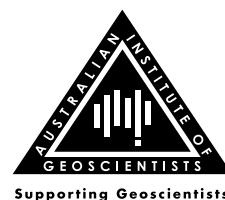


# Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves

## ~ The JORC Code ~ 2004 Edition

*Appended to this document, at pages 21-31, are extracts relevant to the JORC Code from four Australian Securities Exchange Companies Updates: 03/08, 11/07, 03/07, 05/04. These Updates, issued subsequent to publication of the Code, are important guides in the clarification and interpretation of the Code and should be read in conjunction with it.*

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AUSTRALASIAN INSTITUTE OF MINING & METALLURGY



**Effective December 2004**

Prepared by:  
The Joint Ore Reserves Committee of The Australasian Institute of  
Mining and Metallurgy, Australian Institute of Geoscientists and  
Minerals Council of Australia (JORC)

## FOREWORD

1. The *Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves* (the 'JORC Code' or 'the Code') sets out minimum standards, recommendations and guidelines for Public Reporting in Australasia of Exploration Results, Mineral Resources and Ore Reserves. The Joint Ore Reserves Committee ('JORC') was established in 1971 and published several reports containing recommendations on the classification and Public Reporting of Ore Reserves prior to the release of the first edition of the JORC Code in 1989.

Revised and updated editions of the Code were issued in 1992, 1996 and 1999. This 2004 edition supersedes all previous editions.

Concurrently with the evolution of the JORC Code, the Combined Reserves International Reporting Standards Committee ('CRIRSCO'), initially a committee of the Council of Mining and Metallurgical Institutions ('CMMI'), has, since 1994, been working to create a set of standard international definitions for reporting Mineral

Resources and Mineral (Ore) Reserves, modelled on those of the JORC Code.

Representatives of bodies from participating countries (Australia, Canada, South Africa, USA and UK) reached provisional agreement on standard definitions for reporting in 1997. This was followed in 1998 by an agreement to incorporate the CMMI definitions into the International Framework Classification for Reserves and Resources – Solid Fuels and Mineral Commodities, developed by the United Nations Economic Commission for Europe ('UN-ECE').

As a result of the CRIRSCO/CMMI initiative, considerable progress has been made towards widespread adoption of consistent reporting standards throughout the world. These are embodied in the similar codes, guidelines and standards published and adopted by the relevant professional bodies in Australia, Canada, South Africa, USA, UK, Ireland and many countries in Europe. The definitions in this edition of the JORC Code are either identical to, or not materially different from, those international definitions.

## INTRODUCTION

2. In this edition of the JORC Code, important terms and their definitions are highlighted in **bold** text. The guidelines are placed after the respective Code clauses using *indented italics*. They are intended to provide assistance and guidance to readers. They do not form part of the Code, but should be considered persuasive when interpreting the Code. Indented italics are also used for Appendix 1 – '*Generic Terms and Equivalents*', and Table 1 – '*Check List of Assessment and Reporting Criteria*' to make it clear that they are also part of the guidelines, and that the latter is not mandatory for reporting purposes.
3. The Code has been adopted by The Australasian Institute of Mining and Metallurgy ('The AusIMM') and the Australian Institute of Geoscientists ('AIG') and is therefore binding on members of those organisations. It is endorsed by the Minerals Council of Australia, and the Securities Institute of Australia as a contribution to good practice. The Code has also been adopted by and included in the listing rules of the Australian ('ASX') and New Zealand ('NZX') Stock Exchanges.

*The ASX and NZX have, since 1989 and 1992 respectively, incorporated the Code into their listing rules. Under these listing rules, a Public Report must*

*be prepared in accordance with the Code if it includes a statement on Exploration Results, Mineral Resources or Ore Reserves. The incorporation of the Code imposes certain specific requirements on mining or exploration companies reporting to the ASX and NZX. The 2004 edition of the Code has included much of the relevant material previously found only in the listing rules concerning the reporting of Exploration Results and the naming of the Competent Person. Despite the inclusion of this material in the Code it is strongly recommended that users of the Code familiarise themselves with those listing rules which relate to Public Reporting of Exploration Results, Mineral Resources and Ore Reserves.*

*The JORC Code requires the Competent Person(s), on whose work the Public Report of Exploration Results, Mineral Resources or Ore Reserves is based, to be named in the report. The report or attached statement must say that the person consents to the inclusion in the report of the matters based on their information in the form and context in which it appears, and must include the name of the person's firm or employer. Refer to Clause 8 of the Code.*

## SCOPE

4. The main principles governing the operation and application of the JORC Code are transparency, materiality and competence.
  - **Transparency** requires that the reader of a Public Report is provided with sufficient information, the presentation of which is clear and unambiguous, to understand the report and is not misled.
  - **Materiality** requires that a Public Report contains all the relevant information which investors and their professional advisers would reasonably require, and reasonably expect to find in the report, for the purpose of making a reasoned and balanced judgement regarding the Exploration Results, Mineral Resources or Ore Reserves being reported.

- **Competence** requires that the Public Report be based on work that is the responsibility of suitably qualified and experienced persons who are subject to an enforceable professional code of ethics.
5. **Reference in the Code to a Public Report or Public Reporting is to a report or reporting on Exploration Results, Mineral Resources or Ore Reserves, prepared for the purpose of informing investors or potential investors and their advisers. This includes a report or reporting to satisfy regulatory requirements.**

*The Code is a required minimum standard for Public Reporting. JORC also recommends its adoption as a minimum standard for other reporting. Companies are encouraged to provide information in their Public Reports which is as comprehensive as possible.*

*Public Reports include but are not limited to: company annual reports, quarterly reports and other reports to Australian and New Zealand Stock Exchanges, or as required by law. The Code applies to other publicly released company information in the form of postings on company web sites and briefings for shareholders, stockbrokers and investment analysts. The Code also applies to the following reports if they have been prepared for the purposes described in Clause 5: environmental statements; Information Memoranda; Expert Reports, and technical papers referring to Exploration Results, Mineral Resources or Ore Reserves.*

*For companies issuing concise annual reports, or other summary reports, inclusion of all material information relating to Exploration Results, Mineral Resources and Ore Reserves is recommended. In cases where summary information is presented it should be clearly stated that it is a summary, and a reference attached giving the location of the Code-compliant Public Reports or Public Reporting on which the summary is based.*

*It is recognised that companies can be required to issue reports into more than one regulatory jurisdiction, with compliance standards that may differ from this Code. It is recommended that such reports include a statement alerting the reader to this situation. Where members of The AusIMM and the AIG are required to report in other jurisdictions, they are obliged to comply with the requirements of those jurisdictions.*

*The term 'regulatory requirements' as used in Clause 5 is not intended to cover reports provided to State and Federal Government agencies for statutory purposes, where providing information to the investing public is not the primary intent. If such reports become available to the public, they would not*

*normally be regarded as Public Reports under the JORC Code (see also guidelines to Clauses 19 and 37).*

*Reference in the Code to 'documentation' is to internal company documents prepared as a basis for, or to support, a Public Report.*

*It is recognised that situations may arise where documentation prepared by Competent Persons for internal company or similar non-public purposes does not comply with the JORC Code. In such situations, it is recommended that the documentation includes a prominent statement to this effect. This will make it less likely that non-complying documentation will be used to compile Public Reports, since Clause 8 requires Public Reports to fairly reflect Exploration Results, Mineral Resource and/or Ore Reserve estimates, and supporting documentation, prepared by a Competent Person.*

*While every effort has been made within the Code and Guidelines to cover most situations likely to be encountered in Public Reporting, there may be occasions when doubt exists as to the appropriate form of disclosure. On such occasions, users of the Code and those compiling reports to comply with the Code should be guided by its intent, which is to provide a minimum standard for Public Reporting, and to ensure that such reporting contains all information which investors and their professional advisers would reasonably require, and reasonably expect to find in the report, for the purpose of making of a reasoned and balanced judgement regarding the Exploration Results, Mineral Resources or Ore Reserves being reported.*

6. The Code is applicable to all solid minerals, including diamonds, other gemstones, industrial minerals and coal, for which Public Reporting of Exploration Results, Mineral Resources and Ore Reserves is required by the Australian and New Zealand Stock Exchanges.

*The JORC Code is cited by the 'Code and Guidelines for Technical Assessment and/or Valuation of Mineral and Petroleum Assets and Mineral and Petroleum Securities for Independent Expert Reports' (the 'VALMIN Code') as the applicable standard for the public reporting of Exploration Results, Mineral Resources and Ore Reserves. References to 'technical and economic studies' and 'feasibility studies' in the JORC Code are not intended as references to Technical Assessments or Valuations as defined in the VALMIN Code.*

7. JORC recognises that further review of the Code and Guidelines will be required from time to time.

## COMPETENCE AND RESPONSIBILITY

8. A Public Report concerning a company's Exploration Results, Mineral Resources or Ore Reserves is the responsibility of the company acting through its Board of Directors. Any such report must be based on, and fairly reflect the information and supporting documentation prepared by a Competent Person or Persons. A company issuing a Public Report shall disclose the name(s) of the Competent Person or Persons, state whether the Competent Person is a full-time employee of the company, and, if not, name the Competent Person's employer. The report shall be issued with the written consent of the Competent Person or Persons as to the form and context in which it appears.

*Appropriate forms of compliance statements may be as follows (delete bullet points which do not apply):*

- *If the required information is in the report:*

*"The information in this report that relates to Exploration Results, Mineral Resources or Ore Reserves is based on information compiled by (insert name of Competent Person), who is a Member or Fellow of The Australasian Institute of Mining and Metallurgy or the Australian Institute of Geoscientists or a 'Recognised Overseas Professional Organisation' ('ROPO') included in a list promulgated by the ASX from time to time (select as appropriate and if a ROPO insert name of ROPO)": or*

- *If the required information is included in an attached statement:*

*"The information in the report to which this statement is attached that relates to Exploration Results, Mineral Resources or Ore Reserves is based on information compiled by (insert name of Competent Person), who is a Member or Fellow of The Australasian Institute of Mining and Metallurgy or the Australian Institute of Geoscientists or a 'Recognised Overseas Professional Organisation' ('ROPO') included in a list promulgated by the ASX from time to time (select as appropriate and if a ROPO insert name of ROPO)".*

- *If the Competent Person is a full-time employee of the company:*

*"(Insert name of Competent Person) is a full-time employee of the company".*

- *If the Competent Person is not a full-time employee of the company:*

*"(Insert name of Competent Person) is employed by (insert name of Competent Person's employer)".*

- *For all reports:*

*"(Insert name of Competent Person) has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration*

*and to the activity which he (or she) is undertaking to qualify as a Competent Person as defined in the 2004 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. (Insert name of Competent Person) consents to the inclusion in the report of the matters based on his (or her) information in the form and context in which it appears".*

9. Documentation detailing Exploration Results, Mineral Resource and Ore Reserve estimates, on which a Public Report on Exploration Results, Mineral Resources and Ore Reserves is based, must be prepared by, or under the direction of, and signed by, a Competent Person or Persons. The documentation must provide a fair representation of the Exploration Results, Mineral Resources or Ore Reserves being reported.

10. **A 'Competent Person' is a person who is a Member or Fellow of The Australasian Institute of Mining and Metallurgy, or of the Australian Institute of Geoscientists, or of a 'Recognised Overseas Professional Organisation' ('ROPO') included in a list promulgated from time to time.**

**A 'Competent Person' must have a minimum of five years experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which that person is undertaking.**

**If the Competent Person is preparing a report on Exploration Results, the relevant experience must be in exploration. If the Competent Person is estimating, or supervising the estimation of Mineral Resources, the relevant experience must be in the estimation, assessment and evaluation of Mineral Resources. If the Competent Person is estimating, or supervising the estimation of Ore Reserves, the relevant experience must be in the estimation, assessment, evaluation and economic extraction of Ore Reserves.**

*The key qualifier in the definition of a Competent Person is the word 'relevant'. Determination of what constitutes relevant experience can be a difficult area and common sense has to be exercised. For example, in estimating Mineral Resources for vein gold mineralisation, experience in a high-nugget, vein-type mineralisation such as tin, uranium etc. will probably be relevant whereas experience in (say) massive base metal deposits may not be. As a second example, to qualify as a Competent Person in the estimation of Ore Reserves for alluvial gold deposits, considerable (probably at least five years) experience in the evaluation and economic extraction of this type of mineralisation would be needed. This is due to the characteristics of gold in alluvial systems, the particle sizing of the host sediment, and the low grades involved. Experience with placer deposits containing minerals other than gold may not necessarily provide appropriate relevant experience.*

The key word 'relevant' also means that it is not always necessary for a person to have five years experience in each and every type of deposit in order to act as a Competent Person if that person has relevant experience in other deposit types. For example, a person with (say) 20 years experience in estimating Mineral Resources for a variety of metalliferous hard-rock deposit types may not require five years specific experience in (say) porphyry copper deposits in order to act as a Competent Person. Relevant experience in the other deposit types could count towards the required experience in relation to porphyry copper deposits.

In addition to experience in the style of mineralisation, a Competent Person taking responsibility for the compilation of Exploration Results or Mineral Resource estimates should have sufficient experience in the sampling and analytical techniques relevant to the deposit under consideration to be aware of problems which could affect the reliability of data. Some appreciation of extraction and processing techniques applicable to that deposit type may also be important.

As a general guide, persons being called upon to act as Competent Persons should be clearly satisfied in their own minds that they could face their peers and demonstrate competence in the commodity, type of deposit and situation under consideration. If doubt exists, the person should either seek opinions from appropriately experienced colleagues or should decline to act as a Competent Person.

Estimation of Mineral Resources may be a team effort (for example, involving one person or team collecting

the data and another person or team preparing the estimate). Estimation of Ore Reserves is very commonly a team effort involving several technical disciplines. It is recommended that, where there is clear division of responsibility within a team, each Competent Person and his or her contribution should be identified, and responsibility accepted for that particular contribution. If only one Competent Person signs the Mineral Resource or Ore Reserve documentation, that person is responsible and accountable for the whole of the documentation under the Code. It is important in this situation that the Competent Person accepting overall responsibility for a Mineral Resource or Ore Reserve estimate and supporting documentation prepared in whole or in part by others, is satisfied that the work of the other contributors is acceptable.

Complaints made in respect of the professional work of a Competent Person will be dealt with under the disciplinary procedures of the professional organisation to which the Competent Person belongs.

When an Australian or New Zealand Stock Exchange listed company with overseas interests wishes to report overseas Exploration Results, Mineral Resource or Ore Reserve estimates prepared by a person who is not a member of The AusIMM, the AIG or a ROPO, it is necessary for the company to nominate a Competent Person or Persons to take responsibility for the Exploration Results, Mineral Resource or Ore Reserve estimate. The Competent Person or Persons undertaking this activity should appreciate that they are accepting full responsibility for the estimate and supporting documentation under Stock Exchange listing rules and should not treat the procedure merely as a 'rubber-stamping' exercise.

## REPORTING TERMINOLOGY

11. Public Reports dealing with Exploration Results, Mineral Resources or Ore Reserves must only use the terms set out in Figure 1.

**The term 'Modifying Factors' is defined to include mining, metallurgical, economic, marketing, legal, environmental, social and governmental considerations.**

Figure 1 sets out the framework for classifying tonnage and grade estimates to reflect different levels of geological confidence and different degrees of technical and economic evaluation. Mineral Resources can be estimated mainly by a geologist on the basis of geoscientific information with some input from other disciplines. Ore Reserves, which are a modified sub-set of the Indicated and Measured Mineral Resources (shown within the dashed outline in Figure 1), require consideration of the Modifying Factors affecting extraction, and

should in most instances be estimated with input from a range of disciplines.

Measured Mineral Resources may convert to either Proved Ore Reserves or Probable Ore Reserves. The Competent Person may convert Measured Mineral Resources to Probable Ore Reserves because of uncertainties associated with some or all of the Modifying Factors which are taken into account in the conversion from Mineral Resources to Ore Reserves. This relationship is shown by the broken arrow in Figure 1. Although the trend of the broken arrow includes a vertical component, it does not, in this instance, imply a reduction in the level of geological knowledge or confidence. In such a situation these Modifying Factors should be fully explained.

Refer also to the guidelines to Clause 31.

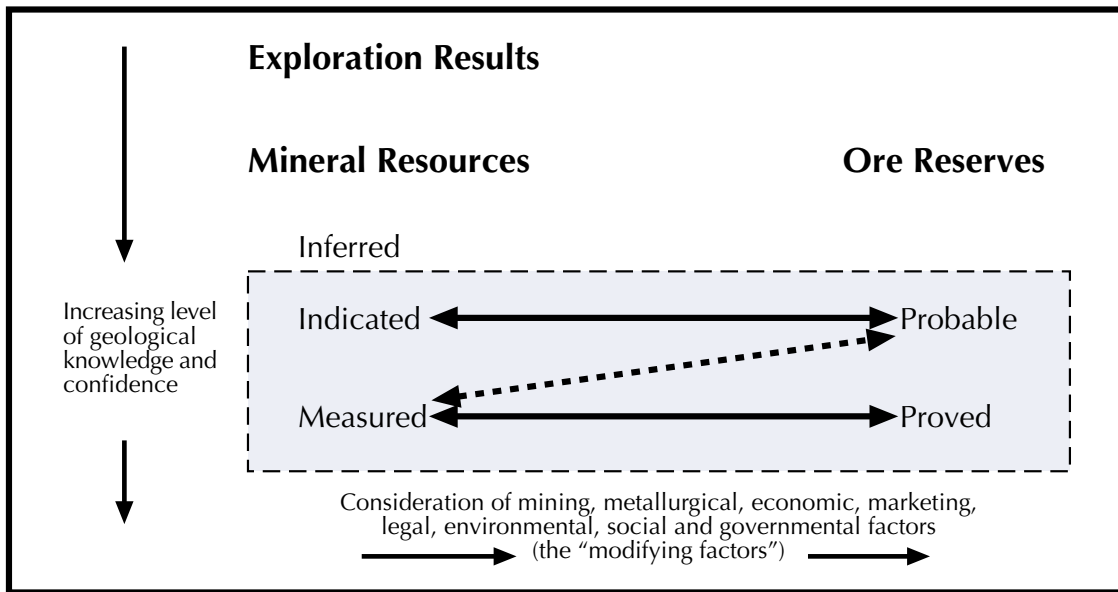


Figure 1. General relationship between Exploration Results, Mineral Resources and Ore Reserves

## REPORTING – GENERAL

12. Public Reports concerning a company's Exploration Results, Mineral Resources or Ore Reserves should include a description of the style and nature of the mineralisation.
13. A company must disclose any relevant information concerning a mineral deposit that could materially influence the economic value of that deposit to the company. A company must promptly report any material changes in its Mineral Resources or Ore Reserves.
14. Companies must review and publicly report on their Mineral Resources and Ore Reserves at least annually.
15. Throughout the Code, if appropriate, 'quality' may be substituted for 'grade' and 'volume' may be substituted for 'tonnage'. (Refer Appendix 1 – Table of Generic Terms and Equivalents).

## REPORTING OF EXPLORATION RESULTS

16. **Exploration Results include data and information generated by exploration programmes that may be of use to investors. The Exploration Results may or may not be part of a formal declaration of Mineral Resources or Ore Reserves.**

The reporting of such information is common in the early stages of exploration when the quantity of data available is generally not sufficient to allow any reasonable estimates of Mineral Resources.

If a company reports Exploration Results in relation to mineralisation not classified as a Mineral Resource or an Ore Reserve, then estimates of tonnages and average grade must not be assigned to the mineralisation unless the situation is covered by Clause 18, and then only in strict accordance with the requirements of that clause.

*Examples of Exploration Results include results of outcrop sampling, assays of drill hole intercepts, geochemical results and geophysical survey results.*

17. Public Reports of Exploration Results must contain sufficient information to allow a considered and balanced

judgement of their significance. Reports must include relevant information such as exploration context, type and method of sampling, sampling intervals and methods, relevant sample locations, distribution, dimensions and relative location of all relevant assay data, data aggregation methods, land tenure status plus information on any of the other criteria listed in Table 1 that are material to an assessment.

Public Reports of Exploration Results must not be presented so as to unreasonably imply that potentially economic mineralisation has been discovered. If true widths of mineralisation are not reported, an appropriate qualification must be included in the Public Report.

Where assay and analytical results are reported, they must be reported using one of the following methods, selected as the most appropriate by the Competent Person:

- either by listing all results, along with sample intervals (or size, in the case of bulk samples), or
- by reporting weighted average grades of mineralised zones, indicating clearly how the grades were calculated.

Reporting of selected information such as isolated assays, isolated drill holes, assays of panned concentrates or supergene enriched soils or surface samples, without placing them in perspective is unacceptable.

*Table 1 is a check list and guideline to which those preparing reports on Exploration Results, Mineral Resources and Ore Reserves should refer. The check list is not prescriptive and, as always, relevance and materiality are overriding principles which determine what information should be publicly reported.*

18. It is recognised that it is common practice for a company to comment on and discuss its exploration in terms of

target size and type. Any such information relating to exploration targets must be expressed so that it cannot be misrepresented or misconstrued as an estimate of Mineral Resources or Ore Reserves. The terms Resource(s) or Reserve(s) must not be used in this context. Any statement referring to potential quantity and grade of the target must be expressed as ranges and must include (1) a detailed explanation of the basis for the statement, and (2) a proximate statement that the potential quantity and grade is conceptual in nature, that there has been insufficient exploration to define a Mineral Resource and that it is uncertain if further exploration will result in the determination of a Mineral Resource.

## REPORTING OF MINERAL RESOURCES

**19. A ‘Mineral Resource’ is a concentration or occurrence of material of intrinsic economic interest in or on the Earth’s crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories.**

Portions of a deposit that do not have reasonable prospects for eventual economic extraction must not be included in a Mineral Resource. If the judgement as to ‘eventual economic extraction’ relies on untested practices or assumptions, this is a material matter which must be disclosed in a public report.

*The term ‘Mineral Resource’ covers mineralisation, including dumps and tailings, which has been identified and estimated through exploration and sampling and within which Ore Reserves may be defined by the consideration and application of the Modifying Factors.*

*The term ‘reasonable prospects for eventual economic extraction’ implies a judgement (albeit preliminary) by the Competent Person in respect of the technical and economic factors likely to influence the prospect of economic extraction, including the approximate mining parameters. In other words, a Mineral Resource is not an inventory of all mineralisation drilled or sampled, regardless of cut-off grade, likely mining dimensions, location or continuity. It is a realistic inventory of mineralisation which, under assumed and justifiable technical and economic conditions, might, in whole or in part, become economically extractable.*

*Where considered appropriate by the Competent Person, Mineral Resource estimates may include material below the selected cut-off grade to ensure*

*that the Mineral Resources comprise bodies of mineralisation of adequate size and continuity to properly consider the most appropriate approach to mining. Documentation of Mineral Resource estimates should clearly identify any diluting material included, and Public Reports should include commentary on the matter if considered material.*

*Any material assumptions made in determining the ‘reasonable prospects for eventual economic extraction’ should be clearly stated in the Public Report.*

*Interpretation of the word ‘eventual’ in this context may vary depending on the commodity or mineral involved. For example, for some coal, iron ore, bauxite and other bulk minerals or commodities, it may be reasonable to envisage ‘eventual economic extraction’ as covering time periods in excess of 50 years. However for the majority of gold deposits, application of the concept would normally be restricted to perhaps 10 to 15 years, and frequently to much shorter periods of time.*

*Any adjustment made to the data for the purpose of making the Mineral Resource estimate, for example by cutting or factoring grades, should be clearly stated and described in the Public Report.*

*Certain reports (eg: inventory coal reports, exploration reports to government and other similar reports not intended primarily for providing information for investment purposes) may require full disclosure of all mineralisation, including some material that does not have reasonable prospects for eventual economic extraction. Such estimates of mineralisation would not qualify as Mineral Resources or Ore Reserves in terms of the JORC Code (refer also to the guidelines to Clauses 5 and 37).*

**20. An ‘Inferred Mineral Resource’ is that part of a Mineral Resource for which tonnage, grade and mineral content can be estimated with a low level of confidence. It is inferred from geological evidence and assumed but not**

**verified geological and/or grade continuity. It is based on information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes which may be limited or of uncertain quality and reliability.**

An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource.

*The Inferred category is intended to cover situations where a mineral concentration or occurrence has been identified and limited measurements and sampling completed, but where the data are insufficient to allow the geological and/or grade continuity to be confidently interpreted. Commonly, it would be reasonable to expect that the majority of Inferred Mineral Resources would upgrade to Indicated Mineral Resources with continued exploration. However, due to the uncertainty of Inferred Mineral Resources, it should not be assumed that such upgrading will always occur.*

*Confidence in the estimate of Inferred Mineral Resources is usually not sufficient to allow the results of the application of technical and economic parameters to be used for detailed planning. For this reason, there is no direct link from an Inferred Resource to any category of Ore Reserves (see Figure 1).*

*Caution should be exercised if this category is considered in technical and economic studies.*

**21. An 'Indicated Mineral Resource' is that part of a Mineral Resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a reasonable level of confidence. It is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. The locations are too widely or inappropriately spaced to confirm geological and/or grade continuity but are spaced closely enough for continuity to be assumed.**

An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource, but has a higher level of confidence than that applying to an Inferred Mineral Resource.

*Mineralisation may be classified as an Indicated Mineral Resource when the nature, quality, amount and distribution of data are such as to allow confident interpretation of the geological framework and to assume continuity of mineralisation.*

*Confidence in the estimate is sufficient to allow the application of technical and economic parameters, and to enable an evaluation of economic viability.*

**22. A 'Measured Mineral Resource' is that part of a Mineral Resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be**

**estimated with a high level of confidence. It is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. The locations are spaced closely enough to confirm geological and grade continuity.**

*Mineralisation may be classified as a Measured Mineral Resource when the nature, quality, amount and distribution of data are such as to leave no reasonable doubt, in the opinion of the Competent Person determining the Mineral Resource, that the tonnage and grade of the mineralisation can be estimated to within close limits, and that any variation from the estimate would be unlikely to 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.*

*Confidence in the estimate is sufficient to allow the application of technical and economic parameters and to enable an evaluation of economic viability that has a greater degree of certainty than an evaluation based on an Indicated Mineral Resource.*

23. The choice of the appropriate category of Mineral Resource depends upon the quantity, distribution and quality of data available and the level of confidence that attaches to those data. The appropriate Mineral Resource category must be determined by a Competent Person or Persons.

*Mineral Resource classification is a matter for skilled judgement and Competent Persons should take into account those items in Table 1 which relate to confidence in Mineral Resource estimation.*

*In deciding between Measured Mineral Resources and Indicated Mineral Resources, Competent Persons may find it useful to consider, in addition to the phrases in the two definitions relating to geological and grade continuity in Clauses 21 and 22, the phrase in the guideline to the definition for Measured Mineral Resources: '... any variation from the estimate would be unlikely to significantly affect potential economic viability'.*

*In deciding between Indicated Mineral Resources and Inferred Mineral Resources, Competent Persons may wish to take into account, in addition to the phrases in the two definitions in Clauses 20 and 21 relating to geological and grade continuity, the guideline to the definition for Indicated Mineral Resources: 'Confidence in the estimate is sufficient to allow the application of technical and economic parameters and to enable an evaluation of economic viability', which contrasts with the guideline to the definition for Inferred Mineral Resources: 'Confidence in the estimate of Inferred Mineral Resources is usually not sufficient to allow the results*

*of the application of technical and economic parameters to be used for detailed planning,’ and ‘Caution should be exercised if this category is considered in technical and economic studies’.*

*The Competent Person should take into consideration issues of the style of mineralisation and cut-off grade when assessing geological and grade continuity.*

*Cut-off grades chosen for the estimation should be realistic in relation to the style of mineralisation.*

24. Mineral Resource estimates are not precise calculations, being dependent on the interpretation of limited information on the location, shape and continuity of the occurrence and on the available sampling results. Reporting of tonnage and grade figures should reflect the relative uncertainty of the estimate by rounding off to appropriately significant figures and, in the case of Inferred Mineral Resources, by qualification with terms such as ‘approximately’.

*In most situations, rounding to the second significant figure should be sufficient. For example 10,863,000 tonnes at 8.23 per cent should be stated as 11 million tonnes at 8.2 per cent. 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 usually be the case with Inferred Mineral Resources.*

*To emphasise the imprecise nature of a Mineral Resource estimate, the final result should always be referred to as an estimate not a calculation.*

*Competent Persons are encouraged, where appropriate, to discuss the relative accuracy and/or confidence of the Mineral Resource estimates. The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnage or volume. Where a statement of the relative accuracy and/or confidence is not possible, a qualitative discussion of the uncertainties should be provided (refer to Table 1).*

25. Public Reports of Mineral Resources must specify one or more of the categories of ‘Inferred’, ‘Indicated’ and ‘Measured’. Categories must not be reported in a combined form unless details for the individual categories are also provided. Mineral Resources must not be reported in terms of contained metal or mineral content unless corresponding tonnages and grades are also presented. Mineral Resources must not be aggregated with Ore Reserves.

Public Reporting of tonnages and grades outside the categories covered by the Code is not permitted unless the situation is covered by Clause 18, and then only in strict accordance with the requirements of that clause.

*Estimates of tonnage and grade outside of the categories covered by the Code may be useful for a*

*company in its internal calculations and evaluation processes, but their inclusion in Public Reports could cause confusion.*

26. Table 1 provides, in a summary form, a list of the main criteria which should be considered when preparing reports on Exploration Results, Mineral Resources and Ore Reserves. These criteria need not be discussed in a Public Report unless they materially affect estimation or classification of the Mineral Resources.

*It is not necessary, when publicly reporting, to comment on each item in Table 1, but it is essential to discuss any matters which might materially affect the reader’s understanding or interpretation of the results or estimates being reported. This is particularly important where inadequate or uncertain data affect the reliability of, or confidence in, a statement of Exploration Results or an estimate of Mineral Resources or Ore Reserves; for example, poor sample recovery, poor repeatability of assay or laboratory results, limited information on bulk densities etc.*

*If there is doubt about what should be reported, it is better to err on the side of providing too much information rather than too little.*

*Uncertainties in any of the criteria listed in Table 1 that could lead to under- or over-statement of resources should be disclosed.*

*Mineral Resource estimates are sometimes reported after adjustment from reconciliation with production data. Such adjustments should be clearly stated in a Public Report of Mineral Resources and the nature of the adjustment or modification described.*

27. The words ‘ore’ and ‘reserves’ must not be used in describing Mineral Resource estimates as the terms imply technical feasibility and economic viability and are only appropriate when all relevant Modifying Factors have been considered. Reports and statements should continue to refer to the appropriate category or categories of Mineral Resources until technical feasibility and economic viability have been established. If re-evaluation indicates that the Ore Reserves are no longer viable, the Ore Reserves must be reclassified as Mineral Resources or removed from Mineral Resource/Ore Reserve statements.

*It is not intended that re-classification from Ore Reserves to Mineral Resources or vice versa should be applied as a result of changes expected to be of a short term or temporary nature, or where company management has made a deliberate decision to operate on a non-economic basis. Examples of such situations might be commodity price fluctuations expected to be of short duration, mine emergency of a non-permanent nature, transport strike etc.*

## REPORTING OF ORE RESERVES

**28. An 'Ore Reserve' is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined. Appropriate assessments and studies have been carried out, and include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction could reasonably be justified. Ore Reserves are sub-divided in order of increasing confidence into Probable Ore Reserves and Proved Ore Reserves.**

In reporting Ore Reserves, information on estimated mineral processing recovery factors is very important, and should always be included in Public Reports.

*Ore Reserves are those portions of Mineral Resources which, after the application of all mining factors, result in an estimated tonnage and grade which, in the opinion of the Competent Person making the estimates, can be the basis of a viable project, after taking account of all relevant Modifying Factors.*

*Ore Reserves are reported as inclusive of marginally economic material and diluting material delivered for treatment or dispatched from the mine without treatment.*

*The term 'economically mineable' implies that extraction of the Ore Reserve has been demonstrated to be viable under reasonable financial assumptions. What constitutes the term 'realistically assumed' will vary with the type of deposit, the level of study that has been carried out and the financial criteria of the individual company. For this reason, there can be no fixed definition for the term 'economically mineable'.*

*In order to achieve the required level of confidence in the Modifying Factors, appropriate studies will have been carried out prior to determination of the Ore Reserves. The studies will have determined a mine plan that is technically achievable and economically viable and from which the Ore Reserves can be derived. It may not be necessary for these studies to be at the level of a final feasibility study.*

*The term 'Ore Reserve' need not necessarily signify that extraction facilities are in place or operative, or that all necessary approvals or sales contracts have been received. It does signify that there are reasonable expectations of such approvals or contracts. The Competent Person should consider the materiality of any unresolved matter that is dependent on a third party on which extraction is contingent. If there is doubt about what should be reported, it is better to err on the side of providing too much information rather than too little.*

*Any adjustment made to the data for the purpose of making the Ore Reserve estimate, for example by cutting or factoring grades, should be clearly stated and described in the Public Report.*

*Where companies prefer to use the term 'Mineral Reserves' in their Public Reports, e.g. for reporting industrial minerals or for reporting outside Australasia, they should state clearly that this is being used with the same meaning as 'Ore Reserves', defined in this Code. If preferred by the reporting company, 'Ore Reserve' and 'Mineral Resource' estimates for coal may be reported as 'Coal Reserve' and 'Coal Resource' estimates.*

*JORC prefers the term 'Ore Reserve' because it assists in maintaining a clear distinction between a 'Mineral Resource' and an 'Ore Reserve'.*

**29. A 'Probable Ore Reserve' is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. It includes diluting materials and allowances for losses which may occur when the material is mined. Appropriate assessments and studies have been carried out, and include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction could reasonably be justified.**

A Probable Ore Reserve has a lower level of confidence than a Proved Ore Reserve but is of sufficient quality to serve as the basis for a decision on the development of the deposit.

**30. A 'Proved Ore Reserve' is the economically mineable part of a Measured Mineral Resource. It includes diluting materials and allowances for losses which may occur when the material is mined. Appropriate assessments and studies have been carried out, and include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction could reasonably be justified.**

*A Proved Ore Reserve represents the highest confidence category of reserve estimate. The style of mineralisation or other factors could mean that Proved Ore Reserves are not achievable in some deposits.*

**31. The choice of the appropriate category of Ore Reserve is determined primarily by the relevant level of confidence in the Mineral Resource and after considering any uncertainties in the Modifying Factors. Allocation of the appropriate category must be made by a Competent Person or Persons.**

*The Code provides for a direct two-way relationship between Indicated Mineral Resources and Probable Ore Reserves and between Measured Mineral Resources and Proved Ore Reserves. In other words, the level of geological confidence for Probable Ore Reserves is similar to that required for the determination of Indicated Mineral Resources, and the level of geological confidence for Proved Ore Reserves is similar to that required for the determination of Measured Mineral Resources.*

*The Code also provides for a two-way relationship between Measured Mineral Resources and Probable Ore Reserves. This is to cover a situation where uncertainties associated with any of the Modifying Factors considered when converting Mineral Resources to Ore Reserves may result in there being a lower degree of confidence in the Ore Reserves than in the corresponding Mineral Resources. Such a conversion would not imply a reduction in the level of geological knowledge or confidence.*

*A Probable Ore Reserve derived from a Measured Mineral Resource may be converted to a Proved Ore Reserve if the uncertainties in the Modifying Factors are removed. No amount of confidence in the Modifying Factors for conversion of a Mineral Resource to an Ore Reserve can override the upper level of confidence that exists in the Mineral Resource. Under no circumstances can an Indicated Mineral Resource be converted directly to a Proved Ore Reserve (see Figure 1).*

*Application of the category of Proved Ore Reserve implies the highest degree of confidence in the estimate, with consequent expectations in the minds of the readers of the report. These expectations should be borne in mind when categorising a Mineral Resource as Measured.*

*Refer also to the guidelines in Clause 23 regarding classification of Mineral Resources.*

32. Ore Reserve estimates are not precise calculations. Reporting of tonnage and grade figures should reflect the relative uncertainty of the estimate by rounding off to appropriately significant figures. Refer also to Clause 24.

*To emphasise the imprecise nature of an Ore Reserve, the final result should always be referred to as an estimate not a calculation.*

*Competent Persons are encouraged, where appropriate, to discuss the relative accuracy and/or confidence of the Ore Reserve estimates. The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnage or volume. Where a statement of the relative accuracy and/or confidence is not possible, a qualitative discussion of the uncertainties should be provided (refer to Table 1).*

33. Public Reports of Ore Reserves must specify one or other or both of the categories of 'Proved' and 'Probable'. Reports must not contain combined Proved and Probable Ore Reserve figures unless the relevant figures for each of the categories are also provided. Reports must not present metal or mineral content figures unless corresponding tonnage and grade figures are also given.

Public Reporting of tonnage and grade outside the categories covered by the Code is not permitted unless the situation is covered by Clause 18, and then only in strict accordance with the requirements of that clause.

*Estimates of tonnage and grade outside of the categories covered by the Code may be useful for a company in its internal calculations and evaluation processes, but their inclusion in Public Reports could cause confusion.*

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

*When revised Ore Reserve and Mineral Resource statements are publicly reported they should be accompanied by reconciliation with previous statements. A detailed account of differences between the figures is not essential, but sufficient comment should be made to enable significant changes to be understood by the reader.*

34. In situations where figures for both Mineral Resources and Ore Reserves are reported, a statement must be included in the report which clearly indicates whether the Mineral Resources are inclusive of, or additional to the Ore Reserves.

Ore Reserve estimates must not be aggregated with Mineral Resource estimates to report a single combined figure.

*In some situations there are reasons for reporting Mineral Resources inclusive of Ore Reserves and in other situations for reporting Mineral Resources additional to Ore Reserves. It must be made clear which form of reporting has been adopted. Appropriate forms of clarifying statements may be:*

*'The Measured and Indicated Mineral Resources are inclusive of those Mineral Resources modified to produce the Ore Reserves.'* or *'The Measured and Indicated Mineral Resources are additional to the Ore Reserves.'*

*In the former case, if any Measured and Indicated Mineral Resources have not been modified to produce Ore Reserves for economic or other reasons, the relevant details of these unmodified Mineral Resources should be included in the report. This is*

*to assist the reader of the report in making a judgement of the likelihood of the unmodified Measured and Indicated Mineral Resources eventually being converted to Ore Reserves.*

*Inferred Mineral Resources are by definition always additional to Ore Reserves.*

*For reasons stated in the guidelines to Clause 33 and in this paragraph, the reported Ore Reserve figures must not be aggregated with the reported Mineral Resource figures. The resulting total is misleading and is capable of being misunderstood or of being misused to give a false impression of a company's prospects.*

35. Table 1 provides, in a summary form, a list of the criteria which should be considered when preparing reports on Exploration Results, Mineral Resources and Ore Reserves. These criteria need not be discussed in a Public Report unless they materially affect estimation or classification of the Ore Reserves. Changes in economic or political factors alone may be the basis for significant changes in Ore Reserves and should be reported accordingly.

*Ore Reserve estimates are sometimes reported after adjustment from reconciliation with production data. Such adjustments should be clearly stated in a Public Report of Ore Reserves and the nature of the adjustment or modification described.*

## REPORTING OF MINERALISED FILL, REMNANTS, PILLARS, LOW GRADE MINERALISATION, STOCKPILES, DUMPS AND TAILINGS

36. The Code applies to the reporting of all potentially economic mineralised material. This can include mineralised fill, remnants, pillars, low grade mineralisation, stockpiles, dumps and tailings (remnant materials) where there are reasonable prospects for eventual economic extraction in the case of Mineral Resources, and where extraction is reasonably justifiable in the case of Ore Reserves. Unless otherwise stated, all other clauses of the Code (including Figure 1) apply.

*Any mineralised material as described in this clause can be considered to be similar to in situ mineralisation for the purposes of reporting Mineral Resources and Ore Reserves. Judgements about the mineability of such mineralised material should be made by professionals with relevant experience.*

*If there are no reasonable prospects for the eventual economic extraction of all or part of the mineralised material as described in this clause, then this material cannot be classified as either Mineral Resources or Ore Reserves. If some portion of the mineralised material is currently sub-economic, but there is a reasonable expectation that it will become*

*economic, then this material may be classified as a Mineral Resource. If technical and economic studies have demonstrated that economic extraction could reasonably be justified under realistically assumed conditions, then the material may be classified as an Ore Reserve.*

*The above guidelines apply equally to low grade in situ mineralisation, sometimes referred to as 'mineralised waste' or 'marginal grade material', and often intended for stockpiling and treatment towards the end of mine life. For clarity of understanding, it is recommended that tonnage and grade estimates of such material be itemised separately in Public Reports, although they may be aggregated with total Mineral Resource and Ore Reserve figures.*

*Stockpiles are defined to include both surface and underground stockpiles, including broken ore in stopes, and can include ore currently in the ore storage system. Mineralised material in the course of being processed (including leaching), if reported, should be reported separately.*

## REPORTING OF COAL RESOURCES AND RESERVES

37. Clauses 37 to 39 of the Code address matters that relate specifically to the Public Reporting of Coal Resources and Reserves. Unless otherwise stated, Clauses 1 to 36 of this Code (including Figure 1) apply. Table 1, as part of the guidelines, should be considered persuasive when reporting on Coal Resources and Reserves.

*For purposes of Public Reporting, the requirements for coal are generally similar to those for other commodities with the replacement of terms such as 'mineral' by 'coal' and 'grade' by 'quality'.*

*For guidance on the estimation of Coal Resources and Reserves and on statutory reporting not primarily*

*intended for providing information to the investing public, readers are referred to the 2003 edition of the 'Australian Guidelines for Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves'. These guidelines do not override the provisions and intentions of the JORC Code for Public Reporting.*

*Because of its impact on planning and land use, governments may require estimates of inventory coal that are not constrained by short to medium term economic considerations. The JORC Code does not cover such estimates. Refer also to the guidelines to Clauses 5 and 19.*

38. The terms 'Mineral Resource(s)' and 'Ore Reserve(s)', and the subdivisions of these as defined above, apply also to coal reporting, but if preferred by the reporting company, the terms 'Coal Resource(s)' and 'Coal Reserve(s)' and the appropriate subdivisions may be substituted.
39. 'Marketable Coal Reserves', representing beneficiated or otherwise enhanced coal product where modifications due to mining, dilution and processing have been considered, may be publicly reported in conjunction with, but not instead of, reports of Ore (Coal) Reserves. The basis of the predicted yield to achieve Marketable Coal Reserves should be stated.

## REPORTING OF DIAMOND EXPLORATION RESULTS, MINERAL RESOURCES AND ORE RESERVES

40. Clauses 40 to 43 of the Code address matters that relate specifically to the Public Reporting of Exploration Results, Mineral Resources and Ore Reserves for diamonds and other gemstones. Unless otherwise stated, Clauses 1 to 36 of this Code (including Figure 1) apply. Table 1, as part of the guidelines, should be considered persuasive when reporting Exploration Results, Mineral Resources and Ore Reserves for diamonds and other gemstones.

*For the purposes of Public Reporting, the requirements for diamonds and other gemstones are generally similar to those for other commodities with the replacement of terms such as 'mineral' by 'diamond' and 'grade' by 'grade and average diamond value'. The term 'quality' should not be substituted for 'grade,' since in diamond deposits these have distinctly separate meanings. Other industry guidelines on the estimation and reporting of diamond resources and reserves may be useful but will not under any circumstances override the provisions and intentions of the JORC Code.*

*A number of characteristics of diamond deposits are different from those of, for example, typical metalliferous and coal deposits and therefore require special consideration. These include the generally low mineral content and variability of primary and placer deposits, the particulate nature of diamonds, the specialised requirement for diamond valuation and the inherent difficulties and uncertainties in the estimation of diamond resources and reserves.*

41. Reports of diamonds recovered from sampling programs must provide material information relating to the basis on which the sample is taken, the method of recovery and the recovery of the diamonds. The weight of diamonds recovered may only be omitted from the report when the diamonds are considered to be too small to be of commercial significance. This lower cut-off size should be stated.

*The stone size distribution and price of diamonds and other gemstones are critical components of the resource and reserve estimates. At an early exploration stage, sampling and delineation drilling will not usually provide this information, which relies on large diameter drilling and, in particular, bulk sampling.*

*In order to demonstrate that a resource has reasonable prospects for economic extraction, some appreciation of the likely stone size distribution and price is necessary, however preliminary. To determine an Inferred Resource in simple, single-facies or single-phase deposits, such information may be obtainable by representative large diameter drilling. More often, some form of bulk sampling, such as pitting and trenching, would be employed to provide larger sample parcels.*

*In order to progress to an Indicated Resource, and from there to a Probable Reserve, it is likely that much more extensive bulk sampling would be needed to fully determine the stone size distribution and value. Commonly such bulk samples would be obtained by underground development designed to obtain sufficient diamonds to enable a confident estimate of price.*

*In complex deposits, it may be very difficult to ensure that the bulk samples taken are truly representative of the whole deposit. The lack of direct bulk sampling, and the uncertainty in demonstrating spatial continuity of size and price relationships should be persuasive in determining the appropriate resource category.*

42. Where diamond Mineral Resource or Ore Reserve grades (carats per tonne) are based on correlations between the frequency of occurrence of micro-diamonds and of commercial size stones, this must be stated, the reliability of the procedure must be explained and the cut-off sieve size for micro-diamonds reported.
43. For Public Reports dealing with diamond or other gemstone mineralisation, it is a requirement that any reported valuation of a parcel of diamonds or gemstones be accompanied by a statement verifying the independence of the valuation. The valuation must be based on a report from a demonstrably reputable and qualified expert.

If a valuation of a parcel of diamonds is reported, the weight in carats and the lower cut-off size of the contained diamonds must be stated and the value of the diamonds must be given in US dollars per carat. Where the valuation is used in the estimation of diamond Mineral Resources or Ore Reserves, the valuation must be based on a parcel representative of the size, shape

and colour distributions of the diamond population in the deposit.

Diamond valuations should not be reported for samples of diamonds processed using total liberation methods.

*Table 1 provides in summary form, a list of the main criteria which should be considered when preparing reports on Exploration Results, Mineral Resources and Ore Reserves for diamonds and other gemstones.*

## REPORTING OF INDUSTRIAL MINERALS EXPLORATION RESULTS, MINERAL RESOURCES AND ORE RESERVES

44. Industrial minerals are covered by the JORC Code if they meet the criteria set out in Clauses 5 and 6 of the Code. For the purpose of the JORC Code, industrial minerals can be considered to cover commodities such as kaolin, phosphate, limestone, talc etc.

*When reporting information and estimates for industrial minerals, the key principles and purpose of the JORC Code apply and should be borne in mind. Assays may not always be relevant, and other quality criteria may be more applicable. If criteria such as deleterious minerals or physical properties are of more relevance than the composition of the bulk mineral itself, then they should be reported accordingly.*

*The factors underpinning the estimation of Mineral Resources and Ore Reserves for industrial minerals are the same as those for other deposit types covered by the JORC Code. It may be necessary, prior to the reporting of a Mineral Resource or Ore Reserve, to take particular account of certain key characteristics or qualities such as likely product specifications,*

*proximity to markets and general product marketability.*

*For some industrial minerals, it is common practice to report the saleable product rather than the ‘as-mined’ product, which is traditionally regarded as the Ore Reserve. JORC’s preference is that, if the saleable product is reported, it should be in conjunction with, not instead of, reporting of the Ore Reserve. However, it is recognised that commercial sensitivities may not always permit this preferred style of reporting. It is important that, in all situations where the saleable product is reported, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.*

*Some industrial mineral deposits may be capable of yielding products suitable for more than one application and/or specification. If considered material by the reporting company, such multiple products should be quantified either separately or as a percentage of the bulk deposit.*

### TABLE 1 CHECK LIST OF ASSESSMENT AND REPORTING CRITERIA

*Table 1 is a check list and guideline which those preparing reports on Exploration Results, Mineral Resources and Ore Reserves should use as a reference. The check list is not prescriptive and, as always, relevance and materiality are overriding principles that determine what information should be publicly reported. It is, however, important to report any matters that might materially affect a reader’s understanding or interpretation of the results or estimates being reported. This is particularly important where inadequate or uncertain data affect the reliability of, or confidence in, a statement of Exploration Results or an estimate of Mineral Resources or Ore Reserves.*

*The order and grouping of criteria in Table 1 reflects the normal systematic approach to exploration and evaluation. Criteria in the first group ‘Sampling Techniques and Data’ apply to all succeeding groups. In the remainder of the table, criteria listed in preceding groups would often apply to succeeding groups and should be considered when estimating and reporting.*

<b>Criteria</b>	<b>Explanation</b>
<b>Sampling Techniques and Data</b> <i>(criteria in this group apply to all succeeding groups)</i>	
<i>Sampling techniques.</i>	<b>• Nature and quality of sampling (eg. cut channels, random chips etc.) and measures taken to ensure sample representivity.</b>
<i>Drilling techniques.</i>	<b>• Drill type (eg. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka etc.) and details (eg. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc.).</b>

Note: Code is in normal typeface, guidelines are in indented italics, definitions are in bold.

<b>Criteria</b>	<b>Explanation</b>
<b>Sampling Techniques and Data</b> (criteria in this group apply to all succeeding groups)	
<i>Drill sample recovery.</i>	<ul style="list-style-type: none"> <li>• Whether core and chip sample recoveries have been properly recorded and results assessed.</li> <li>• Measures taken to maximise sample recovery and ensure representative nature of the samples.</li> <li>• Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.</li> </ul>
<i>Logging.</i>	<ul style="list-style-type: none"> <li>• Whether core and chip samples have been logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.</li> <li>• Whether logging is qualitative or quantitative in nature. Core (or costean, channel etc.) photography.</li> </ul>
<i>Sub-sampling techniques and sample preparation.</i>	<ul style="list-style-type: none"> <li>• If core, whether cut or sawn and whether quarter, half or all core taken.</li> <li>• If non-core, whether riffled, tube sampled, rotary split etc. and whether sampled wet or dry.</li> <li>• For all sample types, the nature, quality and appropriateness of the sample preparation technique.</li> <li>• Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.</li> <li>• Measures taken to ensure that the sampling is representative of the in situ material collected.</li> <li>• Whether sample sizes are appropriate to the grainsize of the material being sampled.</li> </ul>
<i>Quality of assay data and laboratory tests.</i>	<ul style="list-style-type: none"> <li>• The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.</li> <li>• Nature of quality control procedures adopted (eg. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie. lack of bias) and precision have been established.</li> </ul>
<i>Verification of sampling and assaying.</i>	<ul style="list-style-type: none"> <li>• The verification of significant intersections by either independent or alternative company personnel.</li> <li>• The use of twinned holes.</li> </ul>
<i>Location of data points.</i>	<ul style="list-style-type: none"> <li>• Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.</li> <li>• Quality and adequacy of topographic control.</li> </ul>
<i>Data spacing and distribution.</i>	<ul style="list-style-type: none"> <li>• Data spacing for reporting of Exploration Results.</li> <li>• Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.</li> <li>• Whether sample compositing has been applied.</li> </ul>
<i>Orientation of data in relation to geological structure.</i>	<ul style="list-style-type: none"> <li>• Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.</li> <li>• If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.</li> </ul>
<i>Audits or reviews.</i>	<ul style="list-style-type: none"> <li>• The results of any audits or reviews of sampling techniques and data.</li> </ul>
<b>Reporting of Exploration Results</b> (criteria listed in the preceding group apply also to this group)	
<i>Mineral tenement and land tenure status.</i>	<ul style="list-style-type: none"> <li>• Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.</li> <li>• The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.</li> </ul>
<i>Exploration done by other parties.</i>	<ul style="list-style-type: none"> <li>• Acknowledgment and appraisal of exploration by other parties.</li> </ul>
<i>Geology.</i>	<ul style="list-style-type: none"> <li>• Deposit type, geological setting and style of mineralisation.</li> </ul>

Note: Code is in normal typeface, guidelines are in indented italics, definitions are in bold.

<b>Criteria</b>	<b>Explanation</b>
<b>Reporting of Exploration Results</b> <i>(criteria listed in the preceding group apply also to this group)</i>	
<i>Data aggregation methods.</i>	<ul style="list-style-type: none"> <li>• <i>In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg. cutting of high grades) and cut-off grades are usually material and should be stated.</i></li> <li>• <i>Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.</i></li> <li>• <i>The assumptions used for any reporting of metal equivalent values should be clearly stated.</i></li> </ul>
<i>Relationship between mineralisation widths and intercept lengths.</i>	<ul style="list-style-type: none"> <li>• <i>These relationships are particularly important in the reporting of Exploration Results.</i></li> <li>• <i>If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.</i></li> <li>• <i>If it is not known and only the down-hole lengths are reported, there should be a clear statement to this effect (eg. 'downhole length, true width not known').</i></li> </ul>
<i>Diagrams.</i>	<ul style="list-style-type: none"> <li>• <i>Where possible, maps and sections (with scales) and tabulations of intercepts should be included for any material discovery being reported if such diagrams significantly clarify the report.</i></li> </ul>
<i>Balanced reporting.</i>	<ul style="list-style-type: none"> <li>• <i>Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practised to avoid misleading reporting of Exploration Results.</i></li> </ul>
<i>Other substantive exploration data.</i>	<ul style="list-style-type: none"> <li>• <i>Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.</i></li> </ul>
<i>Further work.</i>	<ul style="list-style-type: none"> <li>• <i>The nature and scale of planned further work (eg. tests for lateral extensions or depth extensions or large-scale step-out drilling).</i></li> </ul>
<b>Estimation and Reporting of Mineral Resources</b> <i>(criteria listed in the first group, and where relevant in the second group, apply also to this group)</i>	
<i>Database integrity.</i>	<ul style="list-style-type: none"> <li>• <i>Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.</i></li> <li>• <i>Data validation procedures used.</i></li> </ul>
<i>Geological interpretation.</i>	<ul style="list-style-type: none"> <li>• <i>Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.</i></li> <li>• <i>Nature of the data used and of any assumptions made.</i></li> <li>• <i>The effect, if any, of alternative interpretations on Mineral Resource estimation.</i></li> <li>• <i>The use of geology in guiding and controlling Mineral Resource estimation.</i></li> <li>• <i>The factors affecting continuity both of grade and geology.</i></li> </ul>
<i>Dimensions.</i>	<ul style="list-style-type: none"> <li>• <i>The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.</i></li> </ul>
<i>Estimation and modelling techniques.</i>	<ul style="list-style-type: none"> <li>• <i>The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters, maximum distance of extrapolation from data points.</i></li> <li>• <i>The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.</i></li> <li>• <i>The assumptions made regarding recovery of by-products.</i></li> <li>• <i>Estimation of deleterious elements or other non-grade variables of economic significance (e.g. sulphur for acid mine drainage characterisation).</i></li> </ul>

<b>Criteria</b>	<b>Explanation</b>
	<ul style="list-style-type: none"> <li>• In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.</li> <li>• Any assumptions behind modelling of selective mining units.</li> <li>• Any assumptions about correlation between variables.</li> <li>• The process of validation, the checking process used, the comparison of model data to drillhole data, and use of reconciliation data if available.</li> </ul>
Moisture.	<ul style="list-style-type: none"> <li>• Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.</li> </ul>
Cut-off parameters.	<ul style="list-style-type: none"> <li>• The basis of the adopted cut-off grade(s) or quality parameters applied.</li> </ul>
Mining factors or assumptions.	<ul style="list-style-type: none"> <li>• Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It may not always be possible to make assumptions regarding mining methods and parameters when estimating Mineral Resources. Where no assumptions have been made, this should be reported.</li> </ul>
Metallurgical factors or assumptions.	<ul style="list-style-type: none"> <li>• The basis for assumptions or predictions regarding metallurgical amenability. It may not always be possible to make assumptions regarding metallurgical treatment processes and parameters when reporting Mineral Resources. Where no assumptions have been made, this should be reported.</li> </ul>
Bulk density.	<ul style="list-style-type: none"> <li>• Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.</li> </ul>
Classification.	<ul style="list-style-type: none"> <li>• The basis for the classification of the Mineral Resources into varying confidence categories.</li> <li>• Whether appropriate account has been taken of all relevant factors. i.e. relative confidence in tonnage/grade computations, confidence in continuity of geology and metal values, quality, quantity and distribution of the data.</li> <li>• Whether the result appropriately reflects the Competent Person(s)' view of the deposit.</li> </ul>
Audits or reviews.	<ul style="list-style-type: none"> <li>• The results of any audits or reviews of Mineral Resource estimates.</li> </ul>
Discussion of relative accuracy/confidence.	<ul style="list-style-type: none"> <li>• Where appropriate a statement of the relative accuracy and/or confidence in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative accuracy and confidence of the estimate.</li> <li>• The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages or volumes, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.</li> <li>• These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.</li> </ul>
<b>Estimation and Reporting of Ore Reserves</b> <i>(criteria listed in the first group, and where relevant in other preceding groups, apply also to this group)</i>	
Mineral Resource estimate for conversion to Ore Reserves.	<ul style="list-style-type: none"> <li>• Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve.</li> <li>• Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.</li> </ul>
Study status.	<ul style="list-style-type: none"> <li>• The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves.</li> <li>• The Code does not require that a final feasibility study has been undertaken to convert Mineral Resources to Ore Reserves, but it does require that appropriate studies will have been carried that will have determined a mine plan that is technically achievable and economically viable, and that all Modifying Factors have been considered.</li> </ul>
Cut-off parameters.	<ul style="list-style-type: none"> <li>• The basis of the cut-off grade(s) or quality parameters applied.</li> </ul>

<b>Criteria</b>	<b>Explanation</b>
<i>Mining factors or assumptions.</i>	<ul style="list-style-type: none"> <li>• <i>The method and assumptions used to convert the Mineral Resource to an Ore Reserve (ie either by application of appropriate factors by optimisation or by preliminary or detailed design).</i></li> <li>• <i>The choice of, the nature and the appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.</i></li> <li>• <i>The assumptions made regarding geotechnical parameters (eg. pit slopes, stope sizes, etc.), grade control and pre-production drilling.</i></li> <li>• <i>The major assumptions made and Mineral Resource model used for pit optimisation (if appropriate).</i></li> <li>• <i>The mining dilution factors, mining recovery factors, and minimum mining widths used.</i></li> <li>• <i>The infrastructure requirements of the selected mining methods.</i></li> </ul>
<i>Metallurgical factors or assumptions.</i>	<ul style="list-style-type: none"> <li>• <i>The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.</i></li> <li>• <i>Whether the metallurgical process is well-tested technology or novel in nature.</i></li> <li>• <i>The nature, amount and representativeness of metallurgical testwork undertaken and the metallurgical recovery factors applied.</i></li> <li>• <i>Any assumptions or allowances made for deleterious elements.</i></li> <li>• <i>The existence of any bulk sample or pilot scale testwork and the degree to which such samples are representative of the orebody as a whole.</i></li> </ul>
<i>Cost and revenue factors.</i>	<ul style="list-style-type: none"> <li>• <i>The derivation of, or assumptions made, regarding projected capital and operating costs.</i></li> <li>• <i>The assumptions made regarding revenue including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, etc.</i></li> <li>• <i>The allowances made for royalties payable, both Government and private.</i></li> </ul>
<i>Market assessment.</i>	<ul style="list-style-type: none"> <li>• <i>The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future.</i></li> <li>• <i>A customer and competitor analysis along with the identification of likely market windows for the product.</i></li> <li>• <i>Price and volume forecasts and the basis for these forecasts.</i></li> <li>• <i>For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.</i></li> </ul>
<i>Other.</i>	<ul style="list-style-type: none"> <li>• <i>The effect, if any, of natural risk, infrastructure, environmental, legal, marketing, social or governmental factors on the likely viability of a project and/or on the estimation and classification of the Ore Reserves.</i></li> <li>• <i>The status of titles and approvals critical to the viability of the project, such as mining leases, discharge permits, government and statutory approvals.</i></li> </ul>
<i>Classification.</i>	<ul style="list-style-type: none"> <li>• <i>The basis for the classification of the Ore Reserves into varying confidence categories.</i></li> <li>• <i>Whether the result appropriately reflects the Competent Person(s)' view of the deposit.</i></li> <li>• <i>The proportion of Probable Ore Reserves which have been derived from Measured Mineral Resources (if any).</i></li> </ul>
<i>Audits or reviews.</i>	<ul style="list-style-type: none"> <li>• <i>The results of any audits or reviews of Ore Reserve estimates.</i></li> </ul>
<i>Discussion of relative accuracy/confidence.</i>	<ul style="list-style-type: none"> <li>• <i>Where appropriate a statement of the relative accuracy and/or confidence in the Ore Reserve estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative accuracy and confidence of the estimate.</i></li> <li>• <i>The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages or volumes, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.</i></li> <li>• <i>These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.</i></li> </ul>

Note: Code is in normal typeface, guidelines are in indented italics, definitions are in bold.

<b>Criteria</b>	<b>Explanation</b>
<p><b>Estimation and Reporting of Diamonds and other Gemstones</b>  <i>(criteria listed in other relevant groups also apply to this group; additional guidelines are available in the 'Guidelines for the Reporting of Diamond Exploration Results' issued by the Diamond Exploration Best Practices Committee established by the Canadian Institute of Mining, Metallurgy and Petroleum.)</i></p>	
Indicator minerals.	<ul style="list-style-type: none"> <li>• Reports of indicator minerals, such as chemically/physically distinctive garnet, ilmenite, chrome spinel and chrome diopside, should be prepared by a suitably qualified laboratory.</li> </ul>
Source of diamonds.	<ul style="list-style-type: none"> <li>• Details of the form, shape, size and colour of the diamonds and the nature of the source of diamonds (primary or secondary) including the rock type and geological environment.</li> </ul>
Sample collection.	<ul style="list-style-type: none"> <li>• Type of sample, whether outcrop, boulders, drill core, reverse circulation drill cuttings, gravel, stream sediment or soil, and purpose, e.g. large diameter drilling to establish stones per unit of volume or bulk samples to establish stone size distribution.</li> <li>• Sample size, distribution and representativity.</li> </ul>
Sample treatment.	<ul style="list-style-type: none"> <li>• Type of facility, treatment rate, and accreditation.</li> <li>• Sample size reduction. Bottom screen size, top screen size and re-crush.</li> <li>• Processes (dense media separation, grease, X-ray, hand-sorting etc.).</li> <li>• Process efficiency, tailings auditing and granulometry.</li> <li>• Laboratory used, type of process for micro diamonds and accreditation.</li> </ul>
Carat.	<ul style="list-style-type: none"> <li>• One fifth (0.2) of a gram (often defined as a metric carat or MC).</li> </ul>
Sample grade.	<ul style="list-style-type: none"> <li>• Sample grade in this section of Table 1 is used in the context of carats per units of mass, area or volume.</li> <li>• The sample grade above the specified lower cut-off sieve size should be reported as carats per dry metric tonne and/or carats per 100 dry metric tonnes. For alluvial deposits, sample grades quoted in carats per square metre or carats per cubic metre are acceptable if accompanied by a volume to weight basis for calculation.</li> <li>• In addition to general requirements to assess volume and density there is a need to relate stone frequency (stones per cubic metre or tonne) to stone size (carats per stone) to derive sample grade (carats per tonne).</li> </ul>
Reporting of Exploration Results.	<ul style="list-style-type: none"> <li>• Complete set of sieve data using a standard progression of sieve sizes per facies. Bulk sampling results, global sample grade per facies. Spatial structure analysis and grade distribution. Stone size and number distribution. Sample head feed and tailings particle granulometry.</li> <li>• Sample density determination.</li> <li>• Percent concentrate and undersize per sample.</li> <li>• Sample grade with change in bottom cut-off screen size.</li> <li>• Adjustments made to size distribution for sample plant performance and performance on a commercial scale.</li> <li>• If appropriate or employed, geostatistical techniques applied to model stone size, distribution or frequency from size distribution of exploration diamond samples.</li> <li>• The weight of diamonds may only be omitted from the report when the diamonds are considered too small to be of commercial significance. This lower cut-off size should be stated.</li> </ul>
Grade estimation for reporting Mineral Resources and Ore Reserves.	<ul style="list-style-type: none"> <li>• Description of the sample type and the spatial arrangement of drilling or sampling designed for grade estimation.</li> <li>• The sample crush size and its relationship to that achievable in a commercial treatment plant.</li> <li>• Total number of diamonds greater than the specified and reported lower cut-off sieve size.</li> <li>• Total weight of diamonds greater than the specified and reported lower cut-off sieve size.</li> <li>• The sample grade above the specified lower cut-off sieve size.</li> </ul>
Value estimation.	<ul style="list-style-type: none"> <li>• Valuations should not be reported for samples of diamonds processed using total liberation method, which is commonly used for processing exploration samples.</li> <li>• To the extent that such information is not deemed commercially sensitive, Public Reports should include: <ul style="list-style-type: none"> <li>– Diamonds quantities by appropriate screen size per facies or depth.</li> <li>– Details of parcel valued.</li> <li>– Number of stones, carats, lower size cut-off per facies or depth.</li> </ul> </li> </ul>

Note: Code is in normal typeface, guidelines are in indented italics, definitions are in bold.

<b>Criteria</b>	<b>Explanation</b>
	<ul style="list-style-type: none"> <li>• The average \$/carat and \$/tonne value at the selected bottom cut-off should be reported in US Dollars. The value per carat is of critical importance in demonstrating project value.</li> <li>• The basis for the price (e.g. dealer buying price, dealer selling price etc.).</li> <li>• An assessment of diamond breakage.</li> </ul>
Security and integrity.	<ul style="list-style-type: none"> <li>• Accredited process audit.</li> <li>• Whether samples were sealed after excavation.</li> <li>• Valuer location, escort, delivery, cleaning losses, reconciliation with recorded sample carats and number of stones.</li> <li>• Core samples washed prior to treatment for micro diamonds.</li> <li>• Audit samples treated at alternative facility.</li> <li>• Results of tailings checks.</li> <li>• Recovery of tracer monitors used in sampling and treatment.</li> <li>• Geophysical (logged) density and particle density.</li> <li>• Cross validation of sample weights, wet and dry, with hole volume and density, moisture factor.</li> </ul>
Classification.	<ul style="list-style-type: none"> <li>• In addition to general requirements to assess volume and density there is a need to relate stone frequency (stones per cubic metre or tonne) to stone size (carats per stone) to derive grade (carats per tonne). The elements of uncertainty in these estimates should be considered, and classification developed accordingly.</li> </ul>

## APPENDIX 1 GENERIC TERMS AND EQUIVALENTS

Throughout the Code, certain words are used in a general sense when a more specific meaning might be attached to them by particular commodity groups within the industry. In order to avoid unnecessary duplication, a non-exclusive list of generic terms is tabulated below together with other terms that may be regarded as synonymous for the purposes of this document.

<b>Generic Term</b>	<b>Synonyms and Similar Terms</b>	<b>Intended Generalised Meaning</b>
Tonnage	Quantity, Volume	An expression of the amount of material of interest irrespective of the units of measurement (which should be stated when figures are reported)
Grade	Quality, Assay, Analysis (Value)	Any physical or chemical measurement of the characteristics of the material of interest in samples or product. Note that the term quality has special meaning for diamonds and other gemstones. The units of measurement should be stated when figures are reported.
Metallurgy	Processing, Beneficiation, Preparation, Concentration	Physical and/or chemical separation of constituents of interest from a larger mass of material. Methods employed to prepare a final marketable product from material as mined. Examples include screening, flotation, magnetic separation, leaching, washing, roasting etc.
Recovery	Yield	The percentage of material of initial interest that is extracted during mining and/or processing. A measure of mining or processing efficiency.
Mineralisation	Type of deposit, orebody, style of mineralisation.	Any single mineral or combination of minerals occurring in a mass, or deposit, of economic interest. The term is intended to cover all forms in which mineralisation might occur, whether by class of deposit, mode of occurrence, genesis or composition.
Ore Reserves	Mineral Reserves	'Ore Reserves' is preferred under the JORC Code but 'Mineral Reserves' is in common use in other countries and is generally accepted. Other descriptors can be used to clarify the meaning e.g. coal reserves, diamond reserves etc.
Cut off grade	Product specifications	The lowest grade, or quality, of mineralised material that qualifies as economically mineable and available in a given deposit. May be defined on the basis of economic evaluation, or on physical or chemical attributes that define an acceptable product specification.

Note: Code is in normal typeface, guidelines are in indented italics, definitions are in bold.

## Australian Securities Exchange

### Companies Updates: 03/08; 11/07; 03/07; 05/04 (Extracts relevant to the JORC Code)

Companies Update  
18 March 2008

Update no 03/08

#### JORC compliance

In excess of one third of all ASX Limited ("ASX") listed companies are mining and exploration entities. ASX monitors all announcements made by listed entities and has during the December 2007 quarter identified a number of [JORC Code](#) (PDF 335KB) compliance reporting issues that ASX believes would be assisted by ASX providing further guidance to companies.

These issues include:

1. Reporting of "in situ" values
2. Reporting historical or non-JORC compliant estimates
3. Competent Person statement
4. Reporting exploration targets
5. Lack of drill hole information
6. Combining categories of resources and reserves
7. Incorrect use of reserves or resources to describe results

#### 1. Reporting of "in - ground value" or "in situ value"

During the December 2007 quarter, ASX identified an increased usage of 'in-ground value' or 'in situ value' by companies when reporting exploration results or evaluation of deposits that commonly include a large proportion of Inferred Resources. Consequently, ASX seeks to provide clarification on the usage of 'in-ground value' or 'in situ value' when reporting exploration results.

The practice of reporting 'in-ground value' or 'in situ value' by companies is an attempt to convey the significance of the exploration results or deposit to the investing community by converting it to a dollar amount.

However, the use of 'in-ground values' has little to no relationship to economic viability, value or potential returns to investors and may therefore be misleading. The term implies economic viability without considering the application of the Modifying Factors ([JORC Code](#) (PDF 335KB) Clauses 11 & 28), in particular, the mining, metallurgical, economic, marketing, legal, environmental, social, and governmental considerations. In determining project viability it is necessary to include all reasonable Modifying Factors ([JORC Code](#) (PDF 335KB) Clause 28) to determine the economic value that can be extracted from the mineralisation.

Many deposits with large 'in-ground values' are never developed because they have a negative Net Present Value when all reasonable Modifying Factors are considered. By reporting an 'in-ground value' or 'in situ value' for exploration results or when evaluating deposits that commonly include large portions of inferred resources, companies are not properly representing the economic viability of the project, or the net economic value that can be extracted from the mineralisation.

In practice, the economically viable portion of a mineral resource is converted to ore reserves only after taking into account all Modifying Factors. Clause 27 of the [JORC Code](#) (PDF 335KB) states: "The words 'ore' and 'reserves' must not be used in describing Mineral Resource Estimates as the terms imply economic viability and are only appropriate when all Modifying Factors have

been considered". Inferred Resources are not able to be converted to Ore Reserves, and it is also possible that portions of Indicated and Measured Resources may not convert to Ore Reserves nor contribute to the Net Present Value of a given mineralised body at the time of evaluation.

The publication of 'in-situ' or 'in-ground values' may also breach the principles of the [JORC Code](#) (PDF 335KB) as the use of these terms:

- a. is not transparent, in that the reader is not "provided with sufficient information, the presentation of which is clear and unambiguous, to understand the report and not be misled" ([JORC Code](#) (PDF 335KB) Clause 4); and
- b. lacks materiality in that the statement of 'in-ground values' does not "contain all the relevant information which investors and their professional advisors would reasonably require, and reasonably expect to find in the report, for the purpose of making a reasoned and balanced judgement" ([JORC Code](#) (PDF 335KB) Clause 4).

Consequently use of the terms 'in-ground value' or 'in situ value' is also contrary to the intent of Clause 27 of the Code, and should not be reported by companies.

## **2. Reporting historical estimates or estimates currently not reported in accordance with the JORC Code**

Companies seeking to list on ASX wishing to include information in their prospectus which is not JORC compliant need to approach ASX for a waiver, and, subject to certain conditions, waivers may be granted. Listed companies seeking to announce information that does not comply with the [JORC Code](#) (PDF 335KB) will also need to approach ASX for a waiver, and, in certain circumstances, waivers may be granted (see [Companies Update dated 5 December 2007](#)). Where companies lodge announcements which are based on historical estimates that are not reported in accordance with the [JORC Code](#) (PDF 335KB) and not the subject of an ASX waiver, or do not come under Clause 18 of the [JORC Code](#) (PDF 335KB), it is likely that ASX will request the company to make a further announcement retracting the comments made in the earlier announcement. In addition ASX may pursue further supervisory action.

## **3. Competent person statement**

In releasing public reports that contain information in relation to Exploration Results, Mineral Resources and/or Ore Reserves, companies are required under clause 8 the [JORC Code](#) (PDF 335KB) to do the following:

- disclose the name(s) of the Competent Person or Persons, state whether the Competent Person is a full-time employee of the company, and, if not, name the Competent Person's employer;
- ensure that the Competent Person has a minimum of five years experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which that person is undertaking; and
- ensure that the public report is issued with the prior written consent of the Competent Person or Persons as to the form and context in which it appears.

The [ASX Companies Update dated 3 May 2007](#) outlined ASX's view that it regards the completion of a consent form to be good practice and will accept the completed form (in a format proposed by ASX or another equivalent format) as evidence that the required written consent has been obtained. ASX may request the company to release to the market evidence that it has obtained the consent of the competent person to the inclusion, in the form and context in which it appears in the public report, of the information prepared by the Competent Person. ASX may in certain instances also write to the Boards of listed companies requesting further information

pursuant to [listing rule 18.7](#) (PDF 204 KB) to determine whether ASX believes that the company is in compliance with the rules. In these circumstances the request and response will be released to the market.

#### **4. Exploration Targets**

Clause 18 of the [JORC Code](#) (PDF 335KB) facilitates the reporting of exploration targets in public reports. There are, however, a number of reporting conditions that must be satisfied before an exploration target is reported. The reporting conditions include:

- a. Any such information relating to exploration targets must be expressed so that it cannot be misrepresented or misconstrued as an estimate of Mineral Resources or Ore Reserves.
- b. Any statement referring to potential quantity and grade of the target must be expressed as ranges and must include:
  - i. a detailed explanation of the basis for the statement; and
  - ii. a proximate statement that the potential quantity and grade is conceptual in nature, that there has been insufficient exploration to define a Mineral Resource, and that it is uncertain if further exploration will result in the determination of a Mineral Resource.

It is not sufficient to disclose an exploration target without also disclosing all of the information required under the second reporting condition. Where an exploration target is reported ASX requires the information that satisfies reporting condition 2 to be disclosed with the same prominence as the exploration target and in a proximate location. Where an exploration target is reported in a company presentation, ASX expects the information that satisfies reporting condition 2 also to be included in the presentation slides. If a public report does not comply with clause 18, ASX will require a company to make a retraction or clarifying announcement.

#### **5. Lack of drill hole information**

ASX has identified an increase in the reporting of isolated assays, and isolated drill holes without placing them in perspective. Pursuant to clause 17 of the [JORC Code](#) (PDF 335KB), a company should not report an isolated assay or drill hole without also disclosing the results from all relevant assays or drill holes. It is not necessary for the company to report all assays or drill holes provided that an explanation is given as to why the results are not considered relevant (e.g., cut off grade). In reporting Exploration Results, companies must comply with the requirements of clause 17.

#### **6. Combining categories of resources and reserves**

Clauses 25, 33, and 34 of the [JORC Code](#) (PDF 335KB) do not allow statements in public reports which provide only total figures for Mineral Resources or Ore Reserves.

Mineral Resource estimates must be allocated to the defined categories of Measured, Indicated, and Inferred. Ore Reserve estimates must be allocated to the defined categories of Proved and Probable. Mineral Resources estimates must not be aggregated with Ore Reserves estimates to report a single combined figure.

In situations where figures for both Mineral Resources and Ore Reserves are reported, a statement must be included in the report which clearly indicates whether the Mineral Resources are inclusive of, or additional to, the Ore Reserves.

#### **7. Incorrect use of reserves or resources to describe results**

The reporting of Exploration Results is common in the early stages of exploration when the

quantity of data is generally not sufficient to allow any reasonable estimates of Mineral Resources. Public reports of Exploration Results must not be presented so as unreasonably to imply that potentially economic mineralisation has been discovered.

Companies are encouraged to refer to Table 1 of the [JORC Code](#) (PDF 335KB) for the list of main criteria which should be considered when preparing reports on Exploration Results.

## **JOINT MARKET STATEMENT - ASX & JORC**

### **Historical estimates and foreign resource and reserve estimates, currently not reported in accordance with the JORC Code**

#### **Introduction**

In some instances mining companies listed on ASX are in a position where they want to report, or believe they are required to report, material statements of historical estimates or foreign resource and reserve estimates, currently not reported in accordance with the JORC Code. Historical estimates are those prepared pre-1989, which is when the JORC Code was introduced to the ASX Listing Rules as an Appendix.

This Joint Statement by ASX and JORC sets out the circumstances in which ASX will consider waiving the company's obligation under listing rule 5.6, which requires a report prepared by a mining entity to be in accordance with the JORC Code, in order to accommodate the reporting of historical pre-JORC Code estimates. This Statement also sets out the minimum requirements for disclosing information in relation to such estimates.

This statement is intended to provide certainty to the market in terms of when and how historical non-JORC Code compliant reporting may be made. It is also intended to reinforce that there are only exceptionally limited circumstances in which ASX will accommodate reporting that is not in accordance with the requirements of the JORC Code. Such reporting must, at a minimum, comply with the requirements of this Statement, and any other conditions that ASX imposes on the company. Nothing in this statement affects ASX's ability to take action against a listed company for breach of listing rule 5.6 or any other listing rule.

#### **Circumstances to which this Statement applies**

- Situations where previously prepared reports (which may or may not be published) include statements of historical (pre-JORC Code or before the requirement to name the Competent Person) estimates, or foreign resource and reserve estimates currently not reported in accordance with the JORC Code.

#### **Circumstances to which this Statement does not apply**

- Situations where exploration and evaluation programs are incomplete and companies want to report preliminary resources;
- Situations where appropriate studies have not yet been completed to the point to allow the conversion of mineral resources to ore reserves;

- Situations where the company wishes to refer to resource or reserve estimates, currently not reported in accordance with the JORC Code, and relating to areas adjacent to or near to the company's tenements;
- A company is under no circumstances to treat the historical estimate as a current reserve or resource, for example by including the estimate in economic analysis or in the company's current reserve or resource estimates. The company must make appropriate JORC Code disclosures in accordance with Chapter 5 of the listing rules in relation to those estimates, before the historical estimate can be treated as a current reserve or resource.
- Any other situation where a company is seeking to avoid reporting in accordance with the JORC Code and which does not involve reporting historical or foreign estimates in the spirit of this Statement.

### **Requirements for non-JORC Code Compliant Historical and Foreign Reporting**

A company which requests a waiver from listing rule 5.6 for the purposes of reporting statements of historical estimates or foreign resource and reserve estimates, currently not reported in accordance with the JORC Code must, at a minimum:

1. Clearly disclose that the historical or foreign estimate is not reported in accordance with the JORC Code and it is uncertain that following evaluation and/or further exploration the resource or reserve will ever be able to be reported in accordance with the JORC Code.
2. Clearly identify and disclose the source(s) and date of all the historical estimate(s).
3. Confirm that the historical estimate is relevant and state why it is relevant.
4. Comment on the reliability of the historical estimate with reference to any items in Table 1 of the JORC Code which are relevant to understanding the reliability of the estimate. Specifically comment on the nature of the historic work programs on which the historical estimate is based and the key assumptions and parameters underlying the historical estimate.
5. Comment on the materiality of the historical estimate, with specific reference to:
  - a. Why the estimate is material;
  - b. What exploration or evaluation program the company intends to undertake;
  - c. How the company intends to fund that program;
  - d. Any impact on resources currently devoted to other exploration projects.
6. State whether the historical estimate uses categories other than the ones set out in the JORC Code and, if so, include an explanation of the differences.
7. Include any more recent estimate or data available to the company.
8. Disclose the company's intention to evaluate those matters listed in Table 1 of the JORC Code (Appendix 5A of the listing rules) which are relevant to the estimate and/or conduct exploration for the purposes of allowing a Competent Person to take responsibility for the estimates of Mineral Resources or Ore Reserves in order that they may be reported by the Company in accordance with the JORC Code, and the time frame in which the Company intends to report those activities.
9. Indicate that the report is consistent with the guidance contained in this Companies Update and Companies Update no 05/04 25 March 2004 (reprinted below)
10. Include a statement by a Competent Person who accepts responsibility for the accuracy of the information disclosed in items 2 to 9 above.

The purpose of these ten requirements is to provide adequate warning to investors and to their professional advisers that the information disclosed by the company is not in accordance with the JORC Code. The materiality of the estimates disclosed can therefore be considered in this

context.

**Excerpt: Companies Update no 05/04 25 March 2004  
JORC Code Compliance, Chapter 5 of ASX Listing Rules**

In recent months ASX has noted some instances where companies, when reporting mineral resources and ore reserves, have announced resources which are not in compliance with the requirements of the JORC Code. In some instances, announcements have referred to a non-JORC compliant "resource of xx tonnes and yy grade...".

ASX, in consultation with JORC, takes the view that this represents unacceptable practice under the JORC Code, compliance with which is a requirement of Chapter 5 of ASX Listing Rules. Chapter 5 of the ASX listing Rules requires ASX listed companies to prepare exploration results and mineral resources and ore reserves estimates in compliance with the JORC Code. The description of a resource or reserve estimate as a "**non-JORC compliant**", resource or reserve estimate is not acceptable to ASX.

Where a listed company does release to the market a "**non-JORC compliant**" resource or reserve estimate without prior consultation with ASX, ASX will consider halting trading in the entity's quoted securities until the matter is clarified/rectified.

There may be limited occasions where a listed company believes it needs to provide a "**non-JORC compliant**" estimate under the Continuous Disclosure requirements of the ASX Listing rules. In such cases a company will need to consult with ASX prior to making such disclosure.

Companies Update  
3 May 2007

Update no 03/07

## ASX / JORC INITIATIVES

For more than three decades, ASX Limited (ASX) and the Joint Ore Reserves Committee (JORC) have been working to ensure a practical and effective set of minimum reporting standards and guidelines for the mining industry. These standards and guidelines, embodied in the [JORC Code](#) (DOC 339KB), contribute significantly to Australia's reputation for offering a well-regulated and supervised marketplace. This reputation for integrity is critical to Australia's attractiveness to global capital.

Preserving confidence in the integrity of Australia's market is the mutual interest of all participants, including the market operator, industry bodies, and listed companies. Accordingly, ASX and JORC are working together on a number of initiatives designed to maintain a high standard of compliance with the [JORC Code](#) (DOC 339KB) by ASX listed entities.

One third of all ASX listed companies are mining and resources entities. A well-functioning [JORC Code](#) (DOC 339KB) not only supports Australia's status as a mining centre, it also underpins the market's overall attractiveness. Its success depends on the support of all participants.

During the March 2007 quarter, ASX identified a number reporting issues faced by companies that require some additional guidance. Consequently, this Companies Update seeks to provide clarification on the following issues; the reporting of metal equivalents, the use of extrapolation when reporting Mineral Resources, the inclusion of Competent Person Statements and obtaining written consent from a Competent Person for the release of a public report.

This Companies Update deals with:

1. Reporting of metal equivalents;
2. Reporting of Mineral Resources, Extrapolation, and Sampling;
3. Competent Person's Statement and Consent Form; and
4. Enforcement action by ASX for non-compliance with the [JORC Code](#) (DOC 339KB).

## 1. REPORTING OF METAL EQUIVALENTS

ASX has observed that there appears to be an increased usage of metal equivalents by companies when reporting exploration results. Metal equivalents are used by companies to report polymetallic exploration results in terms of a single equivalent grade of one major metal such as gold or copper. This metal equivalent grade is usually obtained by taking the in situ "value" (grade times price) of each of the individual metals, adding these "values" and calculating the grade of the same "value" of the primary reported metal. Such reporting may be misleading unless additional details such as estimates of metal recoverability are also provided.

The [JORC Code](#) (DOC 339KB) provides guidance in Table 1 - Data Aggregation Methods, that *"The assumptions used for any reporting of metal equivalent values should be clearly stated"*. The reporting of metal equivalents must also adhere to the principles of transparency, materiality and competence, as set out in clause 4 of the [JORC Code](#) (DOC 339KB).

The following minimum information should accompany any report which includes reference to metal equivalents in order to conform with these principles:

- individual assays for all metals included in the metal equivalent calculation;
- assumed commodity prices for all metals. (Companies should disclose the actual assumed prices. It is not sufficient to refer to a spot price without disclosing the price used in calculating the metal equivalent);
- assumed metallurgical recoveries for all metals and the basis on which the assumed recoveries are derived (metallurgical test work, detailed mineralogy, similar deposits, etc.);
- a clear statement that it is the company's opinion that all the elements included in the metal equivalents calculation have a reasonable potential to be recovered; and
- the calculation formula.

In most circumstances the metal chosen for reporting on an equivalent basis should be the one that contributes most to the metal equivalent calculation. If this is not the case, a clear explanation of the logic of choosing another metal must be included in the report.

Estimates of metallurgical recoveries for each metal are particularly important. For many projects at the Exploration Results stage, metallurgical recovery information may not be available or able to be estimated with reasonable confidence. Therefore, for many projects at the Exploration Results stage, reporting in terms of metal equivalents may not be appropriate.

## 2. REPORTING OF MINERAL RESOURCES, SAMPLING AND EXTRAPOLATION

All reports of Mineral Resources must satisfy the requirements of clause 19 of the [JORC Code](#) (DOC 339KB), in particular, that there are reasonable prospects for eventual economic extraction.

It is the intent of the [JORC Code](#) (DOC 339KB) that specific geological evidence required for the estimation of mineral resources must include sampling data for all classifications of Inferred, Indicated and Measured Mineral Resources. A Mineral Resource cannot be estimated in the

absence of sampling information.

For the purposes of interpretation of the [JORC Code](#) (DOC 339KB) a 'sample' may be defined as:

*A statistically-significant subset selected and analysed by an industry accepted method or measured by an appropriate technique to estimate the characteristics of a larger group or population.*

JORC has advised ASX that the guidance note in Table 1 of the [JORC Code](#) (DOC 339KB) on sampling techniques should not be taken as limiting the broad meaning of sampling. Sampling techniques referred to in Table 1 should be interpreted as follows:

**Table 1 Sampling techniques and data**

<i>Sampling Techniques</i>	<i>Nature and quality of sampling (eg. cut channels, random chips, specific specialised industry standard measurement tools appropriate to minerals under investigation such as downhole gamma sondes and prompt fission neutron bore hole probes etc). Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.</i>
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For further guidance on reporting of sampling techniques and data please refer to Table 1 of the [JORC Code](#) (DOC 339KB).

JORC has advised ASX that future editions of the [JORC Code](#) (DOC 339KB) and Guidelines will reflect this interpretation of sampling techniques.

Where the Mineral Resource that is being reported is predominantly an Inferred Resource (that part of a Mineral Resource for which tonnage, grade and mineral content can be estimated with a low level of confidence), sufficient supporting information must be provided to enable the investor to evaluate and assess the risk associated with the reported Mineral Resource. In circumstances where the estimation of the Inferred Resource is presented on the basis of extrapolation, that is, an estimation that extends to an area beyond that of the sample data, clause 26 and Table 1 of the [JORC Code](#) (DOC 339KB) and the [JORC Code](#) (DOC 339KB) principles of materiality and transparency require the report to contain sufficient information to inform the investor of:

- the maximum distance that the resource is extrapolated beyond the sample points;
- the proportion of the resource that is based on extrapolated data;
- the basis on which the resource is extrapolated to these limits; and
- a diagrammatic representation of the Inferred Resource showing clearly the extrapolated part of the estimated resource.

### **3. COMPETENT PERSON'S STATEMENT AND CONSENT FORM**

Clause 5 of the [JORC Code](#) (DOC 339KB) provides that a public report is "a report or reporting on Exploration Results, Mineral Resources or Ore Reserves, prepared for the purpose of informing investors or potential investors and their advisers. This includes a report or reporting to satisfy regulatory requirements". The [JORC Code](#) (DOC 339KB) goes on to provide guidance as to the type of reports that could be considered to be "public reports". They include, but are not limited to, company annual reports, quarterly reports and other reports to ASX, and include other publicly released company information in the form of website postings and briefings for

shareholders, stockbrokers and investment analysts.

Companies reporting Exploration Results, Mineral Resources or Ore Reserves are reminded that while a public report is the responsibility of the company acting through its Board of Directors, clause 8 the [JORC Code](#) (DOC 339KB) requires that any such report "*must be based on, and fairly reflect the information and supporting documentation prepared by a Competent Person or Persons*". In releasing public reports that contain information in relation to Exploration Results, Mineral Resources and/or Ore Reserves, companies are required under clause 8 the [JORC Code](#) (DOC 339KB) to do the following:

- disclose the name(s) of the Competent Person or Persons, state whether the Competent Person is a full-time employee of the company, and, if not, name the Competent Person's employer;
- ensure that the Competent Person has a minimum of five years experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which that person is undertaking; and
- ensure that the public report is issued with the prior written consent of the Competent Person or Persons as to the form and context in which it appears.

In order to assist Competent Persons and companies to comply with these requirements, and to emphasise the need for companies to obtain the written consent of Competent Persons for their material to be included in the form and context in which it appears in the public report, ASX, together with JORC, have developed a Competent Person's Consent Form that incorporates the requirements of the [JORC Code](#) (DOC 339KB).

ASX advises that it:

- regards the completion of a consent form to be good practice and will accept the completed form, whether in the format provided or another equivalent format, as evidence that the required written consent has been obtained; and
- may request a company to release to the market evidence that it has obtained the Competent Person's written consent to the inclusion, in the form and context in which it appears in the public report, of information based on their work in relation to Exploration Results, Mineral Resources and/or Ore Reserves.

Having the Competent Person's Consent Form completed will ensure that evidence of the written consent is readily available if ASX subsequently makes a request for the consent to be released to the market. The Competent Person's Consent Form(s), or other evidence of the Competent Person's written consent, should be retained by the company to ensure that the written consent can be promptly provided to ASX if requested.

The [Competent Person's Consent Form](#) (DOC 49KB) is available to download from [asx.com.au](http://asx.com.au).

#### **4. ENFORCEMENT ACTION BY ASX FOR NON-COMPLIANCE WITH THE JORC CODE**

ASX reminds companies that [Chapter 5](#) (PDF 113 KB) of the ASX Listing Rules requires listed companies to report Exploration Results, Mineral Resources or Ore Reserve estimates in compliance with the [JORC Code](#) (DOC 339KB). Where it appears that a company may not be in compliance with listing rule 5.6, ASX may write to the company pursuant to listing rule 18.7 seeking further information and requesting that the response be provided in a format suitable for release to the market.

Where ASX is concerned that the circumstances of the possible non-compliance may lead to a disorderly or uninformed market, ASX may suspend a company's securities from quotation and/or refer the matter to the Australian Securities & Investments Commission for their consideration.

ASX looks forward to your company's cooperation in helping to maintain the highest standards in reporting Exploration Results, Mineral Resources or Ore Reserves

#### **JORC Code Compliance, Chapter 5 of ASX Listing Rules**

In recent months ASX has noted some instances where companies, when reporting mineral resources and ore reserves, have announced resources which are not in compliance with the requirements of the JORC Code. In some instances, announcements have referred to a non-JORC compliant "resource of xx tonnes and yy grade...".

ASX, in consultation with JORC, takes the view that this represents unacceptable practice under the JORC Code, compliance with which is a requirement of Chapter 5 of ASX Listing Rules.

Chapter 5 of the ASX listing Rules requires ASX listed companies to prepare exploration results and mineral resources and ore reserves estimates in compliance with the JORC Code. The description of a resource or reserve estimate as a "**non-JORC compliant**", resource or reserve estimate is not acceptable to ASX.

Where a listed company does release to the market a "**non-JORC compliant**" resource or reserve estimate without prior consultation with ASX, ASX will consider halting trading in the entity's quoted securities until the matter is clarified/rectified.

There may be limited occasions where a listed company believes it needs to provide a "**non-JORC compliant**" estimate under the Continuous Disclosure requirements of the ASX Listing rules. In such cases a company will need to consult with ASX prior to making such disclosure.

#### **New Listings, listing rule 1.16**

The description of a resource or reserve estimate as a "**non-JORC compliant**" resource or reserve estimate in relation to, or in conjunction with, an application for admission to the official list is not acceptable to ASX.

There may be limited circumstances where a company believes it needs to provide a "**non-JORC compliant**" estimate under the Corporations Act and/or Continuous Disclosure requirements of the ASX Listing rules. In such cases an applicant for admission should consult with ASX prior to doing so.

Full information about JORC Code is available on the [JORC web site](#).

ASX looks forward to your company's cooperation in helping to maintain the highest standards in reporting exploration results, mineral resources and ore reserves.

#### **ASX/JORC Initiatives**

ASX and JORC are committed to ensuring that a high standard of compliance with the JORC

Code by ASX listed entities is maintained, and accordingly, are working together on a number of initiatives towards that objective. Further details will be provided in a future Companies Update as soon as these initiatives are finalized.