

GUIDELINES TO THE AUSTRALASIAN CODE FOR REPORTING OF IDENTIFIED MINERAL RESOURCES AND ORE RESERVES

**Prepared by the Joint Committee of the
Australasian Institute of Mining and Metallurgy
and the
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INTRODUCTION

These guidelines are aimed at both technical and non-technical persons, and are designed to assist in the use and application of the Code, and to clarify certain points. The guidelines are intended to be read in conjunction with the Code, hence repetition of the content of the Code has been avoided.

While every effort has been made both within the Code and within these guidelines to cover most situations likely to be encountered in the reporting of resources and reserves, there will inevitably be occasions when doubt exists as to the appropriate procedure to follow. In such cases, users of the Code should be guided by its intent, which is to provide a standard for reporting, and to ensure that such reporting contains sufficient relevant information to enable an intelligent layman to make a reasonable and balanced judgement of the mineralisation reported.

THE CODE

The "Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves" was released by The AusIMM and AMIC in February 1989, and supersedes the document "Reporting of Ore Reserves" published in 1985. The Code differs from the previous guidelines in that it:

- identifies a separate category of Pre-Resource mineralisation
- introduces the concept of Identified Mineral Resources as the precursor to Ore Reserves and describes the relationship between the two
- provides definitions for categories of Identified Mineral Resources
- defines Ore Reserves in terms of economically mineable tonnes and grade (defined as "recoverable Ore Reserves" in the 1985 guidelines)
- eliminates the classification "Possible Ore", and the need for qualification of Ore Reserves as "in-situ" or "recoverable" (it should also be noted that the commonly used term "Geological Reserves" has no meaning under the Code)
- lists and explains Resource assessment criteria

The revised Code therefore clearly distinguishes between Resources, which can be estimated mainly by a geologist on the basis of geoscientific information, and Reserves, which are a modified sub-set of the resources, and which require consideration of all factors affecting practical and economic exploitation, including environmental, social and political factors, with necessary input from a range of disciplines.

The Code, unlike the previous document, has been adopted in its entirety by the Australian Stock Exchange, and has been appended to its Listing Rules.

It should be emphasised that the Code is not intended as a means of regulating the methods by which resources and reserves are estimated. Its purpose is to provide a standard by which this important information is reported to shareholders and to the general public.

PRE-RESOURCE MINERALISATION

This classification has been introduced in order to cover the situation where a company has identified significant mineralisation about which it wishes, or feels it has an obligation to inform the general public, but which does not meet the conditions specified for the reporting of Identified Mineral Resources. If the company decides to report the discovery, then it is necessary that sufficient information is provided to enable the informed layman to make a reasonable judgement about the prospect. The Code provides a list of Resource Assessment Criteria (Table 1 of the Code) which sets out criteria which, if available, should be disclosed when reporting Pre-Resource mineralisation. It should be noted that full information on factors which bear on sampling and assaying of the mineralisation must be disclosed.

IDENTIFIED MINERAL RESOURCES

This classification has been introduced as the precursor to Ore Reserves. It covers in-situ mineralisation which has been identified and estimated through exploration and sampling, and within which Ore Reserves may be defined by the consideration and application of technical, financial, environmental, social and political factors.

The Code states that an Identified Mineral Resource is quantified on the basis of geological data and a geological cut-off grade only. The latter term refers to a lower limiting grade applied before constraints resulting from mine design have been taken into account. The Code further states however, that in reporting an Identified Mineral Resource, there is an implication that there are reasonable prospects for eventual economic exploitation. This implies a judgement (albeit preliminary) by the Competent Person of the order of lower limiting grade likely to be required to enable economic exploitation.

If cutting or reduction of high grades is considered to be appropriate to the mineralisation being reported, the technique should be applied to grade estimation at the Mineral Resource stage and not restricted to grade estimation at the Ore Reserve stage.

Identified Mineral Resources encompass the now redundant classification of "Possible Ore" and include Ore Reserves formerly qualified as "in-situ". Identified Mineral Resources are subdivided into three categories as set out below, which reflect the level of confidence in the estimate. Definitions are provided in the Code. Selection of appropriate categories is a matter for skilled judgement, and must be made by a Competent Person.

Inferred Resources

This category is intended to cover situations where mineralisation has been identified and some measurement and sampling completed, but where the data is insufficient to allow the geological framework to be confidently interpreted, and continuity of mineralisation to be predicted. It should not necessarily be assumed that all or part of an Inferred Resource will be upgraded to Indicated or Measured Resource by continued exploration. It is suggested that caution should be exercised if this category is considered in studies on economic viability.

Indicated Resources

Mineralisation may be classified as an Indicated Resource when the nature and amount of data is such as to allow the Competent Person determining the resource to confidently interpret the geological framework and to assume continuity of mineralisation.

Confidence in the estimate would be such as to allow the application of technical and financial parameters, and to enable an evaluation of economic viability.

Measured Resources

Mineralisation may be classified as a Measured Resource when the nature and amount of data is such as to leave no reasonable doubt, in the opinion of the Competent Person determining the resource, that the tonnage and grade of the in-situ mineralisation can be estimated to within close limits, and that any variation from the estimate would be such as not significantly to affect potential economic viability. This degree of confidence necessarily requires a firm understanding of the geology and controls of mineralisation.

ORE RESERVES

The definition for Ore Reserves in the Code differs from that in the 1985 guidelines in that reserves are now restricted to what were qualified as "recoverable reserves" in the former guidelines; that is, reserves are inclusive of diluting material which will be mined in conjunction with the reserves and delivered to the treatment plant.

The new Code provides for a direct relationship between Indicated Resources and Probable Reserves, and between Measured Resources and Proved Reserves. In other words, the level of geoscientific confidence for Indicated Resources is the same as that required for Probable Reserves and for Measured Resources the same as that for Proved Reserve. In each case the reserves are that part of the resource which, after the application of all mining factors, results in an estimated tonnage and grade which, in the opinion of the Competent Person or Persons making the estimates, can be the basis of a viable project after taking account of all relevant metallurgical, marketing, environmental, social and governmental factors.

The direct relationship between categories of Mineral Resources and Ore Reserves, implies that the decision as to whether a reserve is defined as Proved or Probable is governed solely by whether the corresponding resource is defined as Measured or Indicated. The standard of the economic evaluation is not a determining factor.

It should be noted that the Code does not require an economic operation to have Proved Reserves, and that situations could arise where Probable Reserves alone are sufficient to justify exploitation, as for example with some alluvial tin or gold deposits.

Application of the category of Proved Reserves implies the highest degree of confidence in the estimate with consequent expectations in the minds of readers of the report. These expectations should be borne in mind when categorising a resource as Measured.

If a change in any of the parameters which affect viability results in some or all of the Ore Reserves becoming non-viable based on assumptions made at the time, then those Reserves should be re-classified as identified Mineral Resources.

It is not intended however, that re-classification should be applied as a result of changes expected to be of a short term or temporary nature, or where Management has made a deliberate decision to operate on a non-economic basis. Examples of such situations might be a commodity price drop expected to be of short duration, mine flooding of a non-permanent nature, transport strike etc.

MINERAL RESOURCE/ORE RESERVE STATEMENTS

In preparing the Ore Reserves Statement each year, the relevant Mineral Resource Statement on which it is based should first be developed. This can be reconciled with the Mineral Resource Statement estimated the previous year, and differences (due, for example, to mine production, exploration etc.) identified. The application of appropriate factors to the Mineral Resource can then be made to develop the Ore Reserve Statement which can also be reconciled with the comparable statement for the previous year. Mining companies are encouraged to reconcile estimates whenever possible.

Where the new Code is being applied for the first time and estimates are being compared with estimates classified under the former guidelines, Resources (1989 Code) can be compared with "In-situ Reserves" and "Possible Ore" (1985 guidelines) as appropriate, and "Ore Reserves" (1989 Code) compared with "Recoverable Ore Reserves" (1985 guidelines).

RESOURCE ASSESSMENT CRITERIA

There are critical technical parameters which should be considered when making an estimate of a Mineral Resource or of Pre-Resource mineralisation. These are listed in Table 1 of the Code, under the heading Resource Assessment Criteria, and each item is accompanied by a brief description. It is presumed that the Competent Person will take full account of these parameters when preparing an estimate, and it is not always necessary, when reporting, to comment on each item. The Code does however make two important references to Table 1:

- When reporting Pre-Resource mineralisation, full information on factors bearing on sampling of the mineralisation must be disclosed. This is to enable the informed layman to make as balanced an assessment of the report as is possible. Reporting of isolated high assays without placing them in perspective is unacceptable.
- When reporting Mineral Resources or Ore Reserves, reference should be made to Table 1 in stating where inadequate data affects the reliability of, or confidence in an estimate; for example, poor sample recovery, non-repeatability of assay results, limited information on tonnage factors etc. The purpose of this requirement is again to assist the reader of the report to make an informed judgement about the prospect or property.

PRECISION

Mineral Resource and Ore Reserve estimates are not precise calculations, being dependent on a geological interpretation and on samples which can represent only a minute fraction of the mineralised body. Statements of tonnage (or volume) and grade should be rounded so as to reflect this uncertainty. In most situations, rounding to the second significant figure should be sufficient. For example 10,863,000 tonnes at 8.23 percent should be stated as 11 million tonnes at 8.2 percent. There will be occasions however, where rounding to the first significant figure may be necessary in order to convey properly the uncertainties in estimation. This would often be the case with Inferred Resources.

In order to reinforce the qualitative nature of a resource or reserve estimate, it is recommended that the final result always be referred to as an estimation not a calculation.

REPORTING

The purpose of the Code is to improve and standardise reporting practices in the mining industry. These guidelines serve to emphasise the points.

In providing different categories within the classifications of Mineral Resources and Ore Reserves, the Code is encouraging reporting which reflects the estimator's confidence in the figures stated. This purpose is undermined if the categories are not reported separately, and the practice of reporting only a combined figure for Proved and Probable Reserves (or for Measured and Indicated Resources) is strongly discouraged.

In situations where figures for both Mineral Resources and Ore Reserves are reported, it is consistent with the intent of the Code if the statement of Measured and Indicated Mineral Resources includes those resources which can be modified to produce Ore Reserves, rather than being stated as additional to those reserves. While the Joint Committee has a clear preference for the former mode of reporting, it is recommended that, whichever is adopted, a clarifying statement be included in the report. For example:

"The Measured and Indicated Mineral Resources are inclusive of those resources modified to produce the Ore Reserve"

or

"The Measured and Indicated Mineral Resources are additional to the Ore Reserves"

Inferred Resources are, by definition, always additional to Ore Reserves.

Ore Reserves incorporate material (dilution) which is not part of the original resource. It is essential that this fundamental difference between resources and reserves is borne in mind, and caution exercised if attempting to draw conclusions from a comparison of the two.

It is recommended that a public report of a company's resource or reserve position should also make reference to figures released for a previous corresponding period. A detailed reconciliation of the two sets of figures is not essential, however sufficient comment should be made to enable significant differences to be understood by an intelligent layman.

COMPETENT PERSON

The concept of a Competent Person was originally introduced in the 1972 Report by the Joint Committee on Ore Reserves, and the definition in the 1989 Code is not different in substance. The reference to a minimum of five years experience is intended to encompass any experience which has specific relevance to the mineralisation under consideration. For example, in estimating vein gold mineralisation, experience in any high-nugget, vein-type mineralisation (such as tin, uranium etc.) is relevant, whereas experience in (say) massive-type deposits is not.

Estimation of Ore Reserves is a team effort involving a number of disciplines. More than one member of the team may qualify as a Competent Person. The Competent Person or Persons who signs the report is responsible and accountable for all aspects of the report under the Code, and by virtue of being a Corporate Member of the AusIMM, is answerable to the AusIMM Ethics and Discipline Committee should that Committee become involved.

The Joint Committee recognises that a difficulty may arise when a company with overseas interests wishes to report an overseas resource or reserve estimate prepared by a person who may not be a resident of Australia and who may therefore not be a member of the AusIMM. In such situations it is recommended that the directors issuing the report indicate that the person making the estimations of grade and tonnage has the required relevant experience in the type of mineralisation being reported that would allow him or her to qualify as a Competent Person were he or she to be a Corporate Member of The AusIMM.

STOCK EXCHANGE LISTING RULES

The Australian Stock Exchange (ASX) has appended the Code in its entirety to its Listing Rules with effect from 1 July 1989. Reports relating to a period after that date must comply with the Code.

Listed mining and exploration companies must report on their activities to the Australian Stock Exchange within a month of the end of each quarter, and must also file an annual report at the end of their financial year. There is also an obligation to make a special report to the ASX regarding any developments or events which have the potential to affect materially the company's share price.

Such public releases of information remain the sole responsibility of the Board of Directors. The Code requires however, that releases which make statements about mineralisation, resources or reserves must be based on reports compiled by a Competent Person as defined in the Code, and must fairly reflect the views of that person. The Listing Rules require that a statement to the effect that this obligation has been met is included in all publicly released reports.

The Code is designed to provide for disclosure of sufficient information so that an intelligent layman is able to make a reasonable and balanced assessment of the mineralisation being reported. If the ASX has doubts about the technical content or quality of a report, it reserves the right to seek an opinion from an appropriately qualified professional. This may result in the ASX requiring a company to amend, clarify or expand on information supplied in the reports until it is satisfied that the release of the information will allow the market to be sufficiently informed.