

THE CBRR GUIDE FOR REPORTING EXPLORATION RESULTS, MINERAL RESOURCES, AND MINERAL RESERVES

*Prepared by Comissão Brasileira de Recursos e
Reservas – CBRR*

2016 EDITION

FOREWORD

1. The Brazilian Commission for Resources and Reserves (“CBRR” – Comissão Brasileira de Recursos e Reservas) has been established in 2015 conceived by the initiative from three of the most important and representative associations within the Brazilian mineral sector: *Associação Brasileira de Empresas de Pesquisa Mineral* (“ABPM” – *Brazilian Association of Mineral Exploration Companies*), *Agência Brasileira de Desenvolvimento Tecnológico da Indústria Mineral* (“ADIMB” – *Brazilian Agency for Mineral Technology, Research and Development*) and *Instituto Brasileiro de Mineração* (“IBRAM” – *Brazilian Mining Institute*). It is estimated that via its three founding members and its associates, CBRR represents over 90% of Brazilian mining GDP encompassing from early stage to global multinational mining companies.

CBRR is constituted as a private non-profit organization focusing on establishing, promoting and managing efforts to promote and develop the Brazilian mineral sector. Initiatives include: best global engineering and geology practices, exploration, mineral resources and reserves reporting guidelines according to CRIRSCO standards, management of the certification process and database for registration of Qualified Professionals in Brazil. The CBRR registers professionals, and as part of the registration process, determines practice areas of qualification. For registered professionals in those areas the term “Registered Qualified Professional” is used.

The “CBRR Guide” outlines and recommends minimum standards and guidelines for Public Reporting in Brazil of Exploration Results, Mineral Resources and Mineral Reserves.

On May 5th 2015, CBRR signed a Memorandum of Understanding with the Committee for Mineral Reserves International Reporting Standards (“CRIRSCO”) establishing the baseline procedure for CBRR’s formal acceptance into CRIRSCO, scheduled to occur over its annual meeting held in Brasilia, Brazil in December 2015.

Since 1994, the Committee for Mineral Reserves International Reporting Standards (“CRIRSCO”) has worked to create a set of standard international definitions for reporting of Mineral Resources and Mineral Reserves.

CRIRSCO was initially a committee of the Council of Mining and Metallurgical Institutions (“CMMI”). In 2002, CMMI was disbanded, but CRIRSCO remained as a separate entity and now has a direct relationship and support of the International Council on Mining and Metals (“ICMM”). CRIRSCO currently has 8 (eight) member countries or regions via its National Reporting Organizations (NROs): Australasia (JORC), Canada (CIM), Chile (National Committee), European Union (PERC), Mongolia (MRC), Russia (NAEN), South Africa (SAMCODES) and United States (SME). Brazil, via CBRR, is the newest official candidate for inclusion in 2015.

As a result of the CRIRSCO/ CMMI initiative, considerable progress has been made towards widespread adoption of consistent reporting standards throughout the world.

In this edition of the “CBRR Guide” terms are aligned to CRIRSCO Standard Definitions as revised in November 2013.

CONTENTS

INTRODUCTION	3
SCOPE	4
Competence and Responsibility	6
Reporting Terminology	8
Reporting General	9
Reporting of Exploration Results	10
Reporting of Mineral Resources	12
Reporting of Mineral Reserves	16
Technical Studies	19
Commodity Pricing and Marketing	21
Permitting and Legal Requirements	22
Environmental, Social and Health and Safety Considerations	23
OTHER DECLARATIONS	24
<i>TABLE 1</i>	28
<i>TABLE 2</i>	49
APPENDIX 1: Generic Terms and Equivalents	51
APPENDIX 2: Code of Ethics	53
APPENDIX 3: Recognized Professional Organizations (RPOs)	54

INTRODUCTION

2. The CBRR Guide to Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves follows the International Reporting Template for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves published by the Committee for Mineral Reserves International Reporting Standards (CRIRSCO) with best practice guidelines and recommendations for the Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves.

Definitions in this edition of the CBRR Guide for Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves are identical or are not materially different from those used in the countries represented on the CRIRSCO.

In this guide, important terms and their definitions are highlighted in **bold** in the text. The defined terms (when mentioned in other clauses) are underlined. The guidelines follow the respective Guide clauses and are in normal text. The *italicized text* aims to provide assistance and guidance for readers in interpreting the application of the clauses in the CBRR Guide. Italics are also used in "Appendix 1 – General terms and Equivalent ", and "Table 1 - Check List of Assessment and Declaration Criteria" to clarify that they are also part of the guidelines for application of the Guide.

Appendix 1 contains a table of general terms and their equivalents in order to avoid unnecessary duplication or ambiguity in the text.

Appendix 2 presents the principles of the Code of Ethics of the CBRR.

Appendix 3 presents the list of reciprocity between the "Recognized Professional Organizations".

It is recognized that subsequent revisions of this guide may be required. Constructive suggestions from the users of this guide can be sent to: contato@cbrr.org.br

SCOPE

3. The main principles governing the operation and application of the CBRR Guide are Transparency, Materiality and Competence.

- Transparency requires that the reader of a Public Report is provided with sufficient information, the presentation of which is clear and unambiguous, so as to understand the report and not be misled by this information or by omission of material information that is known to the Qualified Professional.
- Materiality requires that a Public Report contains all the relevant information that investors and their professional advisers would reasonably require, and reasonably expect to find in the report, for the purpose of making a reasoned and balanced judgment regarding the Exploration Results, Mineral Resources or Mineral Reserves being reported. Where relevant information is not supplied, an explanation must be provided to justify its exclusion.
- Competence requires that the Public Report be based on work that is the responsibility of suitably qualified and experienced professionals who are subject to an enforceable professional code of ethics (the Qualified Professional).

4. **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.**

The Guide indicates the required minimum standard for Public Reporting and is recommended as a minimum standard for other reporting. Entities are encouraged to provide information in their Public Reports, which is as comprehensive as possible.

The Guide applies to documents that include but are not limited to entity annual reports, quarterly reports and other reports to regulatory authorities, or as required by law. The Guide applies to other publicly released entity information in the form of postings on entity web sites, press releases and briefings for shareholders, stockbrokers and investment analysts. The Guide also applies to any reports that have been prepared for the purposes described in Clause 4, such as environmental statements; Information Memoranda; Expert Reports, and technical papers referring to Exploration Results, Mineral Resources or Mineral Reserves. Such reports may also be prepared for the purpose of satisfying regulatory requirements.

For entities issuing concise or similar 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 it is a summary, and a reference attached giving the source and location of the Guide-compliant Public Reports or Public Reporting on which the summary is based.

It is recognized that entities can be required to issue reports into more than one regulatory jurisdiction, with compliance standards that may differ from this Guide. It is recommended that such reports include a statement alerting the reader to this situation.

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

It is recognized that situations may arise where documentation prepared by Qualified Professionals (refer to Clauses 10 and 21) for internal entity or similar non-public purposes does not comply with the Guide. In such situations it is recommended that the document include a prominent statement to this effect. This will make it less likely that non-compliant documentation will be used to compile Public Reports, since the Guide requires Public Reports to fairly reflect Exploration Results, Mineral Resource and/or Mineral Reserve estimates, and supporting documentation, prepared by a Qualified Professional.

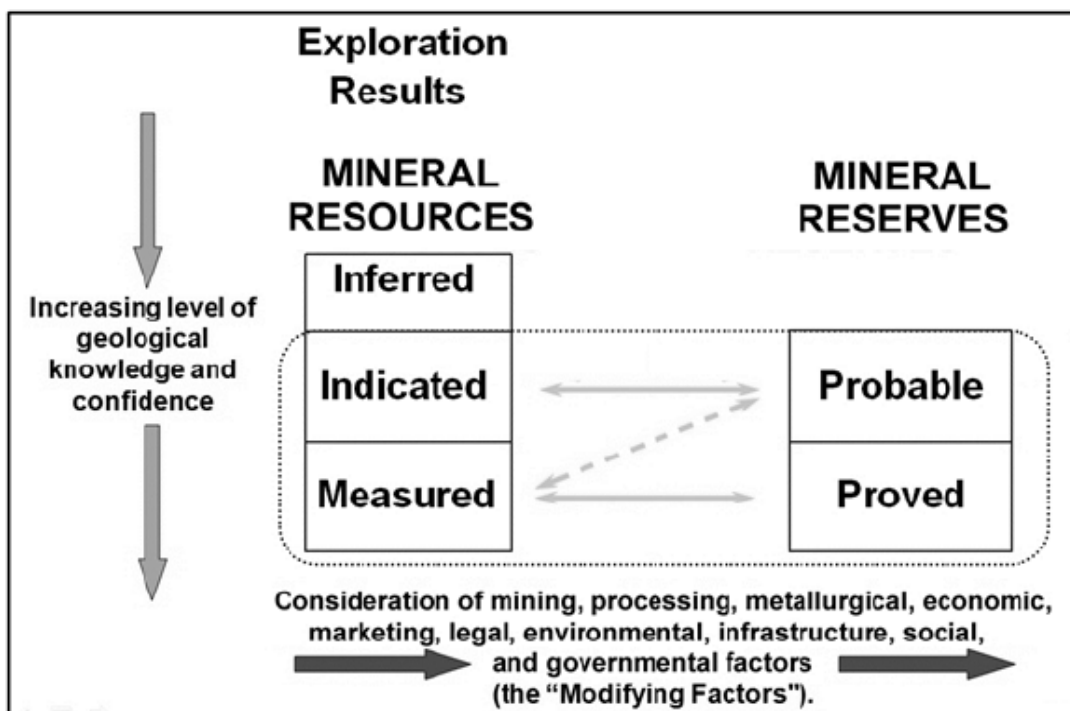
While every effort has been made within the Guide to cover most situations likely to be encountered in Public Reporting, there may be occasions when doubt exists as to the appropriate form of disclosure. On such occasions, users of the Guide and those compiling reports to comply with the Guide should 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 judgment 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.

5. The Guide is applicable to all solid minerals, including diamonds, other gemstones, industrial minerals, stone and aggregates, and coal, for which Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves is required by the relevant regulatory.

6. The CBRR Guide Standard Definitions should be considered in conjunction with Figure 1.

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



COMPETENCE AND RESPONSIBILITY

7. A Public Report concerning an entity's Exploration Results, Mineral Resources and/or Mineral Reserves is the responsibility of the entity acting through its Board of Directors. Any such report must be based on, and fairly reflect the information and supporting documentation prepared by a Qualified Professional.

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

9. An entity issuing a Public Report shall disclose the name(s) of the Qualified Professional(s), their qualifications, professional and corporate affiliations and relevant experience. The report shall be issued with the written consent of the Qualified Professional as to the form and context in which it appears.

10. A Qualified Professional is a mineral industry professional registered with the Brazilian Commission of Resources and Reserves (CBRR) or a member of a Recognized Professional Organization (RPO), presented in the list available in Appendix 3. The CBRR and the RPOs have enforceable disciplinary processes, including the powers to suspend or expel members.

A Qualified Professional registered with the CBRR must have at least 10 (ten) years of professional experience and a minimum of 5 (five) years of relevant experience in the style of mineralization and type of deposit under consideration and in the activity which that person is undertaking, including at least 3 (three) years in a Position of Responsibility.

If the Qualified Professional is preparing a report on Exploration Results, the relevant experience must be in exploration. If the Qualified Professional 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 Qualified Professional 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 key qualifier in the definition of a Qualified Professional 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 mineralization, experience in a high-nugget, vein-type mineralization such as tin, uranium etc. will probably be relevant, whereas experience in massive base metal deposits may not be. As a second example, to qualify as a Qualified Professional 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 mineralization would be needed. This is due to the characteristics of gold in alluvial systems, the particle sizing of the host sediment, and the low grades involved. Experience with placer deposits containing minerals other than gold may not necessarily provide appropriate relevant experience.

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

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

The term 'Position of Responsibility' means that the individual was depended on for significant participation, management and decision making relevant to their respective area of technical competency. Position of responsibility does not necessarily imply a managerial, hierarchical position or corporate interest. Managerial, hierarchical positions or corporate interest cannot be automatically recognized as 'Position of Responsibility'.

As a general guide, persons being called upon to act as Qualified Professionals 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 Qualified Professional.

Both the Declaration and the documentation must be well organized and archived in such a way that the competence is clearly demonstrated, and any future reviews (for example, internal or external audits) can be carried out efficiently.

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 a clear division of responsibility within a team, each Qualified Professional and his or her contribution should be identified, and responsibility accepted for that particular contribution. If only one Qualified Professional signs the Mineral Resource or Mineral Reserve documentation, that person is responsible and accountable for the whole of the documentation under the Guide. It is important in this situation that the Qualified Professional 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.

Complaints made regarding the work of Qualified Professional registered will be treated in accordance with the ethics code and disciplinary procedures of the CBRR.

REPORTING TERMINOLOGY

11. 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.

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

Measured Mineral Resources may convert to either Proved Mineral Reserves or Probable Mineral Reserves. The Qualified Professional may convert Measured Mineral Resources to Probable Mineral Reserves because of uncertainties associated with some or all of the Modifying Factors which are taken into account in the conversion from Mineral Resources to 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, in this instance, imply a reduction in the level of geological knowledge or confidence. In such a situation these Modifying Factors should be fully explained. Refer also to the guidelines to Clauses 30 and 32 .

REPORTING GENERAL

12. Public Reports concerning an entity's Exploration Results, Mineral Resources and/or Mineral Reserves must include a description of the style and nature of mineralization.

13. An entity must disclose any relevant information concerning a mineral deposit that could materially influence the economic value of that deposit to the entity. An entity must promptly report any material changes in its Mineral Resources or Mineral Reserves.

14. Entities 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 shown. Entities are encouraged to provide information in their Public Reports, which is as comprehensive as possible. An entity's economic interest in the project must be declared.

15. Throughout the Guide, 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 1 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 are involved. Qualified Professionals would be expected to select and use the most appropriate terminology for the commodity or activity being reported.

16. Public reporting of tonnages and grades outside of the categories covered by the CBRR Guide (see Figure 1) is not allowed unless the situation is covered and in strict accordance with the requirements of clause 17.

Estimates of tonnage and content outside of the categories covered in Figure 1 of the CBRR Guide can be useful for an entity in their internal evaluation and decision processes, but their inclusion in public statements is not allowed.

REPORTING OF EXPLORATION RESULTS

17. 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 mineralization for which there has been insufficient exploration to estimate **Mineral Resources**.

It is recognized that it is common practice for an entity to comment on and discuss its exploration strategy in terms of target size and type. Any such information relating to exploration target size must not be expressed in a way that could be confused as an estimate of Mineral Resources or Mineral Reserves. Any statement referring to potential quantity and grade of the target must be expressed as ranges and must include a detailed explanation of the basis for the assumptions made and procedures used to estimate ranges of tonnage and grade or quality, and extent. There must also be a proximate statement that the potential quantity and grade is conceptual in nature, that there has been insufficient exploration to define a Mineral Resource, and that it is uncertain if further exploration will result in the determination of a Mineral Resource. The detailed explanation of the basis for the statement of a target must specifically discuss the geological setting and exploration strategy, exploration activity already completed and the presence of or lack of the following attributes:

- mineralized outcrops and assays,
- surface geochemical and physical sampling results,
- surface and subsurface geophysical survey results, and
- drill holes, test pits, and underground workings.

Proposed exploration activities designed to test the validity of an exploration target should be detailed and include the timeframe within which they are expected to be completed.

18. **Exploration Results include data and information generated by mineral exploration programs 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 to be made. Examples include discovery outcrops, single drill hole intercepts or the results of geophysical surveys.

It should be made clear in public reports that contain Mineral Exploration Results that it is inappropriate to use such information to derive estimates of tonnage and grade. It is recommended that such reports carry a continuing statement along the following lines:

The information provided in this report/ statement/ release constitutes Mineral Exploration Results as defined in the CBRR Guide, Clause 17.

It is inappropriate to use such information for deriving estimates of tonnage and grade, unless the disclosure:

a) *States with equal prominence that the potential quantity and grade is conceptual in nature, that there has been insufficient exploration to define a mineral resource and that it is uncertain if further exploration will result in the target being delineated as a mineral resource; and*

b) *States the basis on which the disclosed potential quantity and grade have been determined.*

19. If an Entity reports Exploration Results in relation to mineralization not classified as a Mineral Resource or Mineral Reserve, then estimates of tonnage and associated average grade must not be reported.

20. Public Reports of Exploration Results relating to mineralization not classified as a Mineral Resource or Mineral Reserve must contain sufficient information to allow a considered and balanced judgment of the significance of the results. Public Reports of Exploration Results must not be presented so as to unreasonably imply that potentially economic mineralization has been discovered.

Where assay and analytical results are reported, they should be reported using one of the following methods, selected as the most appropriate by the Qualified Professional:

- *either by listing all results, along with sample intervals (or size, in the case of bulk samples),*

or

- *by reporting weighted average grades of mineralized zones, indicating clearly how the grades were calculated.*

Clear diagrams and maps designed to represent the geological context should be included in the report. These should include, but not be limited to a plan view of material drill hole collar locations with geological features and appropriate sectional views including these geologic boundaries. If drill holes are not considered to be material by the Qualified Professional, this should be explained in the Public Report.

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 in the report is unacceptable.

REPORTING OF MINERAL RESOURCES

21. 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 term 'Mineral Resource' covers mineralization, 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.

The term 'reasonable prospects for eventual economic extraction' implies a judgment (albeit preliminary) by the Qualified Professional in respect of the technical and economic factors likely to influence the prospect of economic extraction, including the approximate mining parameters. In other words, a Mineral Resource is not an inventory of all mineralization drilled or sampled, regardless of cut-off grade, likely mining dimensions, location or continuity. It is a realistic inventory of mineralization 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, such as cutting or factoring grades, should be clearly stated and described in the Public Report.

Estimates of mineral resources may be declared after the reconciliation adjustment with production data ("call factors"). Such adjustments, if applied, should be clearly described the nature and impact of the adjustment.

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 mineralization, including some material that does not have reasonable prospects for eventual economic extraction. Such mineralization estimates would not be classified as Mineral Resources or Mineral Reserves according to the CBRR Guide.

22. 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.

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

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

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

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

23. 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.

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

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

24. 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.

Mineralization 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 Qualified Professional determining the Mineral Resource, that the tonnage and grade of the mineralization can be estimated to within close limits, and that any variation from the estimate would be unlikely to significantly affect potential economic viability.

This category requires a high level of confidence in, and understanding of, the geology and the controls of the mineral deposit.

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

25. The choice of the appropriate category of Mineral Resource depends upon the quantity, distribution and quality of data available and the level of confidence that attaches to those data. The appropriate Mineral Resource category must be determined by a Qualified Professional.

Mineral Resource classification is a matter for skilled judgment and Qualified Professionals should take into account those items in Table 1 which relate to confidence in Mineral Resource estimation.

In deciding between Measured Mineral Resources and Indicated Mineral Resources, Qualified Professionals may find it useful to consider, in addition to the phrases in the two definitions relating to geological and grade continuity in Clauses 23 and 24, the phrase in the guideline to the definition for Measured Mineral Resources: ‘...any variation from the estimate would be unlikely to significantly affect potential economic viability’.

In deciding between Indicated Mineral Resources and Inferred Mineral Resources, Qualified Professionals may wish to take into account, in addition to the phrases in the two definitions in Clauses 22 and 23 relating to geological and grade continuity, the guideline to the definition for Indicated Mineral Resources: ‘Confidence in the estimate is sufficient to allow the application of technical and economic parameters and to enable an evaluation of economic viability.’, which contrasts with the guideline to the definition for Inferred Mineral Resources: ‘Confidence in the estimate of Inferred Mineral Resources is usually not sufficient to allow the results of the application of technical and economic parameters to be used for detailed planning’ and ‘Caution should be exercised if this category is considered in technical and economic studies’.

The Qualified Professional should take into consideration issues of the style of mineralization, scale and cut-off grade when assessing geological and grade continuity.

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

In most situations, rounding to the second significant figure should be sufficient. For example 10,863,000 tonnes at 8.23 per cent should be stated as 11 million tonnes at 8.2 per cent. There will be occasions, however, where rounding to the first significant figure may be necessary in order to convey properly the uncertainties in estimation. This would usually be the case with Inferred Mineral Resources.

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

Qualified Professionals are encouraged, where appropriate, to discuss the relative accuracy and/or confidence of the Mineral Resource estimates. The statement should specify whether it relates to global (whole of resource) or local estimates (a subset of the resource for which the accuracy and/or confidence might differ from the whole of the resource), 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).

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

28. In a Public Report of a Mineral Resource for a significant project for the first time, or when those estimates have materially changed from when they were last reported, a brief summary of the information in relevant sections of Table 1 must be provided or, if a particular criterion is not relevant or material, a disclosure that it is not relevant or material and a brief explanation of why this is the case must be provided.

The technical summary based on the criteria listed in Table 1 is recommended to be presented as an appendix to the public statement of Exploration Results, Mineral Resources and Mineral Reserves. 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; for example, poor sample recovery, poor repeatability of assay or laboratory results, limited information on bulk densities etc.

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

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

29. The words 'ore' and 'reserves' must not be used in stating Mineral Resource estimates (except in the context of common usage such as "iron ore" etc.) 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 entity 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

30. 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 and is properly defined by studies at Pre-Feasibility and Feasibility levels as appropriate including the application of the Modifying Factors.

These assessments demonstrate at the time of reporting that 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, in all situations where this 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 declared.

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

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

The term 'economically mineable' implies that extraction of the Mineral Reserve has been demonstrated to be viable under reasonable financial assumptions. What constitutes the term 'realistically assumed' will vary with the type of deposit, the level of study that has been carried out and the financial criteria of the individual entity. For this reason, there can be no fixed definition for the term 'economically mineable'. However, it is expected that entities 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 that is technically achievable 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 of such approvals or contracts. The Qualified Professional should consider the materiality of any unresolved matter that is dependent on a third party on which extraction is contingent.

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

It should be noted that the Guide does not imply that an economic operation should have Proved Mineral Reserves. Situations may arise where Probable Mineral Reserves alone may be sufficient to justify extraction, as for example with some alluvial tin, diamond or gold deposits. This is a matter for judgment by the Qualified Professional.

31. A Probable Mineral Reserve is the economically mineable part of an Indicated Mineral Resource 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 a decision on the development of the deposit.

32. 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 reserve estimate.

The style of mineralization or other factors could mean that Proved Mineral Reserves are not achievable in some deposits. Qualified Professionals should be aware of the consequences of declaring material of the highest confidence category before satisfying themselves that all of the relevant resource parameters and Modifying Factors have been established at a similarly high level of confidence.

33. 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 Qualified Professional.

The Guide 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 Guide 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 Mineral Resources to Mineral 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 categorizing a Mineral Resource as Measured.

*Refer also to the guidelines in Clause **Erro! Fonte de referência não encontrada.** regarding classification of Mineral Resources.*

34. Mineral Reserve estimates are not precise calculations. Reporting of tonnage and grade figures should reflect the relative uncertainty of the estimate by rounding off to appropriately significant figures. Refer also to Clause 26.

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

Qualified Professionals are encouraged, where appropriate, to 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 estimates (a subset of the reserve for which the accuracy and/or confidence might differ from the whole of the reserve), 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 and to the Guidelines for Clause 26).

35. Public Reports of Mineral Reserves must specify one or both of the categories of ‘Proved’ and ‘Probable’. Categories must not be reported as a combined Proved and Probable Mineral Reserve unless the relevant figures for each of the categories are also provided. Reports must not present metal or mineral content figures unless corresponding tonnage and grade figures are also given.

Public Reporting of tonnage and grade outside the categories covered by the Guide is not permitted.

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 significant changes to be understood by the reader.

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

or

‘The Measured and Indicated Mineral Resources are inclusive of those Mineral Resources modified to produce the Mineral Reserves.’

In the second case, if any Measured and Indicated Mineral Resources have not been modified 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 necessary to assist the reader of the report in making a judgment 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.

For reasons stated in the guidelines to Clause 35 and in this paragraph, the reported Mineral Reserve figures must not be added to the reported Mineral Resource figures. The resulting total is misleading and is capable of being misunderstood or of being misused to give a false impression of an entity’s prospects.

TECHNICAL STUDIES

37. 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.

Scoping Studies are commonly early economic evaluations of a project and may be based on a combination of directly gathered project data together with assumptions sourced from similar deposits or operations to the case envisaged. Scoping Studies are also commonly used internally by entities for comparative and planning purposes. Reporting the general results of a Scoping Study needs to be undertaken with care and should include appropriate cautionary statements to ensure there is no implication that Mineral Reserves have been established or that economic development is assured. In this regard it may be appropriate to indicate the Mineral Resource inputs to the Scoping Study and the processes applied. If the Scoping Study is partially or wholly supported by Inferred Mineral Resources, this must be clearly stated, and a cautionary statement must be included.

A Scoping Study must not be used as a basis for estimation of Mineral Reserves.

38. 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 Qualified Professional, 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.

A Pre-Feasibility Study will consider the application and description of all Modifying Factors to demonstrate economic viability of Measured and Indicated Mineral Resources to support declaration of a Mineral Reserve. Inferred Mineral Resources must be excluded from demonstration of economic viability in support of declaration of a Mineral Reserve. A Pre-Feasibility Study will identify the preferred mining, processing, and infrastructure requirements and capacities, but may not have finalized these matters. Assessments of environmental and socio-economic impacts and requirements will be well advanced. The Pre-Feasibility Study will highlight areas that require further refinement within the final study stage.

39. 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.

Feasibility Study is of a higher degree of accuracy than a Pre-feasibility Study and would normally contain mining, infrastructure, and process designs completed with sufficient rigor to serve as the basis for an investment decision or to support project financing. The Feasibility Study will contain the application and description of relevant criteria (as outlined in Tables 1 and 2) in a more detailed form or with more certainty than the Pre-feasibility Study, and will address detailed mining schedules, construction and production ramp up, and project execution plans.

Terms such as “Full, Final, Comprehensive, Bankable, Definitive” Feasibility Study are noted as being equivalent to a Feasibility Study.

The Guide does not require that a 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 determined that the mining project is technically and economically feasible, and that relevant Modifying Factors have been considered for such a conversion. However, there may be some projects for which the Qualified Professional determines that a Feasibility Study, instead of a Pre-Feasibility Study, is required before the Mineral Resources may be converted to Mineral Reserves due to uncertainties in the Modifying Factors.

The technical studies and their levels of detail and desired accuracy has been a subject of debate and of considerable difference of opinion within the community. Table 2 provides references to be used by the Qualified Professional in the preparation of Technical Studies.

COMMODITY PRICING AND MARKETING

40. Commodity prices and sales volume expectations used for the determination of Mineral Resources and Mineral Reserves should be based on forward-looking estimates reflecting management's reasonable and supportable short- and long-term expectations as supported by all available evidence, which may include consensus forecasts. The basis for the selected prices and sales volumes must be justified and supported by appropriate documentation. The Qualified Professional must ascertain that these prices and volumes are consistent with historical prices or with sales agreements and marketing determinations.

41. For current mining operations, the price and volume profile used for Mineral Resources and Mineral Reserve estimation can reflect current market conditions for short-term forecasts, while trending with time upward or downward toward the long term price and volume estimates based on management's expectations. For undeveloped Mineral Reserves, management should use their long-term price and volume expectations.

42. For commodities sold under existing contracts, Mineral Resources and Mineral Reserves should be determined based on contract terms. For Mineral Reserves whose production would extend beyond the quantities specified in existing contracts, reasonable and supportable assumptions should be made to determine the likelihood of contract renewal and prices applicable for the estimation and reporting of these Mineral Resources and Mineral Reserves.

43. To demonstrate the economic feasibility of a Mineral Reserve, the estimated prices, combined with other engineering parameters and Modifying Factors, must be applied to only Measured and Indicated Mineral Resources.

Mineral Reserves are estimated and published to supply information to investors concerning the value of the deposit and the risk which may be associated with its development. Mineral Reserves are used by management, in conjunction with Mineral Resources, for short-term, long-term and strategic planning. They play a critical role in accounting, including impairment testing, fair value accounting, calculation of depreciation, depletion and accumulated retirement obligation provision rates. To supply investors with information which is consistent with management's plans and financial reporting, commodity prices used for the determination of Mineral Reserves should be based on forward-looking estimates reflecting management's reasonable expectations as supported by all available evidence.

Most commodities, whether sold using publicly quoted prices (e.g., base metals and precious metals) or under long term contract (e.g., coal and iron ore), experience long-term price cycles. Price expectations should reflect current prices as well as long-term trends. Overly optimistic or pessimistic price expectations could result in significant over or underestimation of Mineral Reserves. It is the responsibility of management and the Qualified Professional to determine whether the prices used for Mineral Reserve estimation are reasonable and supportable, given all available information.

PERMITTING AND LEGAL REQUIREMENTS

44. For a mineral deposit to be considered a Mineral Reserve, it is required that legally enforceable mineral title sufficient to have access to the mineral rights for exploration, development and extraction, is controlled by the reporting entity at the time of determination.

45. There must be no known material obstacles to mining, such as those which could cause shut down of mines or processing plants, or failure to get permits or social license to operate. There must be a reasonable expectation by the Qualified Professional, often through reliance on legal and permitting experts that all permits, ancillary rights (including water rights) and authorizations required for mining, and to the extent applicable, processing and marketing, can be obtained in a timely fashion, and maintained for ongoing operations.

Information that materially increases or decreases the risk that the necessary legal rights or permits will be obtained must be publicly disclosed. It is recognized that the legal and permitting environment may change over time and that such changes could have an impact on Mineral Reserve estimation. If it is determined that obstacles arise or are eliminated, the Mineral Reserve estimates must be adjusted accordingly.

Information relating to this review of legal and permitting issues must be documented either in full or by reference. The information may remain confidential to the reporting entity. However, when required, it may be released to regulators or auditors on a confidential basis.

ENVIRONMENTAL, SOCIAL AND HEALTH AND SAFETY CONSIDERATIONS

46. Public reports should discuss environmental, social (sustainability), and health and safety impacts that are expected during development, operation and after closure. These impacts will affect employees, contractors, neighboring communities, and customers. Past achievements should be used to engage all stakeholders and to plan for continued benefits for all concerned parties.

The Qualified Professional should ensure the report discusses reasonably available information on environmental, permitting, and social or community factors related to the project. Consideration should be given to include, where relevant:

- *a summary of the results of any environmental studies and a discussion of any known environmental issues that could materially impact the issuer's ability to extract the mineral resources or mineral reserves;*
- *requirements and plans for waste and tailings disposal, site monitoring, and water management both during operations and post mine closure;*
- *project permitting requirements, the status of any permit applications, and any known requirements to post performance or reclamation bonds,*
- *a discussion of any potential social or community related requirements and plans for the project and the status of any negotiations or agreements with local communities;*
- *a discussion of mine closure (remediation and reclamation) requirements and costs should be considered and addressed.*

OTHER DECLARATIONS

Reporting of Mineralized Fill, Pillars, Low Grade Mineralization, Stockpiles, Dumps and Tailings

47. The Guide applies to the reporting of all potentially economic mineralized material. This can include mineralized fill, remnants, pillars, low grade mineralization, 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, all other clauses of the Guide (including Figure 1) apply.

Any mineralized material as described in this clause can be considered to be similar to in situ Mineralization for the purposes of reporting Mineral Resources and Mineral Reserves. Judgments about the mineability of such mineralized 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 mineralized material as described in this clause, then this material cannot be classified as either Mineral Resources or Mineral Reserves. If some portion of the mineralized material is currently sub-economic, but there is a reasonable expectation that it will become economic, then this material may be classified as a Mineral Resource. If technical and economic studies have demonstrated that economic extraction could reasonably be justified under realistically assumed conditions, then the material may be classified as a Mineral Reserve.

The above guidelines apply equally to low grade in situ mineralization, sometimes referred to as 'mineralized waste' or 'marginal grade material', and often intended for stockpiling and treatment towards the end of mine life. For clarity of understanding, it is recommended that tonnage and grade estimates of such material be itemized separately in Public Reports, although they may also be aggregated 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. Mineralized material in the course of being processed (including leaching), if reported, should be reported separately.

Reporting of Industrial Minerals Exploration Results, Mineral Resources and Mineral Reserves

48. Clauses 48 to 49 of this Guide address matters which relate to the Public Reporting of Industrial Minerals, stone and aggregates of all forms and other bulk commodities such as borates, talc, kaolin etc. that are generally sold on the basis of their product specifications and market acceptance. Unless otherwise stated, clauses 1 to 46 of this Guide (including Figure 1) apply. Table 1, as part of the guidelines, should also be considered persuasive when reporting on Industrial Minerals Exploration Results, Resources and Reserves.

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

The factors underpinning the estimation of Mineral Resources and Mineral Reserves for industrial minerals are the same as those for other deposit types covered by the Guide. 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 some industrial minerals, it is common practice to report the saleable product rather than the “as-mined” product, which is traditionally regarded as the Mineral Reserve. The preferred approach in the Guide is that, if the saleable product is reported, it should be in conjunction with, not instead of, reporting of the Mineral Reserve. However, it is recognized that commercial sensitivities may not always permit this preferred style of reporting. It is important that, in all situations where the saleable product is reported, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.

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

49. With respect to Modifying Factors, the normal geological parameters may be less important in the case of industrial minerals, stone and aggregate. Such factors as quality and marketability are important and should be carefully considered before declaring Mineral Reserves.

Reporting of Diamond and Other Gemstone Exploration Results, Mineral Resources and Mineral Reserves

50. Clauses 50 to 54 **Erro! Fonte de referência não encontrada.** of the Guide address matters that relate specifically to the Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves for diamonds and other gemstones. Unless otherwise stated, Clauses 1 to 46 of this Guide (including Figure 1) apply. Table 1, as part of the guidelines, should be considered persuasive when reporting Exploration Results, Mineral Resources and Mineral Reserves for diamonds and other gemstones.

For the purposes of Public Reporting, the requirements for diamonds and other gemstones are generally similar to those for other commodities with the replacement of terms such as ‘mineral’ by ‘diamond’ and ‘grade’ by ‘grade and average diamond value’. The term ‘quality’ should not be substituted for ‘grade,’ since in diamond deposits these have distinctly separate meanings.

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 low mineral content and variability of primary and placer deposits, the particulate nature of diamonds, the specialized requirement for diamond valuation and the inherent difficulties and uncertainties in the estimation of diamond resources and reserves.

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

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

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

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

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

52. Where Diamond Resource or Diamond Reserve grades (carats per tonne) are based on correlations between the frequency of occurrence of micro-diamonds and of commercial size stones, this must be stated, the reliability of the procedure must be explained, and the cut-off size sieve for micro-diamonds reported.

53. For Public Reports dealing with diamond or other gemstone mineralization, it is a requirement that any reported valuation of a parcel of diamonds or gemstones be accompanied by a statement verifying the independence of the valuation. The valuation must be based on a report from a demonstrably reputable and qualified expert.

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

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

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

Reporting of Coal Exploration Results, Mineral Resources and Mineral Reserves

55. Clauses 55 to 57 of the Guide address matters that relate specifically to the Public Reporting of Coal Exploration Results, Coal Resources and Coal Reserves. Unless otherwise stated, Clauses 1 to 46 of this Guide (including Figure 1) apply. Table 1, as part of the guidelines, should be considered persuasive when reporting on Coal Resources and Reserves.

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

56. 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 entity, the terms 'Coal Resource(s)' and 'Coal Reserve(s)' and the appropriate subdivisions may be substituted.

57. 'Marketable Coal Reserves', representing beneficiated or otherwise enhanced coal product where modifications due to processing have been considered in addition to mining factors such as dilution, may be publicly reported in conjunction with, but not instead of, reports of Coal Reserves. The basis of the predicted yield to achieve Marketable Coal Reserves should be stated.

Reporting of Unconventional Energy resources.

58. Where the "Unconventional Energy" resource is a solid mineral, then the CRIRSCO Template can be applied for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves.

TABLE 1

Check List of Assessment and Declaration Criteria

Table 1 is a checklist and guideline that those preparing reports on Mineral Exploration Results, Mineral Resources and Mineral Reserves should use as a reference. The checklist is not prescriptive and, as always, relevance and materiality are overriding principles that determine what information should be publicly reported. It is important, however, to report any matters that might materially affect a reader's understanding or interpretation of 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.

Mineral Resource and Mineral Reserve estimates seek to attach confidence as a consequence of method and the data. The methods employed should be valid, tested, use accepted definitions of terms and procedures, and best suited to the making of reliable estimates for the project in question. Evaluation and supporting documentation should consider all the criteria listed below and such additional criteria that may be viewed as significant. When considering the criteria outlined below, material items that are not applied should be accompanied by clear explanation in the documentation as to why they have been excluded or that the work is incomplete.

It is the responsibility of the Qualified Professional to determine which criteria listed below and which additional criteria should apply to the study of a particular project. The reported information should be sufficient to enable an intelligent layman or his professional advisor(s) to make a reasonable and balanced assessment of the significance of this information.

Table 1 is displayed in a matrix form listing the assessment criteria in three columns for: Exploration Results, Mineral Resource and Mineral Reserve according to the level of detail recommended for each stage. The assessment criteria are grouped by categories or topics identified by letters and subdivided into sub-items identified by numbers.

The assessment criteria for Mineral Resource would normally apply to Scoping Studies; the assessment criteria for Mineral Reserve would normally apply to Pre-Feasibility and Feasibility Studies.

A. General			
Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
1. Purpose of report	Statement of entity for whom the report was prepared, whether it was intended as a full or partial evaluation, what work was conducted, what work remains to be done. Report's author and relationship to reporting entity.	See Exploration Results.	See Exploration Results.
2. Project Description	Description of commodity, magnitude of project, background, and business arrangement.	See Exploration Results.	See Exploration Results.
3. Project Location	Description of location (country, state or province, county, latitude and longitude, etc.). A map showing location and access should be prepared and made publically available.	See Exploration Results.	See Exploration Results.
4. Property Ownership	Description of ownership of mineral rights, surface rights, access rights, leases, concessions, royalties, agreements, and other encumbrances and liabilities. Nature of reporting entity's existing rights or those still to be obtained to prospect or mine, plus any obligations to earn those rights and time limits. Disclosure of back-in agreements or rights and, to the extent known historic or current environmental liabilities. Discussion of relevant adjacent properties.	See Exploration Results.	See Exploration Results.
5. Accessibility, Climate, Local Resources, Infrastructure and Physiography	Topography, elevation, and flora and fauna. Means to access the property. Proximity of project to population centers and restricted use areas. Climate and length of operating season. Sufficiency of surface rights for mining and processing. Availability and sources of power, water, mining personnel, potential tailings and waste storage areas, heap leach and processing plant sites.	See Exploration Results.	See Exploration Results.

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
6. Project History	Description of prior ownership and ownership changes. Exploration and/or production history. Significant historical Mineral Resource and Mineral Reserve estimates.	See Exploration Results.	See Exploration Results. Comparison of historical production performance statistics to current and planned operations, including the reliability of these and how they relate to the current estimates.
7. Site Visits	Comment on any site visits and date undertaken by the Qualified Professional and outcome of those visits. Reviews of surface sampling, geophysics and mapping programs. If no visits were undertaken, state why.	Comment on site visits and dates undertaken by the Qualified Professional and outcome of those visits. Visits during major drilling programs and metallurgical sample selection. Review logging, sampling, drill hole locations.	See Mineral Resource. Multiple visits during Pre-Feasibility and Feasibility Studies to view aspects of infrastructure layout sites, road access, village meetings.
8. Units of Measure	Units of measure, currency, and relevant exchange rates used should be stated.	See Exploration Results.	See Exploration Results.

B. Project Data

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
<p>1. Location</p>	<p>Maps and cross sections and other two- or three-dimensional representation of results should exist, showing location of samples, drill holes, exploration pits, underground workings, geological data, etc.</p> <p>When evaluating drill hole results, consideration should be given to depth to top and bottom of mineralization, to total length and grade of intercepts, and to the accuracy of survey information including down-hole surveys.</p>	<p>See Exploration Results.</p> <p>Particular attention should be given to drill-hole and other sample survey information including down-hole surveys.</p> <p>If the sample locations are not well known, the effect on the resource estimates should be considered. The location of drill-hole collars should be accurate, and the adequacy of the down-hole surveying technique should be reviewed and commented on. If more than one coordinate system is in use on the project, the relationship between the systems needs to be established and verified.</p> <p>Changes in magnetic declination with time should be accounted for and documented.</p>	<p>See Mineral Resource.</p> <p>The location of samples and other relevant features (property lines, mine workings, etc.) should be well-known.</p>
<p>2. Geology</p>	<p>Description of the nature and reliability of geological information (rock types, structure, alteration, mineralization, and relation to known mineralized zones, etc.). Description of the deposit type and physical continuity of mineralization. Description of drill-hole logging and mapping procedures.</p> <p>Description of geophysical and geochemical data, including dimension, type, results and implications. Reliable geological maps and cross sections of appropriate scales should exist to support interpretations.</p> <p>Preliminary assessments or observations of geotechnical and hydro-geological conditions that can impact mining and processing assumptions.</p>	<p>See Exploration Results.</p> <p>Particular attention should be given to drill-hole logging and other sample information used in resource evaluation.</p> <p>A description of the thoroughness with which all significant lithologic, stratigraphic, structural, mineralogical, alteration, or other geological or geotechnical characteristics were recorded.</p> <p>Significant data, or data that could materially influence the estimated quantity and quality of the resource, should be discussed.</p>	<p>See Mineral Resource.</p>

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
3. Topography	General topographic map is sufficient.	Topographic map in sufficient detail to support mine planning and conceptual infrastructure layout.	Detailed topographic map. Aerial surveys should be checked with ground controls and surveys, particularly in areas of rugged terrain, dense vegetation or high altitude.
4a. Sampling method	<p>Description of sample type and sample collection method (hand, grab, trench, channel, or chip sample; core hole, rotary hole, or reverse circulation; bulk sample, etc.).</p> <p>Discussion of sample quality, size, and representativeness (sample recovery, high grading, selective losses or contamination, and any other factors that may have resulted in sample biases, etc.).</p>	<p>See Exploration Results.</p> <p>The quantity and quality of sample information is critical to the reliability of resource estimates and should be documented.</p> <p>Particular attention should be given to this information.</p>	See Mineral Resource.
4b. Sampling preparation	<p>QA/QC procedures adopted for sample collection including core cutting and splitting as required and should be implemented early in exploration of a mineral prospect.</p> <p>Discussion of whether duplicate samples or alternative methods of sampling were used to verify sample quality.</p> <p>Description of indirect methods of measurement (geophysical methods), with attention given to potential or actual errors or biases in interpretation.</p>	<p>See Exploration Results.</p> <p>Verification of the suitability of sample preparation is required.</p>	See Mineral Resource.

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
4c. Sampling analysis	<p>Identification of laboratory and analytical method (fire assay, AA assay, emission spectroscopy, etc.). Discussion of laboratory accreditation, precision and accuracy, including the use of quality control programs (blanks, duplicates, certified or standard reference materials), and submission of samples to other laboratories for verification.</p> <p>Collection of baseline trace element, whole-rock analyses, and evaluation for possible deleterious elements.</p>	<p>See Exploration Results.</p> <p>Verification of analytical techniques and quality control programs are required.</p> <p>Check sampling and assaying should have been performed by independent laboratories.</p> <p>Quantitative evaluation of QA/QC data.</p> <p>Assaying of all payable and penalty elements; physical tests as required by product specifications.</p> <p>Discussion of methods used to detect the presence of deleterious elements or minerals that will affect mining, processing, environmental programs, or worker safety.</p>	<p>See Mineral Resource.</p>
4d. Sample verification	<p>Collection of independent samples (witness samples) under the supervision of the Qualified Professional. Can include channel samples, twin holes, visual inspection, resampling split core, etc.</p>	<p>See Exploration Results.</p>	<p>See Mineral Resource.</p>
4e. Bulk Density	<p>Generally based on preliminary test work or benchmarking.</p>	<p>Discussion of how the bulk density was determined (assumed, measured, or estimated). If assumed, which assumptions were made and on which basis.</p> <p>If measured, by what method and how abundant and representative are the bulk density data. If estimated, what methodology was used to estimate the density.</p> <p>Discussion of whether different bulk densities were used in different parts of the deposit and why. Bulk density should be stated as on a dry or wet basis.</p>	<p>See Mineral Resource.</p> <p>The bulk density should account for void spaces (vugs, porosity, etc.) and for differences between rock types, structural and alteration zones within the deposit.</p> <p>Waste bulk densities should be well defined.</p>

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
4f. Sample Security	Measures taken to ensure sample security and chain of custody should be documented. Retention of sample rejects pulps and remaining core.	See Exploration Results.	See Exploration Results.
4g. Database Management	Measures taken to ensure data have not been corrupted by, for example, transcription or keying errors. QA/QC and data validation procedures used. Security of project data (backups). Protocols for changing data in database.	See Exploration Results. Methods used to verify primary data and to validate the database should be described.	See Mineral Resource.

C. Interpretation			
Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
1. Geological Interpretation and Model	<p>Description of genetic model and inferences made from this model.</p> <p>Discussion of adequacy of data density and reliability, and whether the quality and quantity of information are sufficient to support statements made or inferred concerning potential for significant economic discovery. Orientation of drill holes and other samples in relation to the geological structures and mineralization to ensure unbiased interpretation of true widths.</p> <p>If true widths are unknown, there should be a clear statement to this effect.</p>	<p>See Exploration Results.</p> <p>Discussion of sufficiency of data density to assure continuity of mineralization, geological boundaries, and provide an adequate database for the estimation procedure used.</p> <p>Discussion of the extent to which the interpretation is based on data or on assumptions and whether consideration was given to alternative interpretations or models.</p> <p>A geologic model of key attributes (e.g. lithology, structure, alteration, and stratigraphy).</p>	See Mineral Resource.
2. Resource Model	<p>Not required, but preliminary model may exist to assist in quantification of potential tonnage and grade ranges.</p> <p>Weight averaging techniques, grade capping, and cut-off grades.</p> <p>Assumptions used for any reporting of metal equivalent values.</p> <p>If possible, establish Exploration Target ranges for grades and tonnages.</p>	<p>Detailed description of the method and reasons used, and the assumptions made, to estimate tonnages and grades (section, polygon, inverse distance, geostatistical, or other method).</p> <p>Description of how the geological interpretation was used to develop domains and control the resource estimates.</p> <p>Discussion of basis for using, or not using, grade cutting or capping.</p> <p>Compositing or data aggregation methods used should be described.</p> <p>If a computer method was chosen, description of programs and parameters used.</p> <p>Geostatistical methods are extremely varied and should be described in detail.</p> <p>The method chosen should be justified.</p> <p>The geostatistical parameters, including the variogram, and their compatibility with the geological interpretation should be discussed.</p> <p>Experience gained in applying geostatistics to similar deposits should be taken into account.</p> <p>Description of methods used to verify and validate models.</p> <p>Assumptions used for any reporting of net smelter returns or metal equivalent values.</p>	See Mineral Resource.

D. Mineral Resource and Reserve Classification

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
1. Criteria	Not applicable.	<p>Description and justification of criteria used to classify the resource, including relationship to cut-off grade assumptions.</p> <p>To classify a resource as Measured or Indicated, there should be a reasonably high level of confidence with respect to the quality of the information used to estimate this resource, as well as the interpretation of this information.</p> <p>If Inferred Mineral Resources are used in economic evaluations, this should be disclosed.</p> <p>Reconciliation with previous Mineral Resource estimates.</p> <p>A conceptual analysis to justify reasonable prospects for eventual economic extraction; Scoping Study preferred.</p>	<p>Description and justification of criteria used to classify the reserves, and confirmation of resource classification assumptions with respect to cut-off grades used in the production schedule.</p> <p>Description of all Modifying Factors used to demonstrate economic viability of Measured and Indicated Mineral Resources to support declaration of a Mineral Reserve.</p> <p>Inferred Mineral Resources should be excluded from demonstration of economic viability to support declaration of a Mineral Reserve</p> <p>Discussion of the level of confidence in the Modifying Factors.</p> <p>Uncertainty in Modifying factors may reduce all or part of the Proved Mineral Reserve to a Probable Mineral Reserve.</p> <p>Reconciliation with previous Reserve estimates.</p>
2. Risks and Opportunities	Opportunity expressed as Exploration Target ranges of tonnages and grades.	<p>Discussion of uncertainty of geological boundary assumptions and their risk and opportunity for overall Mineral Resource estimates.</p> <p>Address uncertainties on the tonnage and grade of production increments.</p> <p>Determine work programs to upgrade classification or increase resources.</p>	Determine work programs to upgrade Probable Mineral Reserves to Proved Mineral Reserves.

E. Extraction			
Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
1a. Mining Method	Description of any Modifying Factors that could have a significant impact on the project viability.	See Exploration Results. Discussion of mining method to be used and selective mining criteria assumed that supports the declared resource. Discussion of the dilution implicit in the resource model.	Mining method(s), mine plans and production schedules defined for the life of the project. Description and justification of mining method(s) to be used. Discussion of mining rate, equipment selected, ore control methods, geotechnical and hydrogeological considerations, staffing requirements, health and safety of the workforce, dilution, and recovery. For open-pit mines, discussion of pit slopes, slope stability, and strip ratio. For underground mines, discussion of mining method, rock mechanics considerations, mine design characteristics, and ventilation/cooling requirements. Consideration of waste rock issues related to impacts on surface and ground water systems.
1b. Mining Costs	Generally not determined.	State basis for assumptions. Currency, exchange rates and dates of estimates. See Table 2.	Description and justification of capital and operating costs. All capital items identified. Detailed equipment list. Price quotes for all major equipment items. Major components of operating costs itemized and justified by functions and elements. Capital (including sustaining) and operating budgets defined by year. See Table 2.

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
<p>2a. Processing Method</p>	<p>Description of any factors that could have a significant impact on mineral processing and/or the project viability.</p>	<p>See Exploration Results. Discussion of possible processing methods and any preliminary processing or metallurgical test work completed. A full definition of the minerals, or at least the assays, to ensure that the process is suitable and that any contaminants / pollutants / possible by-products are recognized, and suitable process steps have been included in the flow sheet. Description, to the extent known, of the degree to which the test samples are representative of the various types and styles of mineralization and the mineral deposit as a whole. Discussion of whether the process method is widely used and if uncommon or novel, then describe the risks and test work designed to mitigate the risk.</p>	<p>Description and justification of processing method(s) to be used, equipment, plant capacity and personnel requirements. State whether the process method selected is well-tested or new technology. Detailed flow sheet and mass balance based on comprehensive metallurgical program. Justification of estimated recovery (proportion of material sent to the processing plant that will be recovered) by geologic zone, whether based on historical information, laboratory tests, or pilot plant results. Assumptions or allowances made for deleterious elements or variability in the ore feed to the process. Known environmental and health and safety risks associated with the flow sheet, with those sections dealing with hazardous materials or operations covered in more detail. For mineral products that are defined by specification, discussion of the basis for the reserve estimate in accordance with the appropriate mineralogy, testing, and processing requirements to meet the specification.</p>
<p>2b. Processing Costs</p>	<p>Generally not determined.</p>	<p>State basis for assumptions taking into account processing method on extraction design and rock/mineralogical character. See Table 2.</p>	<p>Description and justification of capital and operating costs. All capital items identified. Detailed major equipment list. Price quotes for all major equipment items. Major components of operating costs by functions and elements itemized and justified. Capital and operating budgets defined by year. See Table 2.</p>

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
3a. Recovery Mining	Generally not determined.	State typical dilution and mining recovery that would result from application of Modifying Factors	Reported tonnages, grades and mineral contents should take into account mining dilution and mining recovery. Description and justification of mining dilution and mining recovery is required.
3b. Recovery Processing	Generally not determined.	Provide insight gained from preliminary testing and insight into differences between laboratory and commercial scales.	Discussion of whether the reported tonnages and grades consist of material in place or whether processing recoveries are included. If in-place metal or quantities are reported, information should be supplied concerning expected processing losses or recoveries. Justification of processing recoveries is required.
4. Cut-off Grade	Typically reported in terms of minimum true thickness and cut-off grade criteria.	Justification of the cut-off grade used to report resources including but not limited to assumptions made for costs, prices, recoveries, by-product credits if based on revenue, net smelter return.	Description of methods used to calculate cut-off grades, including but not limited to costs, prices, recoveries, and by-product credits if based on revenue, net smelter return.

F. Infrastructure			
Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
1. Facilities	See section A. Item 5.	See section A. Item 5. It is reasonable to assume that necessary facilities could be built or accessed.	Necessary facilities have been designed (which may include processing plant, tailings dam, leaching facilities, waste dumps, road and/or rail accesses, ports, power supply, pipelines, offices, housing, security, etc.). Detailed map showing location of facilities. Construction schedule developed.
2. Staffing	See section A. Item 5. Safety plan. Emergency evacuation plan.	See section A. Item 5. Safety plan. Emergency evacuation plan.	Detailed staffing plan. Training. Salary scale. Work schedule. Operating days. Safety plan. Emergency evacuation plan.
3. Supplies	Generally not determined.	Reasonable assumption that necessary supplies can be obtained.	Necessary supplies have been identified (electricity, reagents, fuels, etc.). Demonstration that supplies are available as needed.
4. Water Issues	Preliminary investigations to support exploration activities.	Stated reasonable assumptions.	Water quantity and quality requirements specified and sources of water identified. Dewatering requirements estimated on the basis of hydrologic and climatic studies. Water treatment and disposal, water balance and management, and quality control plans in place.
5. Costs	Generally not determined.	Stated reasonable assumptions.	Description and justification of capital and operating costs. All capital items identified with sufficient detail for costing. Construction schedule and capital and operating budgets defined by year.

G. Environmental Aspects			
Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
Environmental Aspects	Description of environmental factors likely to prohibit the project proceeding, including contaminants in material to be disturbed and deleterious elements likely to occur in products.	Description of environmental factors that could have a significant impact on the project feasibility and possible means of mitigation. Progress of environmental, cultural, and archeological baseline studies.	The necessary permits have been obtained, or there is reasonable basis to believe that all permits required for the project can be obtained in a timely manner. Description of yearly environmental compliance methods and costs, including reclamation, bonding, and closure plan and costs.

H. Social License			
Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
Social License	Preliminary review with stakeholders in exploration and project development areas. Sustainable development to support exploration. Formal contact with local inhabitants.	Discussion of potential social or community related requirements and plans for the project and the status of negotiations or agreements with local communities and other stakeholders. Sustainable development to support advanced project drilling and sampling. Training programs.	Social management plan and program, and community and other stakeholder related requirements and agreements. Sustainable development to support construction and operation. Training programs, local vendor development plan. Evaluation of political risk and mitigation.

I. Economic Viability

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
1. Product Value	<p>Description of valuable and potentially valuable product(s) including suitability of products to market.</p> <p>For minerals products where a market is needed prior to beginning exploration, a description of the customer specifications, testing, and acceptance requirements.</p>	<p>See Exploration Results.</p> <p>Stated reasonable assumptions concerning likely product value.</p> <p>Potential markets and ability to enter the market.</p> <p>Penalties likely incurred for contaminants and conversely, byproduct credits if estimated in resource model or assumptions made if based on metallurgical testwork.</p>	<p>See Mineral Resource.</p> <p>Description of product to be sold.</p> <p>Discussion of whether there exists a market for the product, its impact on that market, and whether contracts for the sale of the product are in place or expected to be obtained.</p> <p>Demand, supply and inventories for the particular commodity, consumption trends and factors likely to affect supply and demand in the future, resulting in commodity price profiles.</p> <p>Demonstration that the price assumptions are reasonable and supportable.</p> <p>Justification of assumptions made concerning production cost and value of product at sale point.</p> <p>Transportation, marketing, downstream processing, and other costs or losses should be considered.</p>
2. Cash Flow Analysis	Generally not applied.	<p>Application of simple cash flow.</p> <p>Consideration of order of magnitude capital cost, operating costs and revenue to indicate reasonable prospect of eventual economic extraction.</p>	<p>Detailed cash flow analysis for the life of the project, including a summary of taxes, royalties and government levies.</p> <p>Sensitivity analysis and simulations of risk related to grade, prices, capital costs, and operating costs, and any additional significant variables.</p> <p>Discount rate, internal rate of return, payback period and other metrics.</p>
3. Study Accuracies	Preliminary Studies often applied to justify exploration targets.	See Table 2 in reference to Scoping Studies that may be used to support a Mineral Resource statement.	See Table 2 in reference to Pre- Feasibility and Feasibility Studies that are used to support a Mineral Reserve statement.

J. Risk Analysis and Recommendations

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
<p>1.Risk Analysis</p>	<p>Generally not applied. High-level risk and opportunities reviewed.</p>	<p>Sufficient risk assessment completed to confirm reasonable prospects of eventual economic extraction. Resource enhancement opportunities.</p>	<p>Project technical, social, environmental and economic risk in the form of a risk register describing likelihood of occurrence and cost. Description of actions which will be taken to mitigate risk. No known significant risk of project failure. Future options to enhance project value.</p>
<p>2.Considerations and recommendations</p>	<p>Description of any other significant information that is likely to prevent or facilitate the economic viability of the project. Identification of work or conditions required to establish a Mineral Resource.</p>	<p>Description of any other material information that could prevent or facilitate the potential economic viability of the resource. Identification of work or conditions required to convert the Mineral Resource to a Mineral Reserve. Known information that significantly reduces or increases the probability of economic feasibility should be reported.</p>	<p>While any other material information affecting the project should be discussed, no material impediments to the profitable exploitation of the property should remain. Material uncertainties about the geology, extraction, processing, metallurgical, environmental, infrastructure, marketing, social license, and legal requirements have been mitigated or eliminated so that a Qualified Professional, acting reasonably, can determine if all or part of the Mineral Resource may be converted to a Mineral Reserve at the time of reporting. It is not required that all permits be issued or that mining and processing facilities have been constructed. However, there should be a reasonable basis to believe that permitting and construction of the necessary facilities can be accomplished in a timely manner.</p>

K. Qualification and Reference			
Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
1. Qualification of Estimator	<p>Name and qualification of the Qualified Professional preparing and reviewing the report, and whether the Qualified Professional is independent with respect to the entity or project that is the subject of the report. Include description of at least five years' relevant experience in style of mineralization and type of deposit.</p> <p>Include statement that the Qualified Professional's RPO has jurisdiction over the Qualified Professional's actions with regard to the mineral deposit being publicly reported and the Qualified Professional is subject to the code of ethics of the RPO.</p>	See Exploration Results.	See Exploration Results.
2. Reliance on other experts	<p>Reliance on experts applies to information in areas where the experience of the Qualified Professional is insufficient.</p> <p>Identification of:</p> <ul style="list-style-type: none"> - the source of the information relied upon, including the date, title, and author of any report, opinion, or statement, - the extent of reliance, and - the portions of the Public Report to which the reliance applies <p>-consent of the expert for information contained in portions of the Public Report to which the reliance applies</p>	See Exploration Results.	See Exploration Results.
3. References	References cited with author, date, title and source.	See Exploration Results.	See Exploration Results.

L. Diamonds			
Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
1. Exploration	<p>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.</p>	See Exploration Results.	See Results. Exploration
2. Sample Collection	<p>Type of sample and purpose, e.g. core drilling for micro-diamonds sampling and geology, large diameter drilling to establish stones per unit of volume, and grade or bulk samples to establish diamond value.</p> <p>Sample size, distribution and representativity.</p>	See Exploration Results.	See Results. Exploration
3. Sample Treatment	<p>Type of facility, treatment rate, and accreditation.</p> <p>Sample size reduction protocol.</p> <p>Bottom screen cut-size, top screen cut-size and re-crush screen cut-size.</p> <p>Processes (dense media separation, magnetic separation, grease recovery, X-ray sorting, handsorting etc.).</p> <p>Process efficiency, tailings auditing, spike recovery and granulometry analysis.</p> <p>Sample head feed and tailings particle granulometry.</p> <p>Percent concentrate and undersize per sample.</p> <p>Sample density determination.</p> <p>Laboratory used and type of process for micro diamond recovery (e.g. caustic fusion or acidization).</p>	See Exploration Results.	See Results. Exploration

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
<p>4. Sample Grade</p>	<p>Sample grade in this section 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 ton and/or carats per 100 dry metric tons.</p> <p>For placer deposits, sample grades quoted in carats per m² or carats per m³ are acceptable.</p> <p>In the marine placer environment reserve grades are reconciled on a per m² basis.</p> <p>Volume estimates are inherently inaccurate and are used primarily to assist with estimating mining rates and costs.</p>	<p>See Exploration Results.</p>	<p>See Results. Exploration</p>
<p>5. Sample Characteristics</p>	<p>Micro and macro diamond sample results per facies.</p> <p>The weight of diamonds may only be omitted from the report when the diamonds are considered too small to be of commercial significance.</p> <p>The lower cut-off size should be stated.</p>	<p>See Exploration Results.</p> <p>Bulk sampling results, global sample grade per facies and local block estimates in the case of Indicated and Measured resources.</p> <p>Spatial structure analysis and grade distribution.</p> <p>Stone size/weight and size/number distribution.</p> <p>Effect on sample grade with change in bottom cut-off screen size.</p>	<p>See Results. Exploration</p> <p>Adjustments made to diamond size/weight distribution for sample plant performance versus performance on a commercial scale (reserve Modifying Factors).</p>

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
6. Grade Estimation	Generally not applied.	<p>Grade estimation (including geostatistical) and interpolation techniques applied.</p> <p>Adjustments made to diamond size/weight distribution for sample plant performance and performance on a commercial scale.</p>	See Mineral Resource.
7. Value (Price) Estimation	Generally not applied.	<p>Accreditation of Valuer and date of valuation.</p> <p>Details of parcel(s) sorted and valued, number of stones, carats and size/weight distribution using a standard progression of sieve sizes for each identified facies, geological unit or domain.</p> <p>Value per sieve size.</p> <p>Estimation of value with size.</p> <p>Assessment of diamond damage (insignificant, moderate, severe).</p> <p>Value with change in bottom cut-off size.</p> <p>Estimate of the uncertainty in the value estimate due to parcel size and comment on the spatial representivity of the valuation parcel.</p> <p>Clarification as to whether a strict bottom cut-off been applied or does the modelled value include incidental diamonds below the bottom cut-off?</p>	See Mineral Resource.

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
<p>8. Security and Integrity</p>	<p>Chain of custody. Site security.</p>	<p>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.</p>	<p>See Mineral Resource</p>
<p>9. Classification</p>	<p>Not applicable.</p>	<p>Consider the elements of uncertainty in estimates and develop classification accordingly. Key elements to consider for resource classification are the geology, drillhole and sample spacing/interval, spatial representativeness and accuracy of estimates of volume, density, grade, diamond value.</p>	<p>See Mineral Resource</p>

TABLE 2

Study Accuracy Ranges for Capital and Operating Cost Estimates

Levels of effort required for components of Technical Studies and their attendant accuracy levels have been the subject of considerable debate and difference of opinion within the mining community. Table 2 is based on *The 2014 SME Guide for Reporting Exploration Results, Mineral Resources, and Mineral Reserves* (the 2014 SME Guide), to provide standards to be used by the Qualified Professional in preparing Technical Studies. As used in the table, “historic” implies information that may be available and still relevant from similar projects. The term “benchmark” could also be interchangeably used if current data from similar projects are used. In Technical Studies, the Qualified Professional should provide the basis for capital and operating cost estimates and an assessment of the level of accuracy for at least the categories listed below.

Operating cost			
Category	Scoping Study	Prefeasibility Study	Feasibility Study
Basis	Order-of-magnitude estimate	Quantified estimates with some factoring	Describes the basis of the estimate; detailed from zero-based budget; minimal factoring
Operating quantities	General	Specific estimates with some factoring	Detailed estimates
Unit costs	Based on historical data for factoring	Estimates for labor, power, and consumables, some factoring	Letter quotes from vendors; minimal factoring
Accuracy Range	± 35%	± 25%	± 15%
Contingency Range (Allowance for items not specified in scope that will be needed)	± 25%	± 15%	±10% (actual to be determined based on risk analysis)

Capital Cost			
Category	Scoping Study	Prefeasibility Study	Feasibility Study
Basis of Estimate to include the following areas:			
Civil/structural, architectural, piping/HVAC, electrical, instrumentation, construction labor, construction labor productivity, material volumes/amounts, material/equipment, pricing, infrastructure	Order-of-magnitude, based on historic data or factoring. Engineering < 5% complete.	Estimated from historic factors or percentages and vendor quotes based on material volumes. Engineering at 5-15% complete.	Detailed from engineering at 15% to 25% complete, estimated material take-off quantities, and multiple vendor quotations
Contractors	Included in unit cost or as a percentage of total cost	Percentage of direct cost by area for contractors; historic for subcontractors	Written quotes from contractor and subcontractors
Engineering, procurement, and construction management (EPCM)	Percentage of estimated construction cost	Percentage of detailed construction cost	Calculated estimate from EPCM
Pricing	FOB mine site, including taxes and duties	FOB mine site, including taxes and duties	FOB mine site, including taxes and duties
Owner's costs	Historic estimate	Estimate from experience, factored from similar project	Estimate prepared from detailed zero-based budget
Environmental compliance	Factored from historic estimate	Estimate from experience, factored from similar project	Estimate prepared from detailed zero-based budget for design engineering and specific permit requirements
Escalation	Not considered	Based on entity's current budget percentage	Based on cost area with risk
Accuracy Range	± 50%	± 25%	±15%
Contingency Range (Allowance for items not specified in scope that will be needed)	± 25%	± 15%	±10% (actual to be determined based on risk analysis)

APPENDIX 1: Generic Terms and Equivalent

Throughout the Guide, 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.

Generic Term	Synonyms or similar terms	Intended generalized meaning
Cut-off grade	Product specifications	The lowest grade, or quality, of mineralized 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.
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, 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.
Mineral Exploration	Prospecting, Mineral Research	All activities related to mineral research (metals, minerals and gemstones) using tools such as: geological mapping, remote sensing, geochemical and geophysical surveys, Greenfield and Brownfield drilling and excavations (trenches and galleries).
Mineral Reserves	Ore Reserves	'Mineral' is preferred under the Guide 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.
Mineralization	Type of deposit, Mineral deposit, Mineralization style.	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 mineralization might occur, whether by class of deposit, mode of occurrence, genesis or composition.

Generic Term	Synonyms or similar terms	Intended generalized meaning
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.)
Qualified Professional	Qualified Person, Competent Person, Qualified Competent Person	Refer to Guide clause 10 for the definition of Qualified Professional.
Recovery	Yield	The percentage of material of initial interest that is extracted during mining and/or processing. A measure of mining or processing efficiency.
Position of responsibility	Role of Responsibility, Supervisory Experience	Position in which the individual was depended on for significant participation, management and decision making relevant to their respective area of technical competency.
Scoping Study	Conceptual Study	Refer to clause 37 for the definition of Scoping Study
Pre-Feasibility Study	Preliminary Feasibility Study	Refer to clause 38 for the definition of Pre-Feasibility Study
Feasibility Study	Final Feasibility Study, Full Feasibility Study	Refer to clause 39 for the definition of Feasibility Study
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)

APPENDIX 2: Code of Ethics

Appendix 2 presents the six fundamental principles of the Code of Ethics of the Brazilian Commission on Resources and Reserves - CBRR to be observed by the Qualified Professionals in their public statements. Every member of CBRR (ABPM, ADIMB and IBRAM) and its representatives are required to comply with this Code of Ethics, observing and endorsing its principles and rules.

Code of Ethics

1. The first responsibility and the highest duty of members and its representatives shall at all times be the welfare, health and safety of the community.
2. Members and its representatives shall act so as to uphold and enhance the honor, integrity and dignity of the profession.
3. Members and its representatives shall continue their professional development throughout their careers and shall actively assist and encourage those under their direction to advance their knowledge and experience.
4. Members and its representatives shall comply with all laws and government regulations relating to the Brazilian mineral industries, and with the rules, regulations and practices as established by the National Department of Mineral Production (DNPM) and other comparable regulatory authorities in Brazil or any other country.
5. Members and its representatives shall comply with the rules and regulations of his professional body (CREA etc.), complying with its principles and practices. This Code of Ethics is complementary to such regulations.
6. Members and its representatives shall always take care with the truthfulness, impartiality and integrity of his works and his profession, complying with the Brazilian legislation at all times, essentially in regard to civil, criminal, competition and anticorruption issues.

APPENDIX 3: Recognized Professional Organizations (RPOs)

This list is updated from time to time by the CBRR which wish to be added to the list should contact the contato@cbrr.org.br

Professional Organization	Member Designation
Society for Mining, Metallurgy, and Exploration Inc. (SME)	Registered Member
American Institute of Professional Geologists (AIPG)	Certified Professional Geologist
Any state or territory in the United States of America	Licensed or Registered as a Professional Engineer
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
Engineering Council of South Africa (ECSA)	Professional Engineer
South African Council for Professional and Technical Surveyors	Professional Surveyor
South African Institute of Mining and Metallurgy (SAIMM)	Fellow or Member
South African Council for Natural Scientific Professions (SACNASP)	Professional Natural Scientist
Geological Society of South Africa (GSSA)	Member
European Federation of Geologists (EFG)	European Geologist (EurGeol)
Institute of Materials, Minerals and Mining (IOM ³)	Fellow or Professional Member
Institute of Geologists of Ireland (IGI)	Professional Member
Geological Society of London (GSL)	Chartered Geologist
Chilean Comision Minera (ChCM)	Persona Competente Calificada
Any organization or association of engineers and/or geoscientists given authority or recognition by statute in a jurisdiction of Canada	Licensed, certified, registered or accepted by: Professional Engineers Ontario, Association of Professional Engineers and Geoscientists of British Columbia, Association of Professional Engineers and Geoscientists of Manitoba, Association of Professional Geoscientists of Ontario, Association of Professional Engineers and Geoscientists of Newfoundland, Association of Professional Engineers, Geologists and Geophysicists of the Northwest Territories, Association of Professional Geoscientists of Nova Scotia, Association of Professional Engineers and Geoscientists of New Brunswick, Association of Professional Engineers and Geoscientists of Saskatchewan, Association of Professional Engineers, Geologists and Geophysicists of Alberta, Ordre des Géologues du Québec, Ordre des Ingénieurs du Québec
Russian Society of Subsoil Use Experts (OERN)	Expert class