prepared and the experiment well-conceived, stating after minor revisions, manuscript is ready for publication. Some specific suggestions from the reviewer included adding a discussion of the reason for size-biased sampling, adding statistical, quantifiable evidence in support of changing distributions, and adding the development of a prediction methodology.
  - The author did not add a discussion of the reason for size-biased sampling because the reason is currently unknown. (It may be a topic for future research, and the reason is not relevant to this case study). The author believes that adequate evidence in support of changing distributions is presented in the manuscript graphs, which are relatively simple and straightforward; therefore, no additional information as suggested was included in the manuscript. The author's response regarding the development of a prediction methodology is that it is far beyond the scope of this case study and therefore not included.

- Reviewer #3 commented that the two most valuable components of the manuscript were that it analyzes data for size-biased sampling by fitting a regression line and treats the 97 deposits as a self-contained sample space. The reviewer believed some information included in the manuscript was unnecessary, i.e., the imputation of the missing post-mining values, the simulation of simple random samples (SRS) via resampling, and the detailed description of very basic statistical concepts.
  - As suggested by the reviewer, the author deleted the sections on imputation of missing post-mining gold tonnages and simulation of SRS. The author eliminated the discussion of basic statistical concepts but added appropriate reference citations.
Reviewer #4 provided three key comments: 1) the data, which are the basis of the case study, are from mines, not deposits and further, the data should be aggregated; 2) there are newly discovered gold-mineralized rocks inside (and also near but outside) the study area that should be included in the data; and 3) the data used for the case study are dated—current, public-domain data are available from the Ministry of Energy, Northern Development and Mines for the Province of Ontario, Canada.

- References to the data now clearly state that they pertain to mines. Although aggregating data is a common practice in the three-part method, it introduces error in the predictions; this issue is further covered in the Discussion section of the manuscript.
- Although using data from near but outside the study area is a common practice in the three-part method, as previously stated regarding aggregating data, using data from near but outside the study area likewise introduces errors in the predictions. This issue is also discussed further in the Discussion section.
- In response to the reviewer’s last key comment, the author obtained public-domain data (current as of June 18, 2018) from the Ministry of Energy, Northern Development and Mines for the Province of Ontario, Canada. These data were used for a new analysis, and the manuscript was subsequently revised.

Comments from Reviewers #5, 6, 7, and 8 are almost entirely related to clarity of expression and geologic terminology. Reviewer #8 also made suggestions related to the description of the gold deposits:

- The manuscript is revised to improve the clarity of expression and the use of geologic terminology.

The Dissemination

The published information product will be released in the USGS Scientific Investigations Report publication series and will be available at http://pubs.usgs.gov/.