

**PERC REPORTING STANDARD 2013**  
**PAN-EUROPEAN STANDARD FOR REPORTING OF**  
**EXPLORATION RESULTS, MINERAL RESOURCES AND RESERVES**  
**("THE PERC REPORTING STANDARD")**

The Pan-European Reserves and Resources Reporting Committee (PERC asbl)  
 approved and published 15 March 2013

**Table of Contents**

Foreword.....	2
Introduction.....	2
Scope .....	2
Competence and Responsibility .....	4
Reporting Terminology .....	7
Reporting General.....	8
Reporting of Exploration Results .....	9
Reporting of Mineral Resources .....	12
Reporting of Mineral Reserves.....	17
Reporting of Mineralised Fill, Pillars, Low Grade Mineralisation, Stockpiles, Dumps and Tailings.....	23
Reporting of Exploration Results, Resources and Reserves for Coal .....	24
Reporting of Diamond Exploration Results, Mineral Resources and Mineral Reserves .....	25
Reporting of Exploration Results, Mineral Resources and Mineral Reserves for Industrial Minerals, Cement Feed Materials and Construction Raw Materials .....	28
Reporting of Exploration Results, Mineral Resources and Mineral Reserves for Oil Shales, Oil Sands, and other energy minerals extracted by mining methods.....	29
Reporting of Exploration Results, Mineral Resources and Mineral Reserves for Metallic or Non-Metallic Minerals extracted by solution mining methods .....	30
Disclosure of Previously Reported Estimates.....	31
Guideline on Materiality.....	32
TABLE 1: CHECKLIST AND GUIDELINES OF REPORTING AND ASSESSMENT CRITERIA.....	33
APPENDIX 1 GENERIC TERMS AND EQUIVALENTS .....	53
APPENDIX 2 RULES OF CONDUCT AND GUIDELINES .....	54
APPENDIX 3 HISTORICAL NOTES .....	56
APPENDIX 4 COMPETENT PERSON'S CONSENT STATEMENT.....	57
APPENDIX 5 RECOGNISED PROFESSIONAL ORGANISATIONS (RPOS).....	60

## Foreword

- 1 The Pan European Reserves and Resources Reporting Committee (PERC) Standard for Reporting of Exploration Results, Mineral Resources and Mineral Reserves (further referred to as 'the Standard') sets out minimum standards, recommendations and guidelines for Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves in Europe. The history of development of this standard is summarised in Appendix 3.

This 2013 edition supersedes all previous editions of The Reporting Code, the IMM Reporting Code, and the PERC Code.

## Introduction

- 2 In this edition of the PERC Standard, **definitions of important terms are highlighted in bold text**. Normal text contains other mandatory ('Code') elements of the Standard. *Guidelines are placed after the respective Code clauses using indented italics*. They are intended to provide assistance and guidance to users in interpreting the application of the clauses in the Standard. The same indented italics typeface formatting has been applied to Table 1, and to *Appendices 1 and 2* which form part of the Guidelines.
- 3 The Standard has been adopted by the Institute of Materials, Minerals and Mining (IoM3), the Geological Society of London (GSL), the European Federation of Geologists (EFG) and the Institute of Geologists of Ireland (IGI), and is therefore binding on their individual members (in the case of EFG, members of its constituent organisations).

Appendix 1 contains a table of generic terms and their equivalents, designed to avoid unnecessary duplication or ambiguity in the text

Appendix 2 provides Rules of Conduct for Mineral Resource and Mineral Reserve estimators that should be considered in addition to the Codes of Ethics normally applying to members of professional institutions.

## Scope

- 4 The intent of the Standard 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 Mineral Reserves being reported.

The main principles governing the operation and application of the Standard are transparency, materiality, competence, and impartiality. Transparency requires that the reader of a Public Report is provided with sufficient information, the presentation of which is clear and unambiguous. Materiality requires that a Public Report contains all the relevant information available at the date of disclosure, which investors and their professional advisers would reasonably require, and reasonably expect to find in a Public Report, for the purpose of making a reasoned and balanced judgement regarding the Exploration Results, Mineral Resources or Mineral 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 and rules of conduct. Impartiality requires that the author of the Public Report is satisfied and able to state without any qualifications that his work has not been unduly influenced by the organisation, company or person commissioning a Public Report or a report that may become a

Public Report; that all assumptions are documented; and that adequate disclosure is made of all material aspects, including any relevant direct or indirect relationship (such as employment or ownership of shares) between the Competent Person and the owners of the project on which he or she is reporting, that the informed reader may require to make a reasonable and balanced judgement thereof.

5 **Public Reports are reports prepared for the purpose of informing investors or potential investors and their advisers on Exploration Results, Mineral Resources or Mineral Reserves.**

**They include, but are not limited to annual and quarterly company reports, press releases, information memoranda, technical papers, website postings and public presentations.**

Companies are encouraged to provide information in their Public Reports, which is as comprehensive as possible. A company's economic interest in the project must be declared.

The Standard also applies to the following reports if they have been prepared for the purpose of reporting, or if they include, exploration results, mineral resources estimates, or mineral reserves estimates: environmental statements; information memoranda; expert reports, and technical papers referring to Exploration Results, Mineral Resources or Mineral Reserves.

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

*It is recognised that companies can be required to issue reports in more than one regulatory jurisdiction, with compliance standards that may differ from this Standard. It is recommended that such reports include a statement alerting the reader to this situation. Where members of The IOM3, GSL and IGI and constituent organisations of EFG are required to report in other jurisdictions, they are obliged to comply with the requirements of those jurisdictions, as well as complying with the minimum standards set out in this Standard if those minimum standards differ from those in the local code or standard.*

*Reference in the Standard 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 (refer to Clause 10) for internal company or similar non-public purposes does not comply with the Standard. In such situations it is recommended that any such 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 the Standard requires Public Reports to fairly reflect Exploration Results, Mineral Resource and/or Mineral Reserve estimates, and supporting documentation, prepared by a Competent Person.*

*While every effort has been made within the Standard 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 Standard and those compiling reports to comply with the Standard 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 Mineral Reserves being reported.*

*Estimation of Mineral Resources and Mineral Reserves is inherently subject to some level of uncertainty and inaccuracy. Considerable skill and experience may be needed to interpret pieces of information, such as geological maps and analytical results, based on samples that commonly only represent a small part of a mineral deposit. The uncertainty in the estimates should be discussed in documentation and, where material, in Public Reports, and reflected in the appropriate choice of Mineral Reserve and Mineral Resource categories.*

- 6 The Standard is applicable to all solid mineral raw materials, (including but not limited to diamonds and other gemstones, industrial minerals, cement feed materials and construction raw materials, other mineral raw materials, and coal) for which Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves is required by the relevant regulatory authorities.

Mineral-specific guidelines may be developed from time to time and read in conjunction with the Standard to assist in its interpretation. Such guidelines will not take precedence over the Standard.

Table 1, included at the end of the Standard, supplies an outline of items that should be considered when evaluating a minerals project. The importance of each item will vary with the specific project and it is recognised that, for some projects, other items may be relevant which are not included on the list. Table 1 should be considered as a guide to facilitate a reasoned and balanced approach to reporting. However, many decisions, such as the classification of material as a Mineral Resource or a Mineral Reserve, remain a matter of professional judgement based on knowledge, experience and industry practices.

Public disclosure is required of those items in Table 1 most likely to affect the accuracy of estimates made in the report. The authors of reports should both identify and evaluate these important factors in their reports.

PERC recognises that further review of the Standard and Guidelines will be required from time to time.

## **Competence and Responsibility**

- 7 Documentation detailing Exploration Results, Mineral Resources and Mineral Reserves estimates from which a Public Report is produced, must be prepared by or under the direction of, and signed by, a Competent Person or Persons.
- 8 A Public Report concerning a company's Exploration Results, Mineral Resources and/or Mineral Reserves is the responsibility of the company acting through its Board of Directors. Any such report must be based on, and fairly reflect the documentation which has been prepared by, a Competent Person or Persons.
- 9 A company issuing a Public Report shall disclose the name(s), qualifications, professional affiliation(s), and relevant experience 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, including the effective date, in which it appears.

If there is any direct or indirect relationship between the Company and the Competent Person, for example shares, bonds, or options issued by the Company held by the Competent Person or by members of his or her close family, then this must be disclosed. Such disclosure should be made in the same section of any report as the Competent person's consent statement.

Where all or part of another Public Report is included in a Public Report, the written approval of that Report's author should be obtained as to the form and context in which that report is to be included.

A standard consent form is provided for the use of Competent Persons in Appendix 4. The structure and wording of this form, or equivalent statement as specified in Appendix 4, is the only acceptable form of Competent Person consent and is to be retained and made available if required by regulatory bodies.

- 10 A Competent Person is a minerals industry professional, defined as a corporate member, registrant or licensee of a recognised professional body (including mutually recognised international professional organisations) with enforceable disciplinary processes including the powers to suspend or expel a member.**

**A Competent Person must have a minimum of five years relevant experience in the style of mineralisation or type of deposit under consideration and in the activity which that person is undertaking. Acceptable professional bodies and classes of membership under the Standard, which meet these requirements, within Europe or elsewhere (an 'RPO') are listed in Appendix 5 or in updated lists which may be published from time to time.**

**This definition of 'Competent Person' is subject to any additional restrictions or conditions which may be required by the appropriate stock exchange or regulatory authority.**

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 Mineral Reserves, the relevant experience must be in the estimation, assessment, evaluation and economic extraction of Mineral Reserves.

The relevant experience of the Competent Person must also be current and, where practical, continuous within the industry.

*It is expected that the Competent Person will usually be a geoscientist for reporting Exploration Results or Mineral Resources, but for reporting Reserves may be qualified in other fields such as mining engineering or mineral processing.*

*The Competent Person may of course have relevant qualifications or experience in more than one field or type of work.*

*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 Mineral 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. Similarly, sulphidic nickel deposits form a type of their own with nickel being distributed between silicate and sulphide minerals, only the latter being economically extractable. Experience with other types of sulphide deposits may not have given sufficient background in evaluating nickel deposits.*

*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 as much as 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 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. Appropriate appreciation of extraction and processing techniques applicable to that deposit type may also be important.*

*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 Mineral 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 Mineral Reserve documentation, that person is responsible and accountable for the whole of the documentation under the Standard. It is important in this situation that the Competent Person accepting overall responsibility for a Mineral Resource or Mineral Reserve estimate and*

*supporting documentation prepared in whole or in part by others, is satisfied that the work of the other contributors is acceptable. In particular, if the Competent Person is not himself fully responsible for the production of the resource and reserve estimates, he should take reasonable steps to ensure that he fully understands all of the estimation work, including visits to site and personal verification of the data. He should not rely implicitly on the word of others.*

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 a European Stock Exchange listed company with overseas interests wishes to report overseas Exploration Results, Mineral Resources or Mineral Reserve estimates prepared by a person who is not a member of a recognised professional institution (as defined in clause 10 above), it is necessary for the company to nominate a Competent Person or Persons to take responsibility for the Exploration Results, Mineral Resource or Mineral 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 the Stock Exchange's listing rules and should not treat the procedure merely as a 'rubber-stamping' exercise.*

*Rules, regulations or guidelines concerning the Competent Person differ from one jurisdiction to another. It is the responsibility of the Competent Person and the entity making a public report to ensure that the applicable rules, regulations and guidelines are followed.*

*Failure to adhere to the standards of professional conduct set out in the relevant Professional Codes of Ethics or Rules of Conduct and Guidelines can lead to disciplinary action and, in certain circumstances, to expulsion from the institution concerned. Complaints made in respect of the professional work of a Competent Person will be considered in terms of the Professional Code of Ethics or Rules of Conduct and Guidelines of the institution of which the Competent Person is a member, and will be dealt with by the relevant disciplinary procedures.*

## Reporting Terminology

- 11 Public Reports dealing with Mineral Resources and/or Mineral Reserves must only use the terms set out in Figure 1.

**'Modifying Factors' are considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors.**

Modifying factors also include any other factors which impact on the feasibility of the project.

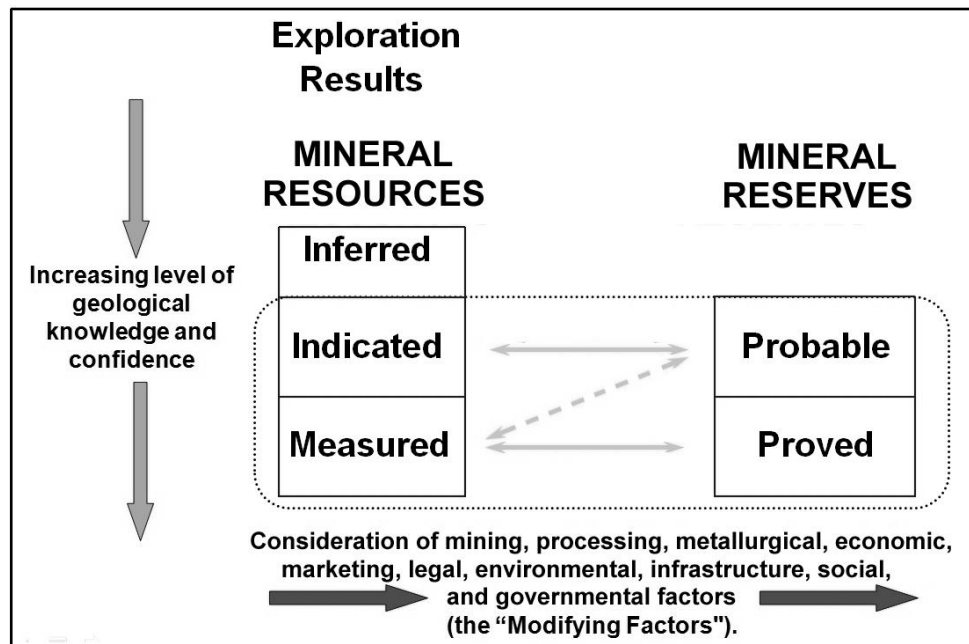
*Figure 1 sets out the framework for classifying tonnage and grade or quality estimates in order to reflect different levels of geological confidence and different degrees of technical and economic evaluation. Mineral Resources can be estimated on the basis of geological information with some input from other relevant disciplines. Mineral Reserves are a modified sub-set of the*

*Indicated and Measured Mineral Resources (shown in the dashed outline in Figure 1). The conversion of Mineral Resources to Mineral Reserves requires consideration of factors affecting extraction ('modifying factors'), and should generally be estimated with input from a range of disciplines, and always with consideration of the range of factors.*

*In certain situations, Measured Mineral Resources could convert to Probable Mineral Reserves because of uncertainties associated with modifying factors that are taken into account in the conversion from Mineral Resources to Mineral 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 imply a reduction in the level of geological knowledge or confidence.** In such a situation the changes in modifying factors should be fully explained. Refer also to the guidelines to Clause 29.*

*It is possible that previously reported Mineral Reserves could convert back to Mineral Resources because of new information affecting the modifying factors. This two-way relationship is indicated by two-headed arrows in Figure 1. The changes in the modifying factors that cause such a conversion should be fully explained. Refer further to the guidelines to Clause 29.*

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



## Reporting General

- 12 Public Reports concerning a company's Exploration Results, Mineral Resources or Mineral Reserves must include a description of the style and nature of 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 Mineral Reserves.

*Reports are prepared for different reasons and may contain more or less detail according to their intended purpose and readership. The contents of a report should be determined by the Competent Person to be appropriate for its use on the basis of relevance (materiality) and, where appropriate, backup documentation (such as audit reports) should be referred to or made available.*

- 14 Companies must review and publicly report on their Exploration Results, Mineral Resources and/or Mineral Reserves at least annually, and the effective date of each Mineral Resource and Mineral Reserve statement must be stated.

*Reviews of Mineral Resources and Mineral Reserves should include the relevance of current technical and economic conditions compared to those which may have been applied when the Mineral Resources and Reserves were estimated. If necessary, technical and economic studies including Pre-feasibility and Feasibility studies should be updated. Pre-feasibility and Feasibility studies are defined in Paragraphs 36 and 37 below.*

- 15 Throughout the Standard, 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, the generic terms are listed in Appendix 2 together with other terms that may be regarded as synonymous for the purposes of this document.

*The use of a particular term throughout this document does not signify that it is preferred or necessarily the ideal term in all circumstances. A typical example is where mining is referred to as quarrying when stone and aggregates and mineral raw materials are involved. Competent Persons would be expected to select and use the most appropriate terminology for the commodity or activity being reported.*

## **Reporting of Exploration Results**

- 16 **Exploration Results include data and information generated by mineral exploration programmes that might be of use to investors but which do not form part of a declaration of Mineral Resources or Mineral Reserves.**

*This is common in the early stages of exploration when the quantity of data available is generally not sufficient to allow any reasonable estimates of tonnage and grade or quality to be made. Examples include discovery outcrops, single drill hole intercepts or the results of geophysical or geochemical surveys.*

*It should be made clear in public reports that contain Exploration Results that it is inappropriate to use such information to derive estimates of tonnage and grade or quality (because if there were sufficient information to do so, the resulting estimates would have been quoted). It is recommended that such reports carry a continuing statement along the following lines:*

*"The information provided in this report/statement/release constitutes Exploration Results as defined in the PERC Standard, Clause 16. It is*

*inappropriate for the reader to use the information presented for deriving estimates of tonnage and grade or quality".*

- 17 If a Company reports Exploration Results in relation to mineralisation not classified as a Mineral Resource or Mineral Reserve, then estimates of tonnage and associated average grade or quality must not be reported.

*Descriptions of exploration targets or exploration potential given in Public Reports, should be expressed so as not to misrepresent them as an estimate of Mineral Resources or Mineral Reserves. See paragraph 19 below.*

- 18 Public Reports of Exploration Results relating to mineralisation not classified as a Mineral Resource or Mineral Reserve must contain sufficient information to allow a considered and balanced judgement of the significance of the results. 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.*

*Exploration Results should include an explanation of sampling techniques and data, land tenure status, geology and mineralisation and other relevant information.*

*"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 or qualities of mineralised zones, indicating clearly how the grades or qualities were calculated.*

*When reporting assay results the analytical technique used should be indicated with discussion of its relevance to assessment of the extractability of the element concerned.*

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 Mineral 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.*

- 19 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. However, any such comment in a Public Report must comply with the following requirements.

**An Exploration Target is a statement or estimate of the exploration potential of a mineral deposit in a defined geological setting where the statement or estimate, quoted as a range of tonnes and a range of grade or quality,**

**relates to mineralisation for which there has been insufficient exploration to estimate Mineral Resources.**

Any such information relating to an Exploration Target must be expressed so that it cannot be misrepresented or misconstrued as an estimate of a Mineral Resource or Ore Reserve. The terms Resource or Reserve must not be used in this context. Any statement referring to potential quantity and grade or quality of the target must both be expressed as ranges and must include:

- a detailed explanation of the basis for the statement, including specific description of the level of exploration testing already completed and,
- a clarification statement within the same paragraph as the first reference of the Exploration Target in the Public Report, stating that the potential quantity and grade or quality is conceptual in nature, that there has been insufficient exploration to estimate a Mineral Resource and that it is uncertain if further exploration will result in the estimation of a Mineral Resource.

Given the level of uncertainty surrounding the supporting data, an Exploration Target tonnage or grade or quality must not be reported as a 'headline statement' in a Public Report.

If a Public Report includes an Exploration Target, it is a requirement to detail proposed exploration activities designed to test the validity of the exploration target and to specify a timeframe within which those activities are expected to be completed.

If an Exploration Target is shown pictorially or with a graph, it must be accompanied by text which meets the requirements above.

A Public Report which includes an Exploration Target must be accompanied by a Competent Person statement taking responsibility for the form and context in which the Exploration Target appears.

*All disclosures of an Exploration Target should clarify whether the target is based on actual exploration results completed or on proposed exploration programs yet to commence. Where the Exploration Target statement includes information relating to ranges of tonnages and grades or qualities these should be represented as approximations. The explanatory text paragraphs should include a brief description of the process used to determine the grade or quality and tonnage ranges used to describe the Exploration Target.*

*For an Exploration Target based on actual exploration results, a summary of the relevant exploration data available and the nature of the results should also be stated, including a disclosure of the current drill hole or sampling spacing and relevant plans or sections. In any subsequent upgraded or modified statements on the Exploration Target, the Competent Person should discuss any material changes to potential scale or quality arising from completed exploration activities.*

## Reporting of Mineral Resources

20 **A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction.**

**The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.**

Mineral Resources are subdivided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories.

Portions of a mineral deposit that do not have reasonable prospects for eventual economic extraction must not be included in a Mineral Resource.

The Mineral Resource clause 20 and guidelines take precedence over those for the Inferred, Indicated and Measured categories, in that estimates must first satisfy the criteria required for classification as a Mineral Resource before consideration is given to the criteria applicable to each category of Mineral Resource.

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

*"Evidence and knowledge" includes sampling of a type and at a spacing appropriate to the geological, chemical, physical, and mineralogical complexity of the mineral occurrence.*

*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 and beneficiation parameters. In other words, a Mineral Resource is not an inventory of all mineralisation drilled or sampled, regardless of cut-off grades, likely mining dimensions, location or continuity, and the useful constituents of a Mineral Resource can be recovered with available mineral processing technology. A Mineral Resource is a realistic inventory of mineralisation, which, under assumed and justifiable technical and economic conditions, might, in whole or in part, become economically extractable.*

*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 many 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 (e.g. inventory reports, exploration reports to government and other similar reports not intended primarily for providing information for investment purposes) may require full disclosure of all occurrences of the mineral(s) of potential economic interest, including some material that does not have reasonable prospects for eventual economic extraction. Such estimates of mineralisation would not qualify as Mineral Resources or Mineral Reserves under the Standard and should be accompanied by the appropriate statement to this effect.*

*Where considered appropriate by the Competent Person, Mineral Resource estimates may include material below the selected cut-off grade or quality 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 such inclusions, and Public Reports should include commentary on the matter if considered material.*

- 21 **An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling.**

**Geological evidence is sufficient to imply but not verify geological and grade or quality continuity.**

**An Inferred Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration..**

Where Inferred Mineral Resources are extrapolated beyond any sampled region containing data points, the proportion extrapolated must be described and disclosed.

*The 'Inferred' category is intended to cover situations where a mineral concentration or occurrence has been identified and limited measurements and sampling have been completed, but where the data are insufficient to allow the geological and/or grade or quality continuity to be confidently interpreted. Due to the uncertainty which may be attached to some Inferred Mineral Resources, it cannot be assumed, but normally would be expected, that a major part of an Inferred Mineral Resource will be upgraded to an Indicated or Measured Mineral Resource as a result of continued exploration.*

*Confidence in the estimate is usually not sufficient to allow the appropriate application of technical and economic parameters or to enable a reliable evaluation of economic viability. For this reason, there is no direct link from an Inferred Resource to any category of Mineral Reserves (see Figure 1). It is accepted that mine design and mine planning may include a proportion of Inferred Mineral Resources.*

If this category is considered in mine design, planning and/or economic studies, the results of which are publicly reported, full disclosure and the effect on the results of the studies must be stated. Inferred Mineral Resources may only be included in mine design, mine planning, and/or economic studies provided that there exists a mine plan and a statement of Mineral Reserves, which states that Inferred Mineral Resources have been used. Where a material amount of mining in the mine plan includes Inferred Mineral Resources, a comparison of the results with and without

these Inferred Mineral Resources must be shown, and the rationale behind their inclusion must be explained.

Modifying factors and assumptions that were applied to the Indicated and Measured Mineral Resources to determine the Mineral Reserves must be equally applied to the Inferred Mineral Resources if these are included within a mine plan, but the inferred resource must nevertheless be reported as such, and not as a reserve.

*For the avoidance, of doubt, it is reiterated that caution should be exercised if this category is considered in technical and economic studies. At the discretion of the Competent Person, a Company may include all or part of its Inferred Mineral Resource for the purpose of internal planning, scoping or strategic studies. Any such reliance on Inferred Resources should be made clear in the report. In such circumstances, the results are not considered to be sufficiently reliable to ensure that all of the Inferred Mineral Resource will eventually become a Mineral Reserve. Any such reliance on Inferred Resources in a mine plan should be made clear in the report. Inferred Mineral Resources cannot be converted to Mineral Reserves, and must not be stated as part of the Mineral Reserve.*

- 22 **An Indicated Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit.**

**Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation.**

**An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.**

The Indicated Mineral Resource has sufficient confidence to support generalised mine design, mine planning, and/or economic studies.

*An Indicated Mineral Resource requires that the nature, quality, amount and distribution of data are such as to allow the Competent Person to confidently interpret the geological framework and to assume geological continuity of mineralisation, with sampling at a pattern and spacing appropriate to the geological characteristics and complexity 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. 'Grade or quality' is to be interpreted broadly, to include all relevant chemical and mineralogical characteristics.*

- 23 **A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit.**

**Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation.**

**A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proved Mineral Reserve or to a Probable Mineral Reserve.**

*The occurrence of mineral(s) of economic interest 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, mineralogy, and grade or quality 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, mineralogy, mineability and amenability to processing of the mineral deposit.*

*Confidence in the estimate is sufficient to allow the appropriate application of technical and economic parameters and to enable an evaluation of economic viability with a high level of confidence.*

- 24 The choice of the appropriate category of Mineral Resource depends upon the quantity, distribution and quality of data available and the level of confidence attached to the data. The appropriate Mineral Resource category must be determined by a Competent Person.

*Mineral Resource classification is a matter for skilled judgement, and the Competent Person should take into account those items in Table 1 which relate to confidence, accuracy (i.e. lack of bias) and precision (i.e. repeatability) in Mineral Resource estimation.*

*In deciding between Measured Mineral Resources and Indicated Mineral Resources, the Competent Person may find it useful to consider, in addition to the phrases in the two definitions relating to geological and grade or quality continuity in Clauses 22 and 23, 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 many cases it will be understood that overall tonnages, densities, shapes, physical characteristics, grades or qualities and mineral contents can be estimated with higher levels of confidence, and local tonnages, densities, shapes, physical characteristics, grades or qualities and mineral contents can be estimated only with lower levels of confidence, insufficient for detailed mine planning. 'Overall' is defined as that part of the deposit for which Measured, Indicated and Inferred Resources are reported. The term 'local' means selected parts of the deposit related to mining increments which are suitable for development of mine plans and financial analysis.*

*In deciding between Indicated Mineral Resources and Inferred Mineral Resources, the Competent Person may wish to take into account, in addition to the phrases in the two definitions in Clauses 21 and 22 relating to geological and grade or quality continuity, and 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'. This contrasts with the guideline to the definition of 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 also take into consideration issues of mineralisation, style, cut off grade or quality and scale when assessing geological and grade or quality continuity.

- 25 Mineral Resource estimates are not precise calculations, being dependent on the interpretation of limited information relating to the location, shape and continuity of the occurrence and on the available sampling results. Reporting of tonnage and grade or quality 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, when rounding to the first significant figure may be necessary 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 should, where appropriate, discuss the relative accuracy and/or confidence of the Mineral Resource estimates. The statement should specify whether it relates to global (whole of resource) or local estimates (a subset of the resource for which the accuracy and/or confidence might differ), 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).*

- 26 Public Reports of Mineral Resources must specify one or more of the categories of 'Inferred', 'Indicated' or 'Measured'. Reports must not contain Mineral Resource figures combining two or more of the categories unless figures for the individual categories are also provided. A Mineral Resource must not be reported in terms of contained mineral content unless corresponding tonnage and grade or quality figures are also presented. Mineral Resources must not be combined with Mineral Reserves.

Public Reporting of tonnage and grade or quality outside the categories covered by the Standard is not permitted.

*Often, exploration results will be communicated privately (such as to a landowner or their advisers) in less technical phraseology that does not necessarily reflect the wording in the Standard. It is recommended that authors of such communications should explain the link between any common usage terms and the definitions in the Standard.*



- 27 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 Mineral Reserves. These criteria need not be discussed in a Public Report unless they materially affect estimation or classification of the Mineral Resources. Where Mineral Resources being reported are predominantly in the Inferred category, and significant proportions of the estimate are based on extrapolation beyond data points, the public report must disclose the proportion of the resource that is based on extrapolated data. The report must also describe the reason for the assumed continuity, discuss sample type and sample spacing and other relevant items as listed in Table 1.

*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; for example, poor sample recovery, poor repeatability of assay or laboratory results, and other deficiencies (such as inadequate mineralogical studies, limited information on bulk densities, deleterious elements/minerals that may affect processing efficiency or value, etc) should be reported.*

*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.*

- 28 The words 'ore' and 'reserves' must not be used in stating 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 any part of the Mineral Reserves is no longer viable, such Mineral Reserves must be re-classified as Mineral Resources or removed from the Mineral Resource/Mineral Reserve statements.

*It is not intended that re-classification from Mineral 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 Mineral Reserves

- 29 **A Mineral 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 or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of Modifying Factors.**

**Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified.**

The reference point at which Reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported. Mineral Reserves are sub-divided in order of increasing confidence into Probable Mineral Reserves and Proved Mineral Reserves.

*A Mineral Reserve normally does not include allowances for losses that occur during beneficiation.*

*Mineral Reserves are those portions of Mineral Resources which, after the application of the modifying factors, result in an estimated tonnage and grade or quality, that in the opinion of the Competent Person making the estimates can be the basis of a viable project. Mineral Reserves are reported as inclusive of marginally economic material and diluting material delivered for treatment or dispatched from the mine without treatment. To avoid confusion in reporting Mineral Reserves the definition of treatment is taken to include any beneficiation of the mined product that might take place prior to, or during, the metallurgical process (if any).*

*In reporting Mineral Reserves, information on the upgrading and recovery factors used for processing the ore, material, or mineral, is very important, and should always be included in Public Reports.*

*The evaluation techniques used (including, where relevant, the block sizes) and the key assumptions made in arriving at the estimate should be disclosed.*

*The term 'economically mineable' implies that extraction of the Mineral Reserve has been demonstrated to be viable based on technical, economic and other relevant assumptions which should be stated. These assumptions 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'. However, it is expected that companies will attempt to achieve an acceptable return on capital invested, and that returns to investors in the project will be competitive with alternative investments of comparable risk.*

*In order to achieve the required level of confidence in the Mineral Resources and all of the modifying factors it is expected that studies to at least a Pre-Feasibility level will have been carried out prior to determination of the Mineral Reserves. The study will have determined a mine plan and process flowsheet that is technically achievable, environmentally acceptable and economically viable and from which the Mineral Reserves can be derived.*

*The term 'Mineral Reserves' 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 that these facilities can be installed and operated profitably and that approvals and/or contracts will be obtained. In certain cases, it may be impossible or unreasonable to hold such 'reasonable expectations' before actual granting of approvals or signing of contracts. The Competent Person should in all cases consider the materiality of any unresolved matter that is dependent on a third party on which extraction is contingent.*

*If zones of radically different characteristics in terms of mineral processing treatment or recoveries are present then these should be reported individually as well as jointly*

*Mineral Reserve estimates are sometimes reported after cutting or capping of high grades or qualities or the application of mine or mill 'call factors' that reflect historical experience of the reconciliation between Mineral Reserve estimates and actual production. If any of the data used in the Mineral Reserve estimate are materially adjusted or modified for the purpose of making the estimate, this should be clearly stated in a Public Report and the nature of the adjustment or modification should be described.*

*Where companies prefer to use the term 'Ore Reserves' in their Public Reports, they should state clearly that this is being used with the same meaning as 'Mineral Reserves', defined in this Standard.*

*It should be noted that the Standard does not imply that an economic operation must have Mineral Reserves whether Proved or Probable. It is not the function of this Standard for reporting to define the parameters necessary to justify economic decision-making.*

*The Competent Person should wherever possible disclose commodity prices and exchange rates used for Mineral Reserve estimation. If commodity prices are not disclosed the reasons for this should be given; e.g. where disclosure of a specific price may put a company at a competitive disadvantage. In such cases where possible, reference should be made to "current or anticipated prices" or "prices known to apply in the area".*

*Commodity prices should be based on supportable forward looking estimates, short term and long term as appropriate. Overly optimistic or pessimistic price forecasts could result in significant over or under estimates.*

*Where commodities are sold under existing contracts, reserves should be determined using these contract prices.*

*When commodity prices are disclosed, disclosure can be as a single price estimate equal to that used for reserve determination, or as a range of prices within which no material change in reserves would occur. Whether or not the commodity prices used to estimate reserves are published, the overall methodology used to determine those prices should be disclosed. Such disclosure should be in a manner which helps investors determine whether, in their own opinion, prices used represent reasonable views of future prices.*

*Documentation supporting price forecasts might include comparisons with historical and current prices, forward projections, market considerations, exchange rates or any other relevant information.*

*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.*

**30 A Probable Mineral Reserve is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource.**

**The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a Proved Mineral Reserve.**

*A Probable Mineral Reserve has a lower level of confidence than a Proved Mineral Reserve but is of sufficient quality to serve as the basis for an internal*

*decision on the development of the deposit taking full account of the risk factors involved.*

31 **A Proved Mineral Reserve is the economically mineable part of a Measured Mineral Resource.**

**A Proved Mineral Reserve implies a high degree of confidence in the Modifying Factors.**

*A Proved Mineral Reserve represents the highest confidence category of material available to a company both technically and economically. As noted in the guidelines to Clause 29, there are many factors that could mean that Proved Mineral Reserves are not achievable in some deposits. Care should be taken to avoid declaring Proved Mineral Reserves too early in the life of a project when subsequent data might show that this decision has been over optimistic, and that the reserves have then to be downgraded or removed. It is generally better to maintain preliminary estimates as Probable Reserves or to defer reporting than to be forced to retract statements at a later date.*

32 The choice of the appropriate category of Mineral 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 the Competent Person.

*The Standard provides for a direct relationship between Indicated Mineral Resources and Probable Mineral Reserves and between Measured Mineral Resources and Proved Mineral Reserves. In other words, the level of geological confidence for Probable Mineral Reserves is similar to that required for the determination of Indicated Mineral Resources. The level of geological confidence for Proved Mineral Reserves is similar to that required for the determination of Measured Mineral Resources. Inferred Mineral Resources are always additional to Mineral Reserves.*

*The Standard also provides for a two-way relationship between Measured Mineral Resources and Probable Mineral Reserves. This is to cover a situation where uncertainties associated with any of the modifying factors considered when converting Resources to Reserves may result in there being a lower degree of confidence in the Mineral 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 Mineral Reserve derived from a Measured Mineral Resource may be converted to a Proved Mineral 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 a Mineral 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 Mineral Reserve (see Figure 1).*

*Application of the category of Proved Mineral Reserves 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 24 regarding classification of Mineral Resources.*

- 33 Mineral Reserve estimates are not precise calculations. Reporting of tonnage and grade or quality figures should reflect the relative uncertainty of the estimate by rounding off to appropriately significant figures.

*Refer to the guidelines to Clause 25 regarding rounding of Mineral Resource estimates.*

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

*Competent Persons should discuss the relative accuracy and/or confidence of the Mineral Reserve estimates. The statement should specify whether it relates to global (whole of reserve) or local (a subset of the reserve for which the accuracy and/or confidence might differ from the whole of the reserve) 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).*

- 34 Public Reports of Mineral Reserves must specify one or both of the categories of 'Proved' and 'Probable'. Reports must not contain combined Proved and Probable Mineral 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 or quality figures are also given.

*When contained metal or mineral figures are quoted then the forecast metal or mineral recovery factor and 'Recoverable Metal' or 'Recoverable Mineral' should also be reported.*

Public Reporting of tonnage and grade or quality estimates outside the categories covered by the Standard is not permitted. While these may be useful for a company in its internal calculations and evaluation processes, their inclusion in Public Reports would cause confusion.

*Mineral 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 Mineral Reserves is borne in mind and caution exercised if attempting to draw conclusions from a comparison of the two.*

*When revised Mineral 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 the causes of significant variances to be understood by the reader.*

*Estimates of Mineral Reserves are normally reported on the basis of mineral which can be mined and delivered to a processing facility. Any consideration or estimation of losses during processing may be reported separately (for example as a percentage recovery factor) but should not be applied as a modifying factor to the reported Mineral Reserves.*

- 35 In situations where figures for both Mineral Resources and Mineral Reserves are reported, a clarifying statement must be included in the report which clearly indicates

whether the Mineral Resources are inclusive of, or additional to the Mineral Reserves.

Mineral Reserve estimates must not be added to Mineral Resource estimates to report a single combined figure.

*In some situations there are reasons for reporting Mineral Resources inclusive of Mineral Reserves and in other situations for reporting Mineral Resources additional to Mineral 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 Mineral Reserves.'*

*or*

*'The Measured and Indicated Mineral Resources are additional to the Mineral Reserves.'*

*In the former case, if any Measured and Indicated Mineral Resources have not been modified (by the application of the set of Modifying Factors) to produce Mineral 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 Mineral Reserves.*

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

*When reporting Mineral Reserves, a sensitivity analysis should be conducted. The disclosure of commodity price and other financial assumptions used for this analysis is recommended.*

*The above clauses apply equally to low-grade mineralisation, often intended for stockpiling and treatment towards the end of mine life.*

*For reasons stated in the first guideline of Clause 34 and in this paragraph, the reported Mineral Reserve figures cannot be added to the reported Mineral Resource figures. The resulting total is misleading and is capable of being misunderstood or, more seriously, of being misused to give a false impression of a company's prospects.*

- 36 **A Scoping Study is an order of magnitude technical and economic study of the potential viability of Mineral Resources that includes appropriate assessments of realistically assumed Modifying Factors together with any other relevant operational factors that are necessary to demonstrate at the time of reporting that progress to a Pre-Feasibility Study can be reasonably justified.**

If a Scoping Study is partially supported by Inferred Mineral Resources, the Competent Person must declare what proportion of the Scoping Study is supported by Inferred Resources. For all Scoping Studies, the report must also include a cautionary statement in the same paragraph as, or immediately following, the disclosure of the Scoping Study, such as in the following example:

*"The Scoping Study referred to in this report is based on low confidence level technical and economic assessments, and is insufficient to support estimation of Mineral Reserves or to provide assurance of an economic development*

*case at this stage , or to provide certainty that the conclusions of the Scoping Study will be realized. ”*

37 **A Pre-Feasibility Study is a comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a preferred mining method, in the case of underground mining, or the pit configuration, in the case of an open pit, is established and an effective method of mineral processing is determined. It includes a financial analysis based on reasonable assumptions on the Modifying Factors and the evaluation of any other relevant factors which are sufficient for a Competent Person, acting reasonably, to determine if all or part of the Mineral Resource may be converted to a Mineral Reserve at the time of reporting. A Pre-feasibility Study is at a lower confidence level than a Feasibility Study.**

38 **A Feasibility Study is a comprehensive technical and economic study of the selected development option for a mineral project that includes appropriately detailed assessments of applicable Modifying Factors together with any other relevant operational factors and detailed financial analysis that are necessary to demonstrate at the time of reporting that extraction is reasonably justified (economically mineable). The results of the study may reasonably serve as the basis for a final decision by a proponent or financial institution to proceed with, or finance, the development of the project. The confidence level of the study will be higher than that of a Pre-Feasibility Study.**

The Standard does not require that a full feasibility study has been undertaken to convert Mineral Resources to Mineral Reserves, but it does require that at least a Pre-Feasibility study will have been carried out that will have determined a mine plan that is technically achievable and economically viable, and that all Modifying Factors have been considered.

39 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 Mineral Reserves. These criteria need not be discussed in a Public Report unless they materially affect estimation or classification of the Mineral Resources and Mineral Reserves. However, changes in economic or political factors alone may be the basis for significant changes in Mineral Reserves and should be reported accordingly.

## **Reporting of Mineralised Fill, Pillars, Low Grade Mineralisation, Stockpiles, Dumps and Tailings**

40 The Standard 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 Mineral Reserves. Unless otherwise stated, clauses 1-39 of the Standard (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 Mineral 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 Mineral 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 at the time of reporting under realistically assumed conditions, then the material may be classified as a Mineral 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 or quality estimates of such material be itemised separately in Public Reports, although they may also be combined with total Mineral Resource and Mineral 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) should not normally be included within reserves, but if reported, should be reported separately.

If stockpiled material is already accounted for elsewhere (using other reporting systems) by the company, then to avoid double counting it must not also be reported under the PERC Standard.

*This situation may arise, for example, with construction raw materials where they have been delivered to stockpiles close to the site at which they are intended to be used, and may have been recorded as assets of a different division of the company.*

## Reporting of Exploration Results, Resources and Reserves for Coal

- 41 Clauses 41 to 43 of the Standard address matters that relate specifically to the Public Reporting of Coal Exploration Results, Coal Resources and Coal Reserves. Unless otherwise stated, Clauses 1 to 39 of this Standard (including Figure 1) apply. Table 1, as part of the guidelines, should be considered 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'.*

- 42 The terms 'Mineral Resource(s)' and 'Mineral 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.

When reporting coal reserves, a clear distinction must be made between reserves where mining losses have been taken into account (sometimes described as recoverable or run of mine) and saleable product where both mining and processing losses have been included (sometimes referred to as marketable reserves). All reserves, by definition, include mining losses and dilution and the use of superfluous description is discouraged. In situ coal is, also by definition, a resource. Reports must not contain combined Proved and Probable Coal Reserve figures unless the relevant figures for each of the individual categories are also provided.



- 43 Saleable product (or marketable Coal Reserves), representing beneficiated or otherwise enhanced coal, may be publicly reported. Where this is the case, the equivalent Proved and/or Probable Coal Reserves should be shown and the basis of the predicted yield to achieve saleable product should be stated.

Relevant coal quality information should be reported for all Coal Resource and Coal Reserve categories including the basis on which the quality parameters are derived. Where applicable, Marketable Coal Reserves should be subdivided into the relevant coal product types.

*The parameters used to measure coal quality, for example on an 'As Received' or 'Air Dried' moisture basis should be reported. The quality of coal should be expressed according to parameters relevant to specific applications e.g. steam coal, metallurgical coal etc. The selection of the relevant quality parameters is the responsibility of the Competent Person and might include ash, volatile matter, sulphur, coking properties, calorific value etc. and will include also bulk density as one of the most important parameters.*

*Resource classification should take into consideration both continuity and reliability of thickness measurements and continuity, reliability and confidence in quality parameters, recognising that variability in seam thickness and quality are not necessarily interdependent. Continuity of seams, partings and their termination by faults and channels should be considered both horizontally and vertically, with attention paid to the ability of the likely mining method to cope with discontinuities and displacements.*

## Reporting of Diamond Exploration Results, Mineral Resources and Mineral Reserves

- 44 Clauses 44 to 47 of the Standard address matters that relate specifically to the Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves for diamonds. Unless otherwise stated, Clauses 1 to 39 of this Standard (including Figure 1) apply. Table 1, as part of the guidelines, should be considered when reporting Exploration Results, Mineral Resources and Mineral Reserves for diamonds.

Diamond deposits can be subdivided into igneous-hosted deposits on the one hand, and into marine and alluvial placers on the other. The particulate nature of diamonds and generally low grade nature of diamond deposits presents specific problems in sampling, estimation and development of such deposits which are discussed in the following sections and in Table 1. The points discussed in the guidelines are not equally applicable to primary and secondary diamond deposits. For example, the use of micro-diamonds for grade estimation is not relevant in the placer environment.

*For the purposes of Public Reporting, the requirements for diamonds have some similarity to those of other commodities with the replacement of terms such as 'mineral' by 'diamond'. The term grade refers specifically to diamond content and should be always be quoted in conjunction with a bottom cut-off for diamond size expressed in mm or equivalent diamond sieve. (See table 1. for detailed guidelines). It is recommended that information on diamond value is quoted in conjunction with grade estimates at the same bottom cut-off. A grade estimate may be disclosed in early stage sampling using micro-macro diamond estimation to give a global estimate of grade before an estimate of average diamond value can be made. Diamond grade is generally quoted in carats per tonne (cpt), carats per hundred tonnes (cpht); or in the case of*

*offshore and some onshore alluvial deposits carats per cubic metre, or the term 'planar grade' in carats per square metre may be used.*

*The term 'quality' should not be substituted for 'grade,' since in diamond deposits these have distinctly separate meanings.*

*A number of characteristics of diamond deposits are different from those of, for example, typical metalliferous and coal deposits and require special consideration. These include the generally very low mineral content and variability of primary and placer deposits, the particulate nature of diamonds and dependence of diamond value on diamond size, quality, colour and shape, the specialised requirement for diamond valuation and the inherent difficulties and uncertainties in the estimation of diamond resources and reserves. As a result, diamond deposits rarely achieve Measured status. The sampling and estimation of marine placer deposits is particularly difficult and expensive and thus even the assignment of Indicated status may prove difficult.*

- 45 For Public Reports dealing with diamonds it is a requirement that any reported valuation of a parcel of diamonds be accompanied by a statement verifying the independence of the valuation which must be based on a report from a demonstrably reputable and qualified expert. It must be clearly stated whether the reported value is actual or modelled and, in the latter case, how the modelling was carried out and by whom. Reports of diamonds recovered from sampling programs must provide material information relating to the basis on which the sample is taken and the method of recovery of the diamonds. The valuation of diamonds must state if the average diamond value includes all categories of diamonds recovered above a bottom cut-off. The bottom cut-off should coincide with that used to disclose diamond grade values.

Diamond valuations should not be reported for samples of diamonds processed using total liberation methods which will be composed mainly of micro-diamonds.

*Total liberation generally refers to acidisation or caustic fusion of micro-diamond samples. There may be instances where valuation of macro-diamonds recovered from such processes may be useful to the Competent Person and may have been used in the estimation of a modelled average diamond value. If such valuations were to be disclosed then this must be done in the correct context and carefully qualified so as not to be misleading.*

*In order to demonstrate that a resource has reasonable prospects for economic extraction, some appreciation of the likely stone size distribution and value is necessary, however preliminary.*

*The stone size distribution and value of diamonds per sieve class are critical components in the estimation of average diamond value. At an early exploration stage, sampling and delineation drilling will not usually provide the required information on diamond value, which relies initially on large diameter drilling and in particular, conventional bulk sampling such as pitting, trenching or exploratory underground development as a project moves beyond the conceptual stage. It is recognised, however, that even bulk sampling may not recover sufficient diamonds to establish an average diamond value. In this instance modelling will still be required.*

*Ideally the valuation parcel should be representative of size, shape, quality and colour. This is rarely achieved and in most instances the average diamond value used in a resource estimate is a "modelled value" which should be derived by a Competent Person.*

*It is also important to qualify whether the parcel is 'run of mine', if any selection has taken place, and if the parcel has been separated into different categories e.g. gem, near-gem, industrial or by 'selling mix', prior to valuation.*

- 46 Where Diamond Resource or Diamond Reserve grades 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 size sieve for micro-diamonds reported. Details of the laboratory facilities used for the processing of samples and the method for recovery of micro-diamonds should also be disclosed i.e. acidisation or caustic fusion.

For the avoidance of doubt, diamond grade estimation using micro-diamonds would not be sufficient to declare a mineral resource unless sufficient macro-diamonds had also been recovered to enable a preliminary estimate of average diamond value. However, in the case of a producing mine or development property, where resources have been declared and sufficient macro-diamonds have been recovered for estimation of average diamond value, it is permissible to extrapolate diamond values if geological homogeneity and continuity can be demonstrated and a preliminary diamond size frequency can be modelled. The Competent Person must take a view on the adequacy of the quantity of recovered macro-diamonds to estimate average diamond value.

*Key issues in the micro-macro diamond modelling approach are the use of appropriate sampling protocols to ensure that dilution in the sample is sufficiently understood. The relationship between the micro and macro diamond portions of the total content curve is critically affected by country rock dilution and diamond liberation.*

*The relative efficiencies of the sampling and subsequent mining technologies must be addressed. This is particularly relevant for marine placer deposits.*

- 47 Other than total dissolution techniques in micro-diamond sample processing, sampling in diamonds does not provide an assay as with other mineral commodities. Conventional macro-diamond sample processing will not liberate or recover all the contained diamonds. The relative efficiencies of micro-diamond sampling, macro-diamond sampling and full-scale treatment and recovery technologies must be considered through granulometry and ore dressing studies to derive appropriate mineral resource to reserve modifying factors in the estimation of mineral reserves.

*In the case of marine placers it is common practice, during the conversion of resources to reserves, to apply mining recovery factors (based on analysis of the realised grades to estimated grades for the types and combination of sampling and mining tools used, and for the type of footwall present in the mined area).*

*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 Mineral Reserves for diamonds.*

## Reporting of Exploration Results, Mineral Resources and Mineral Reserves for Industrial Minerals, Cement Feed Materials and Construction Raw Materials

48 Clauses 48 to 51 of the Standard address matters which relate to the Public Reporting of industrial minerals, cement feed materials and construction raw materials of all forms that are generally sold on the basis of their product specifications and market acceptance. Unless otherwise stated, clauses 1 to 39 of the Standard (including Figure 1) apply. The contents of Table 1, as part of the guidelines, should also be considered when reporting on industrial minerals, cement feed materials and construction raw materials Resources and Reserves, apart from guidelines that may be inappropriate when Mineral Resources and Reserves estimates are presented on an aggregated basis as described in Clause 60.

When reporting information and estimates for industrial minerals, cement feed materials and construction raw materials, all of the key principles and purpose of the Standard apply. Chemical analyses may not always be relevant and other quality and performance characteristics may be more applicable and acceptable as the basis of the reporting. Some industrial mineral, cement feed materials and construction raw material deposits may be capable of yielding products suitable for more than one application and/or specification. If considered material by the Competent Person, such multiple products should be quantified either separately or as a percentage of the bulk the deposit.

*Unless it is a specific aspect of his or her instructions to reflect the range of product mixes and target markets for the deposit, the Competent Person should normally report the reserves and resources within the framework of an existing mining plan or established set of product and market assumptions and objectives. If there is potential for ancillary products, or mining or process waste, to be sold off-site for subsidiary uses in addition to the planned sales of primary products (i.e. other uses for non-saleable quarry production, such as secondary aggregate or engineering or other fill), the Competent Person should reflect this in his report and comment on any significant implications (e.g. reductions in the amount of non-saleable material that could otherwise be used as a restoration material).*

*The factors underpinning the estimation of Mineral Resources and Mineral Reserves for industrial minerals, cement feed materials and construction raw materials are the same as those for other deposit types covered by the Standard. It may be necessary, prior to the reporting of a Mineral Resource or Mineral Reserve, to take particular account of certain key characteristics or qualities such as likely product specifications, proximity to markets and general product marketability.*

*For industrial minerals, cement feed materials and construction raw materials, it is common practice to report the saleable (or useable) product rather than the 'as mined' product as it is recognised that commercial sensitivities may not permit the publication of Mineral Resources and Reserves in the latter format which is the preferred style of reporting within the Standard. It is important that, in all situations where the saleable or usable product is reported, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.*



- 49 Other industry guidelines on the estimation and reporting of industrial minerals, cement feed materials and construction raw materials Resources and Reserves may be useful but will under no circumstances override the provisions and intention of this Standard for public reporting.

*Reports should make clear the 'permitted' or 'non-permitted' status of the resources and reserves, and in addition reserves particularly should only be quoted where the operator has legal control. It should be noted that many of the Modifying Factors are more relevant to industrial minerals, cement feed materials and construction raw materials than to metalliferous minerals. Specifically the legal control may be more important, as well as the permitting or consenting status, due to the local nature of the planning process for non - strategic and non - government owned minerals.*

- 50 Mineral Reserves and Resources of industrial minerals, cement feed materials and construction raw materials serving localised or regional markets may be reported on an aggregated basis on an appropriately defined geographical basis to reflect the particular economic constraints of the deposits being reported without divulging commercially sensitive information. Issues of materiality, as addressed in Clause 62, may also be relevant.
- 51 In certain cases commercial sensitivity may prevent the publication of detailed information associated with Mineral Resources and Reserves, and in such cases this should be clearly justified in the report (either prepared for an individual site or on an aggregated basis).

## **Reporting of Exploration Results, Mineral Resources and Mineral Reserves for Oil Shales, Oil Sands, and other energy minerals extracted by mining methods**

- 52 Clauses 52 to 54 of the Code address matters which relate to the Public Reporting of oil shales, tar sands, and other hydrocarbon minerals where the hydrocarbons are extracted by processing of mined rock. Unless otherwise stated, clauses 1 to 39 of the Code (including Figure 1) apply. Table 1, as part of the guidelines, should also be considered when reporting on Resources and Reserves of oil shales, tar sands, and similar minerals.

When reporting information and estimates for oil shales, tar sands, and other hydrocarbon minerals where the hydrocarbons are extracted by processing of mined rock, the key principles and purpose of the Code apply. Chemical analyses may not always be relevant and other quality and performance characteristics may be more applicable and acceptable as the basis of the reporting. Some deposits of such minerals may be capable of yielding products suitable for more than one application and/or specification. If considered material by the Competent Person, such multiple products should be quantified either separately or as a percentage of the bulk deposit.

*Unless it is a specific aspect of his or her instructions to reflect the range of product mixes and target markets for the deposit, the Competent Person should normally report the reserves and resources within the framework of an existing mining plan or established set of product and market assumptions and objectives. If there is potential for ancillary products, or mining or process waste, to be sold off-site for subsidiary uses in addition to the planned sales of*

*primary products, the Competent Person should reflect this in his report and comment on any significant implications (e.g. reductions in the amount of non-saleable material that could otherwise be used as a restoration material).*

*The factors underpinning the estimation of Mineral Resources and Mineral Reserves for oil shales, tar sands, and similar minerals are the same as those for other deposit types covered by the Code. It may be necessary, prior to the reporting of a Mineral Resource or Mineral Reserve, to take particular account of certain key characteristics or qualities such as likely hydrocarbon product specifications, proximity to markets and general product marketability.*

*For hydrocarbon products, it is common practice to report the saleable product after extraction from the host rock matrix, rather than the 'as mined' product, as it is recognised that commercial sensitivities may not permit the publication of Mineral Resources and Reserves in the latter format which is the preferred style of reporting within the Code. 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.*

- 53 In some jurisdictions, it may be required, or it may be normal practice, to report Exploration Results, Mineral Resources and Mineral Reserves for Oil Shales, Tar Sands, and other similar energy minerals using other reporting standards and under different market regulations from those which apply to solid minerals. In such circumstances, the other reporting standards will generally take precedence and the choice of appropriate reporting standard to be used will in general not be a matter for decision by the Competent Person.

Where this is not the case, even though other industry guidelines on the estimation and reporting of Resources and Reserves of oil shales, tar sands, and similar products may be useful, where such materials are solid minerals they fall within the scope of the PERC Standard, so other reporting standards will not override the provisions and intention of this Standard for public reporting.

*Reports should make clear the 'permitted' or 'non-permitted' status of the resources and reserves, and in addition reserves particularly should only be quoted where the operator has legal control.*

- 54 In certain cases commercial sensitivity may prevent the publication of detailed quality parameters, but in such cases this should be clearly justified in the report.

## **Reporting of Exploration Results, Mineral Resources and Mineral Reserves for Metallic or Non-Metallic Minerals extracted by solution mining methods**

- 55 Clauses 55 to 57 of the Code address matters which relate to the Public Reporting of any minerals which are extracted by in-situ dissolution and transfer to the surface in solution in water, steam, or other solvent. Unless otherwise stated, clauses 1 to 39 of the Code (including Figure 1) apply. Table 1, as part of the guidelines, should also be considered when reporting on minerals produced by solution mining.

When reporting information and estimates for solution mined minerals, the key principles and purpose of the Code apply. Resources as for all other minerals are expressed in terms of the in-situ rock quantities and the quality parameters

representing the proportion and quality of economic mineral product. If Resources are estimated at a stage after production has already started, then the methods and assumptions of such estimation must be stated.

*As with all other minerals reported under the Code, the Competent Person should normally report the reserves and resources within the framework of an existing production plan and an established set of product and market assumptions and objectives.*

*The factors underpinning the estimation of Mineral Resources and Mineral Reserves for solution-mined minerals are the same as those for other deposit types covered by the Code.*

*The 'as mined' product for solution-mined minerals will normally be the solid material remaining after crystallisation, and removal, or recycling of the solvent. The quantities of solvent itself should not be reported as part of the Resources or Reserves, but are relevant only insofar as the related costs must be taken into consideration along with all other Modifying Factors. 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 and what processing steps have been required to obtain this saleable product.*

- 56 Other industry guidelines on the estimation and reporting of Resources and Reserves of solution-mined minerals may be useful but will under no circumstances override the provisions and intention of this Code for public reporting.

*Reports should make clear the 'permitted' or 'non-permitted' status of the resources and reserves, and in addition reserves particularly should only be quoted where the operator has legal control.*

- 57 In certain cases commercial sensitivity may prevent the publication of detailed quality parameters, but in such cases this should be clearly justified in the report.

## **Disclosure of Previously Reported Estimates**

- 58 A company may disclose an estimate previously reported under a classification system other than PERC or by a person or persons other than the Competent Person approving the new disclosure, using the previously used terminology, if the disclosure meets all of the five following requirements:-

- a) identifies the source and date of the previously reported estimate;
- b) comments on the relevance and reliability of the previously reported estimate;
- c) states whether the previously reported estimate uses categories other than the ones set out in clauses 11 to 35 of this Standard and, if so, includes an explanation of the differences;
- d) includes a cautionary statement making clear that such an estimate cannot be combined with any other estimates and cannot be accorded the status of approval by the Competent Person; and
- e) includes any more recent estimates or data available to the company.

*This provision allows for the disclosure of estimates produced by the same or a different company, using the same or other reporting codes or standards, and including the situation where the previous Competent Person (if any) is no longer available to authorise the new disclosure.*

- 59 The company must also include within the disclosure a statement describing the actions proposed to make the estimate compliant with the PERC Standard.

### **Guideline on Materiality**

- 60 *Companies may have large numbers of separate minerals exploration and/or extraction projects, such that it may be impracticable for them to commission or prepare separate Competent Person reports on each project separately. In such circumstances it is recommended that a Competent Person should examine a company's minerals assets and provide an assessment of the appropriate level of aggregation, or 'accounting unit', to be used in all subsequent reporting of the company's Mineral Resources and Mineral Reserves.*

*When examining mineral assets in the context of determining materiality, the Competent Person should consider both the size and number of individual assets in establishing the appropriate level of aggregation. Individual mineral assets that have a disproportionate contribution to the overall Mineral Resource or Reserve available to the company may be 'material' and should be considered for separate reporting by the Competent Person.*

*This guideline is of particular relevance to cement companies and other companies producing industrial and construction raw materials where the value of individual mineral projects is not paramount to the overall value of the business, compared to other mineral companies, and the obligation to produce a Competent Person's Report on each separate mineral asset would be disproportionate in contributing to effective protection for investors.*

*Aggregation in reporting may be on the basis of geographical region or business unit. For example, a multinational company may have operations on several continents and may therefore wish to report Mineral Resources and Reserves based primarily on geographical region reflecting the regional structure of the company. A company with multiple business lines (cement, aggregates, clay building products) may prefer to report relevant Mineral Resources and Reserves by reference to commodities relevant to those business lines, subdivided by geographical regions.*

*Where Mineral Resources and Reserves are reported on an aggregated basis, a statement to the effect that the estimation and reporting criteria for each individual site included in the aggregation is PERC compliant should be provided. Confirmation that the determination of materiality and establishment of the appropriate level of aggregation has been made by a Competent Person should also be provided.*



## TABLE 1: CHECKLIST AND GUIDELINES OF REPORTING AND ASSESSMENT CRITERIA

Table 1 is a high level checklist of assessment criteria and a guideline to be used as a reference by those preparing reports on Exploration Results, Mineral Resources and Mineral Reserves. The checklist is not prescriptive and, as always, relevance and materiality are the overriding principles that determine what information should be publicly reported. It is, however, important to report all 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 and/or Mineral Reserves.

It is the responsibility of the Competent Person to consider all the criteria listed below and which additional criteria should apply to the study of a particular project or operation. The relative importance of the criteria will vary with the particular project and the legal and economic conditions pertaining at the time of determination.

The order and grouping of criteria in Table 1 reflect the normal systematic approach to exploration and evaluation. The table should be approached from left to right. In other words, criteria in the first column, Exploration Results, should be considered to apply also when reporting Mineral Resources and Mineral Reserves. Similarly, additional criteria in the Mineral Resources column apply also to Mineral Reserves reporting.

The evaluation and reporting of mineral projects and forward looking mine plans or statements from ongoing operations are expressions of judgement predicated on knowledge and experience. Such evaluations and reports are more than arbitrary determinations; they seek to facilitate valuations as a consequence of method. The methods employed should be scientifically valid, tested, use accepted scientific definitions of terms and procedures and best suited to the making of reliable estimates for the project in question.

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
<b>General</b>			
<b>Purpose of Report</b>	<p>(i) The report should include a title page and Table of Contents, including figures and tables.</p> <p>(ii) State for whom the report was prepared, whether it was intended as a full or partial evaluation or other purpose, what work was conducted, effective date of report, and what work remains to be done.</p> <p>(iii) The Competent Person should state whether the document is PERC compliant. If a reporting standard or code, other than PERC has been used, The Competent Person should include an explanation of the difference.</p>		
<b>Project Outline</b>	Brief description of scope of project (i.e. whether in preliminary sampling, advanced exploration, conceptual, pre-feasibility, or feasibility phase, Life of Mine plan for an ongoing mining operation or closure). This should include a description of the geological setting, deposit type, commodity, project area, background, and business arrangement.	Brief description of key technical factors that have been considered	Brief description of mining, processing and other key technical factors
<b>History</b>	(i) State historical background to the project and/or adjacent areas concerned, including known results of previous exploration and/or mining activities (type, quantity and	(i) Discuss known or existing historical Mineral Resource estimates and , reconciliations of reported resources/reserves and actual production for past and current	(i) Discuss known or existing historical Mineral Reserve estimates and performance statistics to actual production for past and current operations, including the reliability of

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
	<p>development work), prior ownership and changes thereto.</p> <p>(ii) Reference all information used from other sources.</p>	<p>operations, including the reliability of these and how they relate to the PERC Standard.</p> <p>(ii) Previous successes or failures should be referred to transparently with reasons why the project should now be considered potentially economic.</p>	<p>these and how they relate to the PERC Standard.</p>
<b>Key Plan, Maps and Diagrams</b>	<p>(i) Include and reference a location or index map and more detailed maps showing all important features described in the text, including all relevant cadastral and other infrastructure features. If adjacent or nearby properties have an important bearing to the report, then their location and common mineralised structures should be included on the maps. Reference all information used from other sources. All maps, plans and sections noted in this checklist, should be legible, and include a legend, coordinates, coordinate system,, scale bar and north arrow.</p> <p>(ii) Diagrams or illustrations should be legible, annotated and explained where necessary</p>		
<b>Project Location and Description</b>	<p>(i) Description of location (country, province, and closest town/city, coordinate systems and ranges, etc.).</p> <p>(ii) In respect of each property, diagrams, maps and plans should be supplied demonstrating the location of prospecting/mining rights, any historical and current workings, any exploration, and all principal geological features.</p>		
<b>Topography and Climate</b>	<p>(i) All relevant issues relating to the mineral project, such as the topography and climate, noting any conditions that may affect possible mining activities should be stated.</p> <p>(ii) A general topo-cadastral map should be available to support the above statement</p>	<p>(i) Topo-cadastral map in sufficient detail to support the assessment of eventual economics. Known associated climatic risks should be stated.</p>	<p>(i) Detailed topo-cadastral map. Where applicable aerial surveys should be checked with ground controls and surveys, particularly in areas of rugged terrain, dense vegetation and/or high altitude.</p>

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
<b>Legal Aspects and Tenure</b>	<p><i>The legal tenure should be verified to the satisfaction of the Competent Person, including a description of:</i></p> <p><i>(i) The nature of the issuer's rights (e.g. prospecting and/or mining) and the right to use the surface of the properties to which these rights relate;</i></p> <p><i>(ii) The principal terms and conditions of all existing agreements, and details of those still to be obtained, (such as, but not limited to, concessions, partnerships, joint ventures, access rights, leases, historical and cultural sites, wilderness or national park and environmental settings, royalties, consents, permission, permits or authorizations)</i></p> <p><i>(iii) The security of the tenure held at the time of reporting or which is reasonably expected to be granted in the future along with any known impediments to obtaining the right to operate in the area; and</i></p> <p><i>(iv) A statement of any legal proceedings that may have an influence on the rights to prospect for minerals, or an appropriate negative statement.</i></p>		
<b>Personal introduction into projects and verification of the data</b>	<p><i>(i) Date of visit(s)</i></p> <p><i>(i) Meetings with key persons responsible for the project which is being reported upon, defining their responsible fields and experience relevant to the project.</i></p> <p><i>(ii) Visit to project area resulting in a report itemising significant observations</i></p> <p><i>(iv) What parts of the project were available for personal verification</i></p> <p><i>(v) List of data used or cited in preparation of the Public Report</i></p>		



ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
<b>Sampling Techniques and Data</b>  <b>Applicable to all reporting groups</b>			
<b>Type(s) of sampling</b>	<i>The type of sampling and its location, which will give rise to the results being reported, should be stated. Types of sampling include stream sediment, soil and heavy mineral concentrate samples, trenching and pitting, rock chip and channel sampling, drilling, auger etc. Examples of locations include old workings, mine dumps etc. Wherever possible the spacing of such samples should be stated, and locations shown on coordinated maps, plans and sections at suitable scales.</i>		
<b>Drilling techniques</b>	<i>Drilling techniques may include core, reverse circulation, percussion, rotary auger, down-the-hole hammer, etc. These should be stated and details (e.g. core diameter) provided. Measures taken to maximise sample recovery and ensure representative nature of the samples should be stated.</i>		
<b>Drill sample recovery</b>	<i>Whether sample recoveries have been properly recorded and results assessed should be disclosed. In particular the report should state whether a relationship exists between sample recovery and grade or quality and sample bias (e.g. preferential loss/gain of fine/coarse material).</i>		
<b>Logging</b>	<i>Whether samples have been logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies should be confirmed, and whether logging is qualitative or quantitative in nature should be stated. Core (or trench, channel etc.) photography should be included.</i>		
<b>Other sampling techniques</b>	<i>Nature and quality of sampling (e.g. cut channels, random chips etc.) and measures taken to ensure sample representativity should be stated. The precise location and unique numbering of each sample should be provided by reference to a coordinate system (which should be stated).</i>		
<b>Sub-sampling techniques and sample preparation</b>	<i>For sampling from core, whether cut or sawn or whether quarter, half or all core has been taken in the course of sampling should be stated. If non-core, whether riffled, tube sampled, rotary split etc. and whether split wet or dry. For all sample types, the nature, quality and appropriateness of the sample preparation technique should be described, together with quality control procedures adopted for all sub-sampling stages to maximise representativity of samples.</i>		

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
	<i>Measures taken to ensure that the sampling is representative of the in situ material collected should be stated. Whether sample sizes are appropriate to the grain size of the material being sampled should be described. A statement as to the security measures taken to ensure sample integrity is recommended</i>		
<b>Assay data and laboratory investigation</b>	<p><i>The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total should be stated. Attention should also be given to how presented assay results express the assumed extractable content of the element.</i></p> <p><i>Sample preparation and assaying may be carried out by internal or independent laboratories. The laboratories actually used for this work should be identified in any report. In any case, there should be consideration given to the accreditation of the laboratory (e.g. ISO standards awarded such as ISO 9000:2001 and ISO 17025) and to the actual procedures used at all stages of sample preparation and analysis, including the use of randomisation, internal and external standard samples, and blanks, as well as monitoring procedures for systematic bias. In particular, it should be noted whether analyses of samples within the set used to support the resource estimate have been replicated independently in other laboratories.</i></p>		
<b>Verification of results</b>	<i>The verification of selected intersections by either independent or alternative personnel is recommended as is the use of twinned holes, deflections or duplicate samples.</i>		
<b>Data location</b>	<i>A statement is required regarding the accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations. Quality and adequacy of topographic control should be described and locality plans provided.</i>		
<b>Data density and distribution</b>	<i>Data density for reporting of Exploration Results should be described.</i>	<p><i>A statement should be included as to whether the data density and distribution are sufficient to establish the degree of geological and grade or quality continuity appropriate for the Mineral Resource and Mineral Reserve estimation procedure and classifications applied, and whether sample compositing has been applied.</i></p> <p><i>Whether the orientation of sampling achieves unbiased sampling of possible</i></p>	

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
		<i>structures and the extent to which this is known, considering the deposit type should be stated</i>	
<b>Reporting Archives</b>	<i>Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) for preparing the report should be provided.</i>		
<b>Audits or reviews</b>	<i>The results of any audits or reviews of sampling techniques and data should be presented and discussed.</i>		

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
<p><b>Reporting of Exploration Results</b></p> <p>Criteria applicable to reporting groups as shown</p>			
<b>Mineral rights and land ownership</b>	<p><i>Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, historical sites, wilderness or national park and environmental settings. In particular 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. Location plans of mineral rights and titles. It is not expected that the description of mineral title in a technical report should be a legal opinion, but should be a brief and clear description of such title as understood by the author.</i></p>		
<b>Exploration work carried out by other parties</b>	<p><i>Acknowledgement and appraisal of exploration by other parties.</i></p>		
<b>Geology</b>	<p><i>Description of the nature, detail, and reliability of geological information (rock types, structure, alteration, mineralisation, and relation to known mineralised zones, etc.). Description of geophysical and geochemical data. Reliable geological maps and cross sections should exist to support interpretations.</i></p>		
<b>Mineralogy</b>	<p><i>Description of the minerals present in the ore, their frequency, size and other characteristics. Includes minor and gangue minerals where these will have an effect on the processing steps. Should indicate the variability of each important mineral within the deposit.</i></p>		
<b>Data compositing (aggregation) methods.</b>	<p><i>In reporting Exploration Results, weighted averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are usually material and should be stated. Where composite intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the</i></p>		



ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
	<p><i>procedure used for such compositing should be stated and some typical examples of such composites should be shown in detail. The assumptions used for any reporting of metal equivalent values should be clearly stated.</i></p>		
<p><b><i>Relationship between mineralisation widths and intercept lengths</i></b></p>	<p><i>These relationships are particularly important in the reporting of Exploration Results. If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported. If it is not known and only the down-hole lengths are reported, there should be a clear statement to this effect (e.g. 'down-hole length, true width not known').</i></p>		
<p><b><i>Diagrams</i></b></p>	<p><i>Where possible, maps, plans 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></p>		
<p><b><i>Balanced reporting</i></b></p>	<p><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></p>		

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
<b><i>Other substantive exploration data</i></b>	<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; moisture content; potential deleterious or contaminating substances.</i>		
<b><i>Further work</i></b>	<i>The nature and scale of planned further work (e.g. additional exploration). Environmental descriptions of anticipated liabilities.</i>		

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
<b>Estimation and Reporting of Mineral Resources and Mineral Reserves</b>  <b>Criteria applicable to reporting groups as shown</b>			
<i>Database integrity</i>		<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. Data verification and/or validation procedures used.</i>	
<i>Geological interpretation</i>		<i>Description of geological model and inferences made from this model. Discussion of sufficiency of data density to assure continuity of mineralisation and provide an adequate database for the estimation procedure used. Discussion of alternative interpretations and their potential impact on the estimation</i>	
<i>Estimation and modelling techniques</i>		<i>The nature and appropriateness of the estimation techniques applied and key assumptions, including treatment of extreme grade values, domaining, compositing (including by length and/or density), interpolation parameters, maximum distance of projection from data points, and the proportion of the estimate that is extrapolated. Interpolation means estimation which is supported by surrounding sample data. Extrapolation means estimation which extends beyond the spatial limits of the sample data. . The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data. The assumptions made regarding recovery of by-products and other minerals that will affect processing of the ore. In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed. Any assumptions behind modelling of selective mining units (e.g. non-linear kriging). The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.</i>  <i>Detailed description of the method used and the assumptions made to estimate</i>	

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
		<p><i>tonnages and grades (section, polygon, inverse distance, geostatistical, or other method). Description of how the geological interpretation was used to control the resource estimates. Discussion of basis for using or not using grade cutting or capping. If a computer method was chosen, description of programmes and parameters used. Geostatistical methods are extremely varied and should be described in detail. The method chosen should be justified. The geostatistical parameters, including the variogram, and their compatibility with the geological interpretation should be discussed. Experience gained in applying geostatistics to similar deposits should be taken into account.</i></p> <p><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></p> <p><i>All metals (or other components) to be treated should be shown, even those rejected as waste. A statement that there are no other deleterious elements requiring removal should be included.</i></p>	
<p><b><i>Metal equivalents or other combined representation of multiple components</i></b></p>		<p><i>The following minimum information should accompany any report which includes reference to metal equivalents (or other component equivalents) in order to conform with these principles:</i></p> <ul style="list-style-type: none"> <li><i>• individual assays for all metals included in the metal equivalent calculation;</i></li> <li><i>• 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);</i></li> <li><i>• assumed metallurgical recoveries for all metals and the basis on which the assumed recoveries are derived (metallurgical test work, detailed mineralogy, similar deposits, etc.);</i></li> </ul>	



ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
		<ul style="list-style-type: none"> <li>• 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</li> <li>• the calculation formula.</li> </ul> <p>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.</p> <p>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.</p> <p>Overall metal recoveries are usually calculated from a mass balance based on the flowsheet. This should have been demonstrated by the testwork and shown to be relevant to the ore body under consideration and not just the sample treated.</p>	
<b>Cut-off grades or parameters</b>		The basis of the cut-off grades or quality parameters applied, including the basis, if appropriate, of equivalent metal formulae. The cut-off parameter may be economic value per block rather than grade.	
<b>Tonnage Factor/In-situ Bulk Density</b>		Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, the frequency of the measurements, the nature, size and representativeness of the samples.	
<b>Mining factors or assumptions</b>		The mining method proposed and its suitability for the style of mineralisation, including minimum mining dimensions and internal (or, if applicable, external) mining dilution. It may not always be possible to make detailed assumptions	The method and assumptions used to convert the Mineral Resource to a Mineral Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or detailed design). The choice of, the

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
		<p>regarding mining factors when estimating Mineral Resources. In order to demonstrate realistic prospects for eventual economic extraction, basic assumptions are necessary. Examples include access issues (shafts, declines etc.), geotechnical parameters (pit slopes, stope dimensions etc.), infrastructure requirements and estimated mining costs. All assumptions should be clearly stated.</p>	<p>nature and the appropriateness of the selected mining methods and other mining parameters including associated design issues such as pre-strip, access, etc. The assumptions made regarding geotechnical parameters and hydrogeological regime (e.g. pit slopes, stope sizes, dewatering methods and requirements, etc.), grade control and pre-production drilling. The major assumptions made and Mineral Resource model used for pit optimisation (if appropriate). The mining dilution factors, mining recovery factors, and minimum mining widths used and the infrastructure requirements of the selected mining methods. Where available, the historic reliability of the performance parameters.</p>
<p><b>Metallurgical factors or assumptions</b></p>		<p>The metallurgical process proposed and the appropriateness of that process to the style of mineralisation. It may not always be possible to make detailed assumptions regarding metallurgical treatment processes when reporting Mineral Resources. In order to demonstrate realistic prospects for eventual economic extraction, basic assumptions are necessary. Examples</p>	<p>The flowsheet proposed and the appropriateness of these processes to the mineralisation of the deposit. Whether the process is well-tested technology used on minerals of this type before or novel in nature. The nature, amount and representativeness of test work undertaken. The existence of any bulk sample or pilot scale test work and the degree to which such</p>

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
		<p><i>include the extent of metallurgical test work, recovery factors, allowances for by-product credits or deleterious elements, infrastructure requirements and estimated processing costs. All assumptions should be clearly stated. A full definition of the minerals or at least the assays is required to ensure that the process is suitable and that any contaminants / pollutants / possible by-products are recognised and suitable process steps included in the flowsheet.</i></p>	<p><i>samples and test results are representative of the ore body as a whole. The metallurgical recovery and upgrading factors used and how these relate to those determined in the test work. Any assumptions or allowances made for deleterious elements or variability in the ore feed to the process should be stated. The environmental and health and safety risks associated with each section of the flowsheet should be noted with those sections dealing with hazardous materials or operations covered in more detail. The tonnages and grades reported for Mineral Reserves should state clearly whether these are in respect of material delivered to the plant or after recovery. Comment on suitability of existing plant and equipment for use in the proposed process.</i></p>
<p><b>Mineral Resource estimate for conversion to Mineral Reserves</b></p>			<p><i>Description of the Mineral Resource estimate used as a basis for the conversion to a Mineral Reserve. Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Mineral Reserves.</i></p>

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
<b>Cost and revenue factors.</b>			<i>The derivation of assumptions made, regarding projected capital and operating costs. The assumptions made regarding revenue including head grade, metal or commodity prices, exchange rates, transportation and treatment charges, penalties, etc. The allowances made for royalties payable, both Government and private. Basic cash flow inputs for a stated period.</i>
<b>Market assessment.</b>			<i>The demand, supply and stock situation for the particular mineral, consumption trends and factors likely to affect supply and demand into the future. A customer and competitor analysis along with the identification of likely market windows for the product. Price and volume forecasts and the basis for these forecasts. The market assessment can indicate that minerals are not saleable in the proportions in which they are to be produced, and as a result the reserves estimates may need to be adjusted.</i>



ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
<b>Others.</b>		<i>Any potential impediments to mining such as land access, environmental or legal permitting. Location plans of mineral rights and titles.</i>	<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 Mineral Reserves. The status of titles and approvals critical to the viability of the project, such as mining leases, discharge permits, government and statutory approvals. Environmental descriptions of anticipated liabilities. Location plans of mineral rights and titles.</i>
<b>Classification</b>		<i>The basis for the classification of the Mineral Resources into varying confidence categories. 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. Whether the result appropriately reflects the Competent Person's view of the deposit.</i>	<i>The basis for the classification of the Mineral Reserves into varying confidence categories. Whether the result appropriately reflects the Competent Person's view of the deposit. The proportion of Probable Mineral Reserves which have been derived from Measured Mineral Resources (if any).</i>
<b>Audits or reviews.</b>		<i>The results of any audits or reviews of Mineral Resource estimates.</i>	<i>The results of any audits or reviews of Mineral Reserve estimates.</i>

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
<p><i>Discussion of relative accuracy/confidence</i></p>			<p><i>Where appropriate a statement of the relative accuracy and/or confidence in the Mineral 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. 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. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available. . Discussion of any tests of the production sequence via conditional simulation on the uncertainty of tonnage and grade of production increments.</i></p>

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
<p><b>Estimation and Reporting of Diamond Mineralisation</b></p> <p>Criteria from the foregoing sections apply together with those applicable to reporting groups as shown</p>			
<b>Exploration</b>	<i>Reports of collection and analysis of indicator minerals such as chemically/physically distinctive garnet, ilmenite, chrome spinel and chrome diopside which distinguish them as being sourced from potentially diamondiferous rocks should be prepared by a suitably qualified and accredited laboratory.</i>		
<b>Sample collection</b>	<i>Type of sample and purpose, e.g. core drilling for micro-diamond sampling and geology, large diameter drilling to establish stones per unit of volume and grade or bulk samples to establish average diamond value. Sample size, distribution and representativity.</i>		
<b>Sample treatment</b>	<i>Type of facility, treatment rate, and accreditation. Sample size reduction. Bottom screen size, top screen size and re-crush. Processes (dense media separation, grease, X-ray, hand-sorting etc. Process efficiency, tailings auditing and granulometry analysis. Sample head feed and tailings particle granulometry. Percent concentrate and undersize per sample. Sample density determination. Laboratory used and type of process for micro diamond recovery and accreditation i.e. caustic fusion or acidisation.</i>		
<b>Sample Grade</b>	<i>Sample grade in this section of Table 1 is used in the context of carats per units of mass, area or volume. 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 placer deposits, sample grades quoted in carats per square metre or carats per cubic metre are acceptable. In the marine placer environment reserve grades are reconciled on a per square meter basis. Volume estimates are inherently inaccurate and are used primarily to assist with estimating mining rates and costs.</i>		
<b>Sample characteristics</b>	<i>Micro and macro diamond sample results per facies. Bulk sampling results, global sample grade per facies and local block estimates in the case of Indicated resources. Spatial structure analysis and grade distribution. Stone size and number distribution. Affect on sample grade with change in bottom cut-off screen size. Adjustments made to size distribution for sample plant performance and performance on a commercial scale (reserve modifying factors). 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.</i>		

ASSESSMENT CRITERIA	EXPLORATION RESULTS	MINERAL RESOURCES	MINERAL RESERVES
<b>Grade estimation</b>	<i>Grade estimation (including geostatistical) and interpolation techniques applied. Adjustments made to size distribution for sample plant performance and performance on a commercial scale.</i>		
<b>Value estimation</b>	<i>Accreditation of Valuer. Details of parcel valued, number of stones, carats and size distribution using a standard progression of sieve sizes for each identified facies. Average valuation per sieve size. Estimation of value with size. Assessment of diamond breakage. Average \$/carat and \$/tonne value with change in bottom cut-off. Minimum parcel size for representative valuation. Has a strict bottom cut-off been applied or does the modelled value include incidental diamonds below the bottom cut-off?</i>		
<b>Security and integrity</b>	<i>Accredited process audit. Whether samples were sealed after excavation. Valuer location, escort, delivery, cleaning losses, reconciliation with recorded sample carats and number of stones. Core samples washed prior to treatment for micro diamonds. Audit samples treated at alternative facility. Results of tailings checks. Recovery of tracer monitors used in sampling and treatment. Geophysical (logged) density and particle density. Cross validation of sample weights, wet and dry, with borehole volume and density, moisture factor.</i>		
<b>Classification</b>	<i>Consider the elements of uncertainty in estimates and develop classification accordingly. Key elements to consider for resource classification are the geology and estimates of volume, grade, average diamond value and density.</i>		



## APPENDIX 1 GENERIC TERMS AND EQUIVALENTS

Throughout the Standard, 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, the generic terms are listed 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>
Mining	Quarrying	All activities related to extraction of metals, minerals and gemstones from the Earth whether surface or underground, and by any method (e.g. quarries, open cast, open cut, solution mining, dredging etc.)
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.
Metallurgy	Processing, Mineral 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	Mineral Deposit, Mineralised zone, Mineralised material	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.
Mineral Reserves	Ore Reserves	'Mineral' is preferred under the PERC Reporting Standard but 'ore' is in common use and is generally acceptable. 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.
Diamond	Gemstones	Diamonds and other gemstones with the same characteristics.

## APPENDIX 2 RULES OF CONDUCT AND GUIDELINES

*The following Rules of Conduct apply to Competent Persons engaged in the practice of preparing or contributing to public reports that include statements of Exploration Results, Mineral Resources or Mineral Reserves. These Rules are in addition to the Professional Codes of Ethics that may apply due to the Competent Person's membership of a recognised professional body. The Rules of Conduct are listed under various areas of responsibility, highlighted in bold text.*

*Enforcement of these rules is not within the scope of PERC, but should be the responsibility of the relevant financial regulatory organisation or stock exchange.*

### **The Public and Society**

**Competent Persons must discharge their duties with fidelity to the public, and at all times in their professional or employed capacities carry out their work with integrity and professional responsibility. In particular:**

- Recognise at all times, that the responsibility of Competent Persons towards the Public overrides all other specific responsibilities including responsibility to professional, sectional, or private interests or to other Competent Persons.
- *Ensure that public comments on geological, engineering and metallurgical and related matters are made with care and accuracy, without unsubstantiated, exaggerated, or premature statements; they should be made clearly and concisely.*
- *Base Public Reports on Mineral Resources and Mineral Reserves on adequately validated data, sound and relevant estimation techniques, and unbiased judgement.*
- Note that when required to do so, Competent Persons should give evidence, express opinions or make statements in an objective and truthful manner on the basis of *adequate knowledge and understanding.*
- *Recognise that where required to do so, Competent Persons should be prepared to disclose details of qualifications, professional affiliations and relevant experience in all public reports. CPD (Continuous Professional Development) records may be useful as a way of demonstrating relevant and current experience.*

### **The Profession, Employers and Clients**

**Competent Persons must uphold the honour, integrity, reputation and dignity of their profession and maintain the highest level of conduct in all professional matters. In particular they should:**

- *Act with due skill, care and diligence at all times in conducting their activities.*
- *Perform work only in their area of competence, except where training under the supervision of other Competent Persons in a new area of expertise.*
- *Never knowingly mislead or deceive others, falsify or fabricate data.*
- *Respect and safeguard confidential information.*
- *Acknowledge and avoid wherever possible both real and perceived conflicts of interest.*

- *Distinguish between fact and opinion so that it is clearly evident what is description or interpretation of fact and what is professional judgement. Competent/Qualified Persons may give a considered professional opinion based on facts, experience, interpretation, extrapolation or a combination of these.*
- *Ensure that scientific and technological contributions are thorough, accurate and unbiased in design, implementation and presentation.*
- *Ensure that sound and relevant estimation techniques, adequately validated data and unbiased judgement are applied to the documentation upon which public reports on Exploration Results, Mineral Resources and Mineral Reserves are based.*
- *Maintain documentation of all aspects of work-product in a format that facilitates review and auditing.*
- *Comply with all laws and regulations relating to the mineral industries and rules, regulations and practices as established and promulgated by the relevant regulatory authorities.*
- *Use their best endeavours to ensure that their employer or client complies with the rules and regulations and practices of the relevant regulatory authorities.*

### **Professional Bodies, Colleagues and Associates**

**Competent Persons must at all times conform to the rules of the professional bodies to which they belong and respect and acknowledge the contributions of colleagues and other experts in enabling them to conduct their work. They should:**

- *Accept responsibility for their own errors.*
- *Demonstrate a willingness to be judged by their professional peers.*
- *Agree to be bound by the disciplinary code of the professional body to which they are affiliated.*
- *Encourage others to accept the same responsibilities, to join a recognised professional body and to be bound by these Rules of Conduct.*

### **The Environment, Health and Safety**

**In performing their work, Competent Persons should strive to protect the natural environment and ensure that the consequences of their work do not adversely affect the safety, health and welfare of themselves, colleagues and members of the Public.**

- *Ensure that consideration of the modifying factors used to determine Mineral Reserves fully recognises the need to provide a safe working environment.*
- *Ensure that Mineral Reserve estimates acknowledge the likely environmental impact of development and ensure that appropriate allowances are made for mitigation and remediation.*

## APPENDIX 3 HISTORICAL NOTES

*In 1991, the Council of the Institute of Mining and Metallurgy (IMM, now part of the Institute of Materials, Minerals and Mining, IoM3) approved definitions for resources that appeared in a slightly modified form in the London Stock Exchange Listing Rules.*

*A committee (now known as CRIRSCO) of the Council of Mining and Metallurgical Institutions ('CMMI') was established in 1994 comprising representatives from mining and metallurgical institutions from the United States (SME), Australia (AusIMM/AIG), Canada (CIM), the United Kingdom (IMM) and South Africa (SAIMM). This committee worked towards the creation of a set of standard international definitions for the public reporting of Exploration Results, Mineral Resources and Mineral Reserves, modelled on the existing (1989) JORC Code (the Australasian Code for Reporting of Mineral Resources and Ore Reserves) and reached provisional agreement on standard reporting definitions in 1997 (the Denver Accord). This was followed in 1999, in Geneva, 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 consequence of the CMMI initiative, significant developments have taken place towards producing consistent reporting standards for Mineral Resources and Mineral Reserves. These include the release of updated versions of the JORC Code in Australia in 1996 and 1999, followed by publication of similar Codes and Guidelines by the professional bodies in South Africa, the USA, Canada, UK, Ireland and Europe.*

*In July 2006, the former CMMI Committee, now the Committee for Mineral Reserves International Reporting Standards, or CRIRSCO, published an International Reporting Template which integrates the minimum standards being adopted in national reporting standards and codes worldwide with recommendations and interpretive guidelines for the Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves. The Template is non binding and does not account for local regulatory reporting requirements. Thus, where national reporting is concerned, national reporting standards and codes such as the PERC Standard take precedence. The CRIRSCO Template is available at [www.crirSCO.com](http://www.crirSCO.com).*

*PERC was set up in 2006 to replace the former IMM Reserves Committee, with broader geographic scope, and in 2012 was registered in Brussels as a not-for-profit association (asbl). The PERC Code was first published in 2008, now updated and reissued as the PERC Standard, draws from and is consistent with the CRIRSCO International Reporting Template and the national Codes and Standards from which it is derived.*

*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, Chile, Peru, and the Philippines, as well as Europe. The core definitions in this edition of the PERC Standard are identical to the international definitions agreed by CRIRSCO in 2012.*



## APPENDIX 4 COMPETENT PERSON'S CONSENT STATEMENT

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 Mineral Reserves is based on information compiled by (insert name of Competent Person), who is a professional (Member or Fellow with 'Chartered' or 'European Geologist' or 'European Engineer' status) of (insert name of professional institution) which is included in the current list of recognised institutions or a member institution of the European Federation of Geologists, or an institution elsewhere of equivalent status (as confirmed by an adjudication by the PERC Accreditation Sub-committee on xx/xx/xxxx) ." 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 Mineral Reserves, is based on information compiled by (insert name of Competent Person), who is a professional (Member or Fellow with 'Chartered' or 'European Geologist' or 'European Engineer' Status) of (insert name of professional institution) which is included in the current list of recognised institutions or a member institution of the European Federation of Geologists, or an institution elsewhere of equivalent status (as confirmed by an adjudication by the PERC Accreditation Sub-committee on xx/xx/xxxx)."*

and

- 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 2011 Edition of the 'Pan-European Standard for Reporting of Exploration Results, Mineral Resources and 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"*.

Alternatively, the following prototype form may be used:-



**PROTOTYPE COMPETENT PERSON'S CONSENT STATEMENT**

[Letterhead of Competent Person or Competent Person's employer]

**Competent Person's Consent Statement**

**Pursuant to the requirements of clause 7 of the PERC Standard**

**[report name]**

.....for

*(insert name or heading of report to be publicly released) ("Report")*

**[company]**.....

*(insert name of company releasing the Report and the deposit to which the report refers)* If there is insufficient space, complete the following sheet and sign it in the same manner as this original sheet.

.....  
Effective date of report

I, ..... confirm that:  
*(insert full name)*

- I have read and understood the requirements of the PERC Standard for Reporting of Exploration Results, Mineral Resources and Mineral Reserves ("2011 PERC Standard").
- I am a Competent Person as defined by the PERC Standard, having at least five years' relevant experience in relation to the style of mineralisation and type of deposit described in the Report, and to the activity for which I am accepting responsibility.
- I am a professional Member or otherwise registered professional, with required status (CEng, CGeol, CSci, EurGeol, Eurlng) of
- .....
- ..... being an institution which is included in the current list of recognised professional organisations or a member institution of the European Federation of Geologists, or an organisation elsewhere included in the RPO list in Appendix 5 of the PERC Standard or as subsequently updated
- *I have reviewed the Report to which this Consent Statement applies.*
- I am a full time employee of ..... *(insert company name)* OR I am a consultant working for ..... *(insert name of company)* and have been engaged by ..... *(insert name of company)* to prepare the Report for



..... *(insert deposit name)* for the period  
ended ..... *(insert effective date of resource/reserve statement)*.

- There is no other direct or indirect financial relationship between myself and the Company OR There is a direct or indirect financial relationship between myself and the Company as described here:

.....  
I verify that the Report is based on, and fairly and accurately reflects in the form and context in which it appears, the information in my supporting documentation relating to Exploration Results, Mineral Resources and/or Mineral Reserves *(select as appropriate)*.

I consent to the release of the Report and this Consent Statement by the directors of:

.....  
*(name of reporting company)*

Signature of Competent Person:

Date:

Professional Membership:

Membership Number:

*(Organisation)*

Additional Deposits covered by the Report for which the Competent Person signing this form is accepting responsibility:

.....  
.....

Additional Reports related to the deposit for which the Competent Person signing this form is accepting responsibility:

.....  
.....

Signature of Competent Person:

Date:

Professional Membership:

Membership Number:

*(Organisation)*

## APPENDIX 5 RECOGNISED PROFESSIONAL ORGANISATIONS (RPOS)

This is a list of professional organisations (RPOs, or Recognised Professional Organisations) and required membership levels for the purpose of the definition of a Competent Person in the PERC Standard (paragraph 10).

To be recognised as an RPO, an organisation must satisfy the following criteria:

- 1 be a self-regulatory organisation covering professionals in the mining and/or exploration industry;
- 2 admit members primarily on the basis of their academic qualifications and professional experience;
- 3 require compliance with the professional standards of competence and ethics established by the organisation anywhere in the World (not just within the home jurisdiction of the organisation); and
- 4 have disciplinary powers, including the power to suspend or expel a member for breaches of professional standards of competence or ethics anywhere in the World.

The minimum membership classes required are consistent with those in other CRIRSCO codes and have been set at a level where the membership class is based on a system of peer scrutiny, including submission of documentation demonstrating experience and expertise and normally a professional interview, or where there is no interview PERC would need to be satisfied that the system of peer scrutiny is sufficiently robust.

Organisations wishing to be considered as RPOs and added to the list below should write to the PERC Secretary with full justification and documentary evidence that they meet the criteria outlined above.

Organisations not listed below may nonetheless be considered as RPOs provided that they meet the criteria above, but a Competent Person relying upon membership of such an unlisted organisation may be challenged and required to provide the necessary evidence to justify their acceptance.

EUROPEAN RPOS RECOGNISED BY PERC, AND MEMBERSHIP LEVELS REQUIRED	
Organisation	Minimum membership class required
The Institute of Materials Minerals and Mining (IOM3)	'Member' (MIMMM) or 'Fellow' (FIMMM)
National Associations which constitute the European Federation of Geologists (EFG)	'European Geologist' (EurGeol)
The Institute of Geologists of Ireland	'Professional Geologist' (PGeo)
The Geological Society of London	'Chartered Geologist' (CGeol) or 'Chartered Scientist' (CSci)

RPOS OUTSIDE EUROPE	
Organisation	Minimum membership class required
OERN (Russia)	'Expert'

American Institute of Professional Geologists	(AIPG) Certified Professional Geologist
Mining and Metallurgical Society of America (MMSA)	Qualified Professional
Australasian Institute of Mining and Metallurgy (AusIMM)	Fellow or Member
Australian Institute of Geoscientists (AIG)	Fellow or Member
South African Institute of Mining and Metallurgy (SAIMM)	Fellow
South African Council for Natural Scientific Professions Professional Natural Scientist (SACNASP)	Professional Natural Scientist
A self-regulatory organization of engineers, geoscientists or both engineers and geoscientists that is given authority or recognition by statute in a jurisdiction of Canada	Professional Geoscientist (P.Geo.), Professional Geologist (P.Geol), Professional Geophysicist (P.Geoph) or Professional Engineer (P.Eng)
Chilean Comision Minera (ChCM)	Current registration as a Competent Qualified Person in the relevant subject area
Other organisations within Europe or elsewhere which have been defined as acceptable by the European Securities and Markets Authority regulations for minerals companies paragraph 133.i) a) i) 2). These may include appropriate recognised professional associations, institutions or bodies relevant to the activity being undertaken, with enforceable rules of conduct.	Any person who is professionally qualified and a member or registrant in good standing of such professional association, institution or body, who is subject to the enforceable rules of conduct, and whose membership status is based on rigorous peer scrutiny including submission of documentary evidence of experience and competence and an examination (oral or written).