



Improving assurance for Mineral Resource and Ore Reserve estimates and reporting

Mineral Resources and Ore Reserves are the key assets of a mining company, and senior management, company boards and external stakeholders require assurance on the accuracy of estimated and reported technical information

Mark Noppe
Corporate Consultant
(Geology and Project
Evaluation), SRK Consulting
(Australasia) Pty Ltd



Risk is an inherent component of the mining industry, and risk governance is an integral part of corporate assurance and business decision making. Like the requirements for financial, legal and environmental governance, assurance regarding the processes applied to data collection,

estimation and reporting of Mineral Resources and Ore Reserves is required.

Improved assurance is particularly crucial at a time in the industry when companies are running lean or relying on teams who have limited technical or management oversight experience. Despite industry guidance, and some

companies having standards requiring reviews or audits of Mineral Resource and Ore Reserve generation and reporting processes, it is surprising how infrequently or ineffectively these are actually carried out.

What seems to be going wrong?

There are many examples where errors and improvements identified after the fact could have been avoided. For example, some errors concern basic data verification and data preparation processes, rather than somewhat more subjective choices about estimation-related parameters. Such issues highlight the lack of experience of the people tasked with the estimation and the lack of adequate internal peer review to identify such issues early.

A common concern is that some companies and managers have not recognised the critical role that peer review plays in improving the skills of individuals and in supporting confidence in the technical outputs. In some cases, while the importance of peer review is formally recognised by companies as part of their standard procedures, there is actually no practical or effective peer review process being carried out.

The importance of people, processes and systems

A balance between the core elements of people, processes and systems is essential for managing the risk and reducing exposure to inaccurate Mineral Resource and Ore Reserve generation and reporting. Having competent people following adequate and effective processes, and making use of appropriate systems, will ensure reliable estimates are consistently generated and reported.

What can be done to improve assurance?

All companies large or small, whether publicly listed or not, require some form of quality control and demonstrable assurance to support good governance. The assurance of reliable Mineral Resource and Ore Reserve reporting must therefore be included in a mining company's risk management and control framework.

An effective assurance process for the governance of Mineral Resources and Ore Reserves consists of three layers of defence: a layer of self-validation and peer review where and when the work is performed, a layer of internal peer review or oversight and a final level of independent review or audit administered and monitored by appropriately mandated levels of management or board oversight.

Peer reviews are ideally carried out concurrently with the preparation of data, selection of estimation procedures

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and validation of outputs from Mineral Resource and Ore Reserve estimation prior to the handover of results between disciplines or the final reporting of results. Audits, on the other hand, are generally retrospective reviews by independent or external reviewers who rate the risks inherent with an already completed process, identifying opportunities for improvements in the future.

Reviews and audits improve the level of assurance in the reliability of estimated and reported Exploration Results, Mineral Resources, Ore Reserves, and mine reconciliation. Peer reviews and audits contribute not only to governance processes, but also identify valuable improvement opportunities, and provide mentoring and professional development guidance to those whose work is being reviewed.

A case study

A recent technical audit of a multinational client's projects in Africa and North America was conducted to provide assurance to management and the board that the Resource and Reserve processes and systems were adequately designed, and that personnel were sufficiently skilled and equipped to support the accurate generation of Resource and Reserve estimates and their reporting.

The audit process included:

- agreeing on the risk rating definitions and templates for reporting feedback
- reviewing systems and process documentation prior to undertaking site visits
- holding interviews with key stakeholders to understand the objectives, as well as risks, in relation to the Resource and Reserve processes
- gaining understanding of the Resource and Reserve estimation processes and assigned responsibilities and competencies
- identifying the risk management controls within the estimation and reporting processes, and evaluating the adequacy and effectiveness of the controls and compliance with industry standards
- testing and validating key procedural controls to evaluate whether they operate as intended



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- presenting feedback on preliminary findings
- documenting findings, recommendations and management actions required to address any risks found to be inadequately managed.

Some key findings identified were common across all operations and therefore the company stood to benefit from an integrated solution to manage these risks. Several improvement opportunities were identified which, while not significant, could improve selected processes and the repeatability of the processes. It was also identified that, in general, those carrying out the processes were highly competent and received adequate support from management.

This client called for an audit because it identified a weakness within its existing Resource and Reserve processes and wished to review the entire process and ensure the same weaknesses were not being repeated

elsewhere. In other cases, clients carry out such audits and reviews as a part of their governance processes to proactively ensure their processes are robust, their systems appropriate and their staff adequately experienced to accurately generate and report on Resource and Reserve estimates.

An additional benefit of this particular audit (and any audit if carried out adequately) was that it provided an opportunity to share knowledge across the local technical and management teams. The process of identifying improvements gave those carrying out the work an increased level of understanding of the importance of the results they generate, and those receiving the information, a better understanding of the effort required to produce the results.

Conclusion


If a company does not, at a minimum, have a system of internal peer review (as opposed to a formal external assurance process) to provide verification or validation of the actual numbers generated, this lack of internal control may represent a weak link in the assurance of the Resource and Reserve estimates generated and reported. Indeed, for companies not having an established internal audit function or activity, senior management or the board should disclose to their stakeholders how adequate assurance on the effectiveness of the company's governance, risk management and control structure will be provided. 

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