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Reporting of Ore Reserves

REPORT OF THE JOINT COMMITTEE OF
THE AUSTRALASIAN INSTITUTE
OF MINING AND METALLURGY AND
AUSTRALIAN MINING INDUSTRY COUNCIL



INCORPORATED BY ROYAL CHARTER 1955



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Estimating of
Reserves

REPORT OF THE JOINT COMMITTEE OF
THE AUSTRALASIAN INSTITUTE

OF MINING AND METALS

OF AUSTRALIA AND NEW ZEALAND

**Report of the Joint Committee of The AusIMM and AMIC on
Ore Reserves as revised March 1982**

FOREWORD

The Committee was originally set up to consider, on behalf of both The AusIMM and AMIC, the following two situations:

- (a) In September, 1971 the Melbourne Stock Exchange asked AMIC for its opinion on a proposal that one of the listing requirements applicable to mining companies should be the use "when reporting on an orebody" of "the terms currently employed by the U.S. Bureau of Mines", i.e. measured ore, indicated ore, inferred ore.

The Exchange indicated it would welcome alternative recommendations.

- (b) In late 1971 the Senate Select Committee on Securities and Exchange invited The AusIMM to comment on a transcript of evidence which indicated that within the Australian Mining Industry there were no recommended or required standards or terminology for expression of ore reserves.

The Report of the Joint Committee originally published in April 1972 was endorsed without change by the Committee in April 1975. The Committee was reconvened in 1978 to consider developments since that time and to recommend changes considered necessary.

An important aspect to emerge from the most recent review was the need to draw attention to the fact that reserves should be expressed so as to convey an explicit indication that they are estimates and not precise calculations. This matter is referred to in the recommendations under "Precision".

Other aspects relate to the need to distinguish between "in situ" and "recoverable" reserves, and the need to move away from the presently available options in reserve definitions in favour of "proved reserves, probable reserves and possible ore".

The Committee has not given attention to the broader issue of the definition and classification of "resources" which is considered a matter primarily of concern to government organisations.

BACKGROUND

The principal modern events in this field are:

1. 1943—U.S. Bureau of Mines adopts a threefold classification—measured, indicated, inferred (in order of increasing degree of risk)—for estimation of national resources. It was explicitly stated (Sub-Committee on Public Lands, May 1947) that the classification was not adapted to "a mining operation".
2. 1950/54—Institution of Mining and Metallurgy (London) has a Committee looking into the question of standard terminology. No decision reached and no action by Council.
3. 1953/55—The Australasian Institute of Mining and Metallurgy has a Committee studying the same question. Diversity of opinion among members of The Institute found to be too great for standardisation. No further action.
4. 1953/56—Society of Economic Geologists has Committee studying same question. Committee has representatives from South America, Europe, United States, Great Britain, Africa, Australia, North America and Asia.

For use in mines, it recommends the traditional terms, "proved", "probable", "possible". It recommends that "measured", "indicated", "inferred" and equivalent terms are appropriate only for assessing "the reserve or resource position of a whole industry or of a region or a nation".

5. Current practice of the U.S. Securities Exchange Commission recognises two categories of ore reserves – "proven" and "probable".
6. 1975 – Department of Energy, Mines and Resources, Canada publishes report on Departmental Terminology and Definitions of Reserves and Resources, classifying ore reserves as "measured" (or "proved"), "indicated" (or "probable"), "inferred" (or "possible") whilst noting that the inclusion of "inferred" or "possible" reserves in total reserve figures is not acceptable.

CONCLUSIONS

- A. Whilst the enquiries of the Melbourne Stock Exchange and of the Senate Committee were originally concerned primarily with instances of significant divergence between estimates or opinions given at an early stage of investigation, the Associated Stock Exchanges have more recently also become concerned at the need for standardisation of nomenclature for ore reserve statements generally.
- B. The Committee considered that standardisation of classification and nomenclature of ore reserves was desirable but, because estimation of ore reserves involved a factor of judgement, standardisation of procedure would not of itself yield improved estimates.
- C. It followed therefore that estimates of ore reserves and reports on related matters at earlier stages should be prepared by "responsible professionally qualified" persons (quoting the Institution of Mining and Metallurgy, 1954) of appropriate experience.
- D. That the Committee should make recommendations as to standards and terminology that could be recommended to its members by The Australasian Institute of Mining and Metallurgy, in its capacity as a professional organisation and that the Committee should also make additional recommendations as to conditions of reporting which could be recommended by AMIC to companies and to the Stock Exchanges.

RECOMMENDATIONS

1. *General*

The Committee believes that reports on ore or mineralisation should be standardised as far as possible and that the mining industry should in its own interests assist the Australian Associated Stock Exchanges in their efforts to eliminate unsatisfactory reporting.

2. *Responsibility for Reports*

The Committee believes that any statement on a company's ore or mineralisation position is and must remain the sole responsibility of the Board of Directors. That is, a Board should not be required compulsorily to attach to its reports supporting documents signed by any other personnel.

Where, however, a Board of Directors chooses to include supporting documents on its ore or mineralisation situation, it should be a requirement that the signatory to any such document be a competent person as defined below.

3. Requirement Regarding Competence

The Committee considers that competence and experience are the most important factors involved in reporting on an ore or mineralisation situation. Because of this, it would not, in the opinion of the Committee, be unreasonable to expect any company exploring for minerals to meet a required level of competence, as a condition of listing with the Stock Exchanges.

The Stock Exchanges should require listed companies exploring for minerals, and wishing to publicise their exploration results from time to time to establish their competence with the Australian Associated Stock Exchanges according to the definitions below. The onus would be on each company, once its competence has been established, not only to maintain its status in this regard but also to ensure that any reports in the context of mineral exploration and assessment issued by the company, are based on work compiled by competent persons as defined.

Definition of Competence

(a) **Competent Person**

Where reports on a company's ore or mineralisation situation are concerned, persons responsible for the compilation of such reports would be acceptable as "competent" if they are Corporate Members of The Australasian Institute of Mining and Metallurgy, and also have a minimum of five years' experience in the fields of activity relevant to the estimates.

(b) **Competent Company**

For the purposes of reporting on its ore or mineralisation situation, a company would be acceptable as "competent" if it employs or has engaged the services of a competent person or persons.

(c) **Competent Report**

Any report or statement of technical fact, interpretation or assessment, made on behalf of a competent company, is assumed to conform to a desirable standard of competence. Provided that where a company's competence depends on its having engaged the services of an outside competent person, it shall for each such report or statement made hold a supporting document signed by that competent person.

4. Pre-Ore Reserve Terminology

The Committee considers that the pre-ore reserve stage extends from the earliest exploratory investigations to the stage at which an actual ore reserve can be estimated with reasonable assurance by a competent person as defined.

The Committee believes that the words "ore" and "reserves" should not be used in reports and statements within the pre-ore reserve stage. These terms imply economic viability and hence are not appropriate to early stage terminology.

In lieu of such terms, early stage reports and statements should refer to "mineralisation" or some similar term having no economic connotation.

Reports and statements in the field of mineral exploration and assessment which may be made by the Directors of a company up to and including the initial ore reserve statement should include relevant basic data such as — the type and method of sampling, and the distribution, dimensions, assay results and relative location of all relevant samples. If true dimensions, particularly widths of mineralisation, are not stated the report should be qualified accordingly.

References to geophysical or geochemical results should be only to "anomalies" and not to "mineralisation", "ore", "reserves" and the like. The Committee recognises that as the testing and sampling of a mineral discovery progresses, and before sufficient information is available to allow for estimation of reserves, indicative quantitative or qualitative estimates may be justified based on broad knowledge of the geological character of the deposit and on assumed continuity for which there is geological and/or geophysical evidence. The Committee recommends that such estimates be referred to as "potentially economic mineralisation".

5. *Ore Reserve Terminology*

The Committee believes that no mining company should be required compulsorily to report an estimate of its ore reserves position at any time, but that where it so chooses, it should do so in accordance with recommended definitions for "ore reserves". The Committee recommends the use of Categories set out below.

Proved/Probable/Possible

The definitions below follow closely those recommended by the Committee of the Society of Economic Geologists in 1956.

Proved ore reserves are those in which the ore has been blocked out in three dimensions by excavation or drilling, but include in addition minor extensions beyond actual openings and drill holes, where the geological factors that limit the ore body are definitely known and where the chance of failure of the ore to reach these limits is so remote as not to be a factor in the practical planning of mine operations.

Probable ore reserves cover extensions near at hand to proved ore where the conditions are such that ore will probably be found but where the extent and limiting conditions cannot be so precisely defined as for proved ore. Probable ore reserves may also include ore that has been cut by drill holes too widely spaced to assure continuity.

Possible ore (NOT RESERVES) is that for which quantitative estimates are based largely on broad knowledge of the geologic character of the deposit and for which there are few samples or measurements. The estimates are based on an assumed continuity or repetition of which there is geologic evidence; this evidence may include comparison with deposits of similar type.

NOTE: (i) A company may elect to report only its proved reserves.
(ii) The "possible" category of ore should not be included as reserves. Where the category is used publicly, it should never stand alone, but should be used only when "proved" or "probable" reserves have also been reported.

The Committee considers that companies should use the more generally accepted categories defined above and should phase out the use of other categories as soon as possible.

6. *Definition of "Ore"*

The Committee recommends that for the purposes of the above ore reserves classifications, the term "ore" be defined as follows:

"Ore" is defined as a solid naturally occurring aggregate from which one or more valuable constituents may be recovered, and which is of sufficient economic interest to warrant estimation of tonnage and grade.

7. *Precision*

The Committee recognises that ore reserves are estimates, not precise calculations, being dependent on interpretation of the available evidence

of outline and continuity of the deposit and on the available sampling results.

Accordingly the Committee recommends that both tonnage and grade figures should be expressed so as to convey the order of accuracy of the estimates by rounding off normally to the second significant figure and by the use of appropriate words rather than figures. For example, 10 863 000 tonnes at 8.23 per cent should be stated as 11 million tonnes at 8.2 per cent.

8. *Qualification*

The Committee recommends that an ore reserve statement should specify whether the figures given refer to in-situ reserves or recoverable reserves.

An in-situ ore reserve is the tonnage and grade of a defined volume of ore meeting certain cut-off grades, as determined over minimum dimensions, before other mining factors are considered.

A recoverable ore reserve is the tonnage and grade of a defined volume of ore meeting certain cut-off grades which takes into account all mining factors including dilution and mine recovery.

9. *Continuing Review*

The Committee is conscious of the fact that the above recommendations have been the subject of much debate over a great number of years without any international agreement.

It realises, however, that in the present circumstances, positive recommendations are required. These have been made, however, in the knowledge that they may need review from time to time.

10. *Ore Reserve Guidelines*

The Committee has not addressed the question of coal reserve terminology, but recommends that when public statements on coal reserves are being made the recommendations outlined in one of the existing State Government Codes be adopted. In this regard attention is drawn to the "Code for Calculating and Reporting Coal Reserves" prepared by the Standing Committee on Coalfield Geology of New South Wales.