



## Foreword

- i. The 2007 SME Guide for Reporting Exploration Results, Mineral Resources, and Mineral Reserves (the 2007 SME Guide) has been adopted by the Society for Mining, Metallurgy, and Exploration, Inc. (SME) and is therefore strongly recommended to be used by members of this organization.
- ii. The Guide is recommended as a minimum standard for reporting Exploration Results, Mineral Resources and Mineral Reserves for public and private purposes. In terms of the Guide, a Public Report is a report on Exploration Results, Mineral Resources or Mineral Reserves prepared for the purpose of informing the general public.
- iii. In this Guide, important terms and their definitions are highlighted in **bold** text. The guidelines are written using regular font. Paragraphs with border on the left side and written in *italics* give directions on how to interpret definitions and guidelines.
- iv. THE UNITED STATES SECURITIES AND EXCHANGE COMMISSION (U.S. SEC) REGULATES THE REPORTING OF EXPLORATION RESULTS, RESOURCES AND RESERVES BY ORGANIZATIONS, INDIVIDUALS OR COMPANIES (“ENTITIES”) SUBJECT TO THE FILING AND REPORTING REQUIREMENTS OF THE U.S. SEC. DECISIONS AS TO WHEN AND WHAT INFORMATION SHOULD BE PUBLICLY REPORTED ARE THE SOLE RESPONSIBILITY OF THE ENTITY OWNING THE INFORMATION, AND ARE SUBJECT TO U.S. SEC RULES AND REGULATIONS. THE REPORTING OF EXPLORATION RESULTS, RESOURCES AND RESERVES MAY ALSO BE SUBJECT TO OTHER NATIONAL AND INTERNATIONAL RULES AND REGULATIONS. THESE RULES AND REGULATIONS VARY FROM TIME TO TIME, AND AT ANY GIVEN TIME MAY NOT BE CONSISTENT WITH THE CONTENT OF THIS GUIDE. THE ADVICE OF SECURITIES COUNSEL SHOULD BE SOUGHT IN PREPARING FILINGS FOR THE U.S. SEC OR OTHER SECURITIES REGULATORY AUTHORITIES, AND IN PREPARING OTHER PUBLIC DISCLOSURES.
- v. It is recognized that further review of the Guide will be required from time to time. Constructive suggestions are solicited from all users of this Guide. Comments should be sent to:

Chairman, Resources and Reserves Committee  
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## History

1. In 1988, at the request of members of the Society for Mining, Metallurgy, and Exploration (SME), Inc., the President of SME formed Working Party #79, Ore Reserve Definition, with the mission to develop guidelines for the public reporting of exploration results, resources, and reserves. A Subcommittee was appointed by the Working Party to draft these guidelines and submit recommendations to SME. The Subcommittee's recommendations were published by SME in the April 1991 issue of "Mining Engineering", and as a document entitled "A Guide for Reporting Exploration Information, Resources, and Reserves" (the SME Guide) in January 1992. Work continued on an ad-hoc basis until 1996, when Working Party #79 was renamed the SME Resources and Reserves Committee and became a standing committee.

In 1994, the Council of Mining and Metallurgical Institutions (CMMI) started a concerted international effort to create a set of international definitions for reporting mineral resources and mineral reserves. An ad-hoc International Definitions Group was formed, with representatives from mining and metallurgical institutions from the United States (SME), Australia (AusIMM), Canada (CIM), the United Kingdom (IMM) and South Africa (SAIMM). A major breakthrough came on October 18, 1997 when the CMMI International Definitions Group met in Denver, Colorado and reached a provisional agreement (the Denver Accord) on definitions of mineral resources and mineral reserves. Concurrently, and since 1992, the United Nations Economic Commission for Europe (UN-ECE) was developing an international framework classification for mineral resources and mineral reserves. Starting in October 1998, joint meetings were held in Geneva between the CMMI International Definitions Group and the UN-ECE Task Force, resulting in agreement to incorporate the CMMI definitions into the UN framework classification.

In 2002, the Combined Reserves International Reporting Standards Committee (CRIRSCO, now known as the Committee for Mineral Reserves International Reporting Standards) was formed, replacing the CMMI International Definitions Group with the mission to continue coordination between member countries, of the development of international standards for the definition and reporting of exploration results, mineral resources and mineral reserves. Chile joined CRIRSCO in 2002 and developed the first non-English reporting code which follows the international definitions.

The international resources and reserves definitions or their precursors were accepted as part of national reporting codes and guidelines by the regulatory agencies of Australia (1989), South Africa (2000), Canada (2001), and the United Kingdom (2001). The United Nations formally adopted these definitions in 1999. In 2007 the Government of Chile approved a reporting code which includes these definitions.

2. The SME Guide, first published in 1992, was updated in 1999 when the requirement was introduced that the reporting of mineral resources and reserves be made by a

Competent Person. The SME Guide was recommended to be used by members of SME. However, some key aspects of the SME Guide were not consistent with requirements of the U.S. Securities and Exchange Commissions (U.S. SEC) which are based on the U.S. SEC Industry Guide 7. While the SME Guide was accepted by a number of U.S. and international mining and consulting companies, its usefulness remained limited.

To resolve the differences between the SME Guide and the U.S. SEC rules and regulations, SME opened a dialogue with the U.S. SEC in 2003, and started a renewed effort to better define the industry position with respect to a number of critical issues. In February 2004, SME formed a consortium of mining, consulting and financial auditing organizations known as the SEC Reserves Working Group (the Working Group), whose members formed the SME Resources and Reserves Committee. The Working Group recommendations were included in this Guide and submitted to the U.S. SEC for their consideration in April 2005. The most significant changes included improved definition of the terms Mineral Resources and its subdivisions (Measured, Indicated and Inferred Mineral Resources), and clarification of the technical, economic, legal and permitting requirements which must be satisfied before a reserve can be declared. A section was added defining the commodity prices which can be used for reserve estimation and reporting, and how price sensitivity should be measured during periods of low prices. Documentation requirements were clarified, including the requirement for a Mineral Reserves Declaration Report. The role of the Competent Person was reemphasized.

The 2007 SME Guide reflects the recommendations made to the U.S. SEC in 2005. However, the position of the U.S. SEC with respect to public reporting remains that stated in Industry Guide 7 as interpreted by U.S. SEC Staff. Consequently at any given time some key aspects of the 2007 SME Guide may not be consistent with requirements of the U.S. Securities and Exchange Commission.

### **Governing Principles**

3. This Guide was written taking into account industry good practices and the mission of the U.S. Securities and Exchange Commission (U.S. SEC) which is to protect investors and maintain the integrity of the securities markets. All investors, whether large institutions or private individuals, should have access to certain basic facts about an investment prior to purchasing or selling it. The U.S. SEC requires public companies to disclose meaningful financial and other information to the public, which provides a common pool of knowledge for all investors to use to judge for themselves if a company's securities are a good investment. Only through the steady flow of timely, comprehensive and accurate information can the public make sound investment decisions. To meet the SEC's requirements for disclosure, a company must make available all information, whether it is positive or negative, that might be relevant to an investor's decision to buy, sell, or hold the security.

The main principles governing the development and application of this 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 to be misled.
- **Materiality** requires that a public report contains all the relevant information which investors and their professional advisers would reasonably require, and reasonably expect to find in a public report, for the purpose of making a reasoned and balanced judgment regarding the exploration results, mineral resources or mineral reserves being reported.
- **Competence** requires that the public report be based on work that is the responsibility of suitably qualified and experienced persons who are subject to an enforceable professional code of ethics and rules of conduct.

The following additional principles were also taken into account:

- **Consistency between Financial and Technical Reports:** Financial reports take into account mineral resources and mineral reserves and are based on assumptions concerning commodity prices, exchange rates, and other parameters of significance. To be clear and unambiguous technical and financial information should be published on a comparable basis.
- **Consistency between Financial Markets:** For global companies, transparency can only be achieved if information is reported on a consistent basis in all financial markets. Only then can the information supplied to all investors be identical, clear and unambiguous.

## Scope

4. **Public reporting:** The Guide is recommended as a minimum standard for reporting Exploration Results, Mineral Resources and Mineral Reserves for public and private purposes. In terms of the Guide, a Public Report is a report on Exploration Results, Mineral Resources and Mineral Reserves, prepared for the purpose of informing the general public.

*Public reports include, but are not limited to: company Annual Reports, quarterly reports, press releases, reports which the U.S. SEC requests companies to publish on a yearly, quarterly or other basis, and other reports. It is recommended that the Guide apply to the following reports if they have been prepared or are likely to be used for informing the general public: information memoranda, expert reports and technical papers reporting on Exploration Results, Mineral Resources or Mineral Reserves.*

5. **Use of the Guide:** Public companies should provide all relevant and material information, necessary for an intelligent layman to make a reasonable and balanced assessment of the Exploration Results, Mineral Resources and Mineral Reserves being reported.

*While every effort has been made within the Guide to cover most situations likely to be encountered in the reporting of Exploration Results, Mineral Resources and Mineral Reserves, there will inevitably be occasions when doubt exists as to the appropriate procedure to follow. In such cases, users of the Guide and those compiling reports under the Guide should be guided by its intent, which is to provide a minimum standard for 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 a reasoned and balanced judgment regarding the Exploration Results, Mineral Resources and Mineral Reserves reported.*

*Table 1, included at the end of the Guide, supplies an outline of items that should be considered when evaluating a project. The importance of each item will vary with the project, and it is recognized that, for some projects, other items may be relevant which are not on the list. The Table should be considered a guide to facilitate a rational and orderly approach to evaluation. However, the need remains for exploration and mining professionals to make difficult decisions, such as the classification of material as a Mineral Resource or a Mineral Reserve. Decisions remain a matter of professional judgment based on knowledge, experience, and industry practices.*

*The relative importance of the items in Table 1 will vary with each project depending on the geological environment and technical constraints, as well as economic and legal conditions pertaining at the time of evaluation. When evaluating a project, the relative importance of each item should be weighed. All relevant information must be given careful consideration before deciding which information should be reported to the public.*

*Where a particular report addresses only some of the items in Table 1, the report should disclose its limited scope and should refer to other information required for a complete evaluation of the Exploration Results, Mineral Resources and Mineral Reserves being reported. While such limited scope reports are commonly prepared as part of the overall preparation of an evaluation, such reports may contain information warranting public disclosure independent of the results of other studies, and the authors of such reports should be aware of their responsibilities with respect to public disclosure.*

*Public disclosure may be required of factors most likely to affect the accuracy of estimates made in the report. The authors of reports should both identify and evaluate these important factors within their reports.*

*For a variety of reasons, including the need for confidentiality, some data used to evaluate a project need not be made public. However, the public can reasonably assume that all necessary information is available to support public statements at the time they are made. Regulators including the U.S. SEC may require copies of all supporting documents on a confidential basis even if such documents are not made public.*

*Demonstrating feasibility of economic extraction is not required before reporting Exploration Results or Mineral Resources. However, particular attention should be given to all relevant information that increases or decreases the chances that the project will result in economic extraction. Demonstrating feasibility of economic extraction is required before reporting Mineral Reserves.*

*It is recognized that estimates of Exploration Results, Mineral Resources and Mineral Reserves, being predictions of what will occur in the future based on imperfect knowledge of the present, are inherently forward-looking statements, and will be imprecise to some degree. It is also recognized that different individuals analyzing the same data may arrive at somewhat differing interpretations and conclusions. The fact that a Mineral Reserve estimate is misclassified or proven inaccurate at a later date, when additional information becomes available or economic conditions have changed, does not necessarily*

*mean that the estimate was not made in good faith by a Competent Person taking into account the information available at the time. Statements concerning Exploration Results, Mineral Resources and Mineral Reserves must have a reasonable basis and be made in good faith.*

## **Competence and Responsibility**

6. Any Public Report concerning an entity's Exploration Results, Mineral Resources and Mineral Reserves is the responsibility of the entity's management. Any such report must be based on, and fairly reflect the information and supporting documentation prepared by a Competent Person or Persons, as defined below.

An entity issuing a Public Report shall make publicly available on request the name(s) of the Competent Person or Persons, state whether the Competent Person is a full-time employee of the entity, and, if not, name the Competent Person's employer, its relationship with the entity, and whether the Competent Person and his/her employer are independent with respect to the entity or project that is the subject of the Public Report.

Issuance of the Public Report requires the written consent of the Competent Person or Persons as to the form and context in which it appears. The entity must provide to the Competent Person the entity's public disclosure of information prepared by the Competent Person, and seek approval for its context and the use of the Competent Person's name in connection with that disclosure.

*The requirement for, and the naming of, a Competent Person is aimed at increasing the quality of the information being released, and at increasing investor confidence. These guidelines only require that the name of the Competent Person be made available on request. However, whenever Exploration Results, Mineral Resources and Mineral Reserves are publicly reported, it is recommended that the name of the Competent Person be disclosed.*

*The Competent Person should be independent of the entity issuing the Public Report or, if he/she is not independent, clear disclosure of the relevant relationships and interests should be made both in the Competent Person's report and in the relevant Public Reports.*

7. Documentation detailing Exploration Results, Mineral Resources and Mineral Reserves 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 Competent Person or Persons. If the Competent Person is an employee, officer, director or associate of a company whose principal business is the provision of engineering or geoscientific services, the documentation must also be signed by that company.
8. A **'Competent Person'** is a **Registered Member of the SME or a Member or Fellow of an approved 'Recognized Professional Organization' ('RPO') included in a list promulgated by the SME from time to time (Appendix A). A RPO is a U.S. or foreign self-regulatory organization of engineers, geologists or geoscientists that admits individuals on the basis of their academic qualifications**

**and experience, requires compliance with the professional standards of competence and ethics established by the organization, and has disciplinary powers, including the power to suspend or expel a member.**

**A Competent Person is an engineer, geoscientist or other mining professional who must have a minimum of five years experience which is relevant to the style of mineralization and type of deposit under consideration and to the activity which that person is undertaking.**

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

*The key qualifier in the definition of a Competent Person is the word 'relevant'. Determination of what constitutes relevant experience can be a difficult area, and common sense has to be exercised. Different experience is required to evaluate coal, base metal, industrial mineral, iron ore, sand and gravel, or gold deposits. Other differences are less obvious. 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 (say) a low grade disseminated gold deposit may not be. To qualify as a Competent Person in the estimation of Mineral Reserves for alluvial gold deposits, considerable (probably at least five years) experience in the evaluation and economic extraction of this type of 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 Competent Person if that person has relevant experience in other deposit types. For example, a person with (say) 20 years experience in estimating Mineral Resources for a variety of metalliferous hard-rock deposit types may not require as much as five years specific experience in (say) porphyry-copper deposits in order to act as a Competent Person. Relevant experience in the other deposit types could count towards the experience in relation to porphyry-copper deposits.*

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

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

*Estimation of Mineral Resources may be a team effort (for example, involving one person or team collecting the data and another person or team preparing the estimate). Estimation of Mineral Reserves is very commonly a team effort involving several disciplines. It is recommended that where there is a clear division of responsibility within a team, each Competent Person and his or her contribution should be identified, and responsibility accepted for that particular contribution. However, the definitions have been specifically written to allow an appropriate degree of latitude for companies to define the organizational structure within which they apply the role of the Competent Person. If only one Competent Person signs the Mineral Resource or Mineral Reserve documentation, that person is responsible and accountable for the whole of the documentation under the Guide. It is important in this situation that the Competent Person accepting overall responsibility for a Mineral Resource or Mineral Reserve estimate and supporting documentation prepared in whole or in part by others, is satisfied, in his/her professional opinion, that the work of the other contributors is reliable.*

*A Competent Person may be an employee of the entity reporting Exploration Results, Mineral Resources and Mineral Reserves, or an independent consultant. When the Competent Person's recommendations are likely to have material consequences (such as development of a new mining or processing facility, or significant decreases or increases in reserves), it is recommended that these recommendations be independently reviewed before the recommendations are finalized. The independent reviewer should qualify as a Competent Person in the context of the project being reviewed.*

10. Complaints made in respect of the professional work of a Competent Person will be dealt with under the disciplinary procedures of the professional organization to which the Competent Person belongs.
11. When a U.S.-listed company with foreign interests wishes to report foreign Exploration Results, Mineral Resources and Mineral Reserves, estimates prepared by a person who is not a Registered Member of the SME or a member or fellow of a Recognized Professional Organization (RPO), it is necessary for the company to nominate a Competent Person or Persons to take responsibility for the Exploration Results, Mineral Resources or Mineral Reserves estimate. The Competent Person or Persons undertaking this activity should appreciate that they are accepting full responsibility for the estimate and supporting documentation and should not treat the procedure merely as a 'rubber-stamping' exercise.

*Rules, regulations or guidelines concerning the Competent Person differ from country to country. When Exploration Results, Mineral Resources and Mineral Reserves are reported in the United States or in countries other than the United States, it is the responsibility of the Competent Person and the entity making a public report to ensure that the applicable rules, regulations and guidelines are followed.*

12. If documentation detailing Exploration Results, Mineral Resources or Mineral Reserves is signed by a firm or a company, a partner or director of the firm or company must also sign this documentation. This partner or director must have produced or directly supervised the production of the report on behalf of the company, and must satisfy the Competent Person criteria set out in the preceding paragraphs.

*A partner or director of a company who signs a document accepts overall responsibility for this document and must be satisfied, in his/her professional opinion, that the work of the other contributors is reliable. It is recommended that when a document is signed by a firm or company a list is included of all contributors who acted as Competent Persons in the preparation of parts of the document.*

*As stated in Clause 6 above, issuance of a Public Report must be based on documentation prepared by a Competent Person, and requires the written consent of the Competent Person. If the documentation used to prepare the Public Report was signed by a firm or company, the partner or director who signed the document assumes the responsibilities of the Competent Person.*

13. If documentation was signed by a partner or director of a firm or company, who is no longer a member of the firm or company, another partner or director can take responsibility for the documentation. This partner or director must satisfy the Competent Person criteria set out in the preceding paragraphs. Before signing this documentation the partner or director must complete sufficient work to be satisfied, in his/her professional opinion, that the content of the documentation remains reliable.

### **Reporting Terminology**

14. Public reports dealing with Exploration Results, Mineral Resources and/or Mineral Reserves must only use the terms set out in Figure 1.

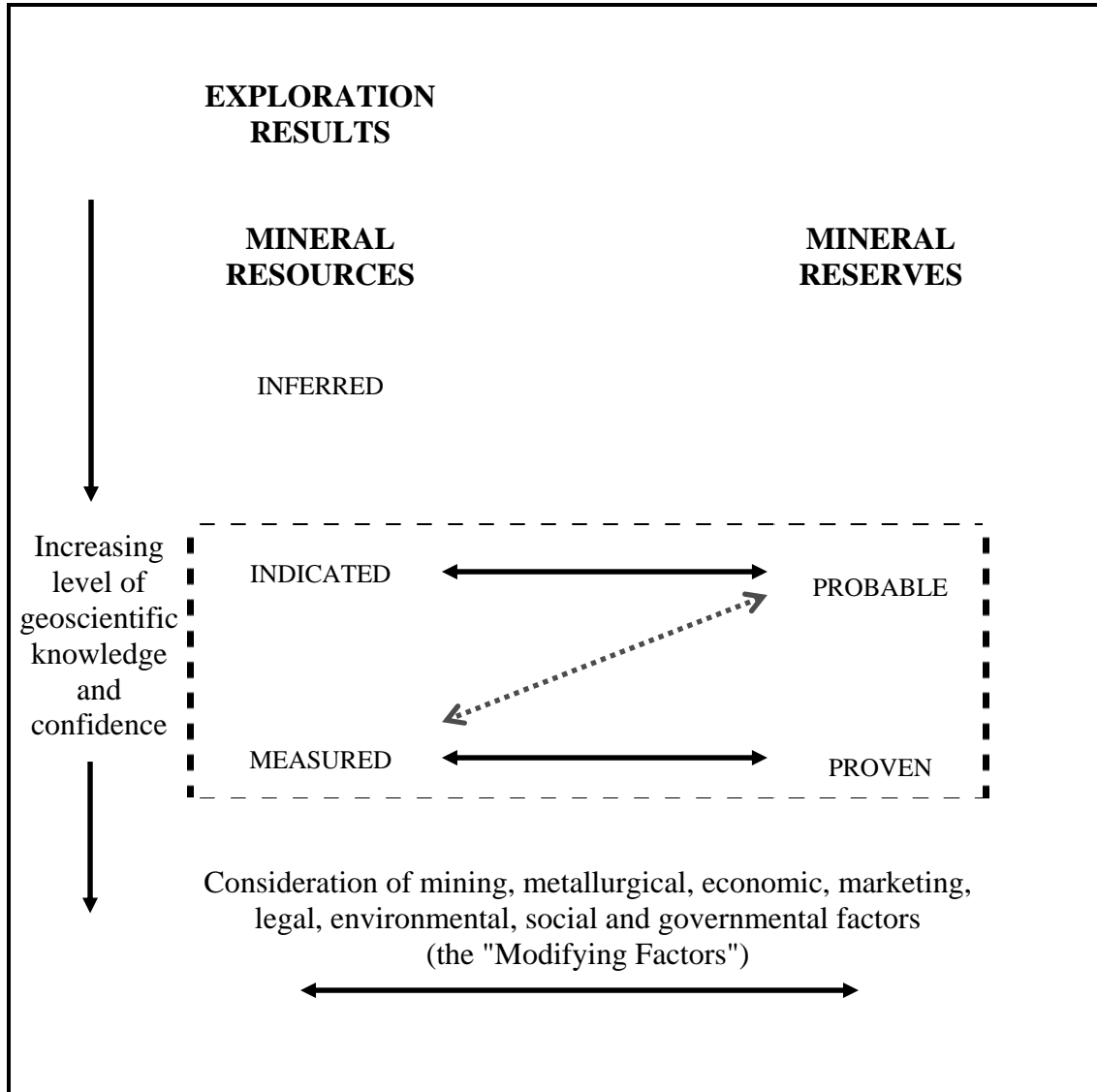
**The term ‘Modifying Factors’ is defined to include mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors**

*Figure 1 sets out the framework for classifying exploration results, tonnage and grade estimates, and contained or recoverable minerals as applicable. This classification reflects different levels of geoscientific knowledge and different degrees of technical and economic evaluation. Mineral Resources can be estimated mainly on the basis of geoscientific information with some input from other disciplines. Mineral Reserves, which are a modified sub-set of the Indicated and Measured Mineral Resources, require consideration of those factors affecting extraction, including mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors, and should in most instances be estimated with input from a range of disciplines.*

*In certain situations, Measured Mineral Resources could convert to Probable Mineral Reserves rather than to Proven Mineral Reserves because of uncertainties associated with 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. In such situations, these modifying factors should be fully explained.*

*In certain situations, previously reported Mineral Reserves could convert back to Mineral Resources because of new information according to which a Mineral Reserve can no longer be reported. The resulting two-way relationship is shown by the two-headed arrows in Figure 1. The modifying factors which resulted in reclassification of a Mineral Reserve should be fully explained.*

**Figure 1 – General Relationship between Exploration Results, Mineral Resources and Mineral Reserves**



### **Public Reporting – General**

15. Public Reports concerning an entity's Exploration Results, Mineral Resources or Mineral Reserves should include a description of the style and nature of mineralization.
16. An entity must disclose relevant information concerning the status and characteristics of a mineral deposit which could materially influence the economic value of that

deposit. To meet disclosure obligations, an entity may be required to promptly report any material changes in its Mineral Resources or Mineral Reserves.

17. An entity must review and publicly report on its Mineral Resources and Mineral Reserves at least annually.
18. Throughout the Guide, where appropriate, “quality” may be substituted for “grade” and “volume” may be substituted for “tonnage”.
19. Units used for reporting Mineral Resources or Mineral Reserves should be those generally applicable within the industry and within the jurisdiction where reporting takes place, for the mineral being reported.

### **Reporting of Exploration Results**

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

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

If an entity reports Exploration Results in relation to mineralization not classified as a Mineral Resource or a Mineral Reserve, then estimates of tonnages and average grade must not be assigned to the mineralization unless the situation is covered in Clause 22 below, and then only in strict accordance with the requirements of that clause.

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

21. Public reports of Exploration Results must contain sufficient information to allow a considered and balanced judgment of their significance. Reports must include relevant information such as exploration context, type and method of sampling, sampling intervals and methods, relevant sample locations, distribution, dimensions and relative location of all relevant assay data, data aggregation methods, land tenure status plus information on any of the other criteria listed in Table 1 that are material to an assessment.

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

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

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

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

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

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

## **Reporting of Mineral Resources**

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

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

*The term “Mineral Resource” covers mineralization (including, in certain instances, dumps and tailings) which has been identified within reasonable limits 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 Competent Person with respect to 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 cutoff grade, likely mining dimensions, location, or continuity. It is a realistic inventory of mineralization which, under assumed and justifiable technical and economic conditions, might become economically extractable.*

*The term "reasonable prospect" implies that Measured, Indicated, and Inferred Mineral Resources are constrained within pit shells or cones for open pit mines, or constrained to coherent zones which support mining, processing and development cost estimates for underground extraction. A deposit model is required, which may be a computer-generated block model or a model based on cross- or long-sections. Economic tests should be documented in technical studies, but the disclosure of Mineral Resources should not require formal detailed technical and economic studies such as those required for reserve disclosure. Economic criteria should be applied equally to all categories of Mineral Resources (Measured, Indicated and Inferred).*

*When publishing Mineral Resources, a statement should be made that, while the estimate of Mineral Resources is based on the Competent Person's judgment that there are reasonable prospects for eventual economic extraction, no assurance can be given that Mineral Resources will eventually convert to Mineral Reserves. Consideration should also be given to publication of the reasons why a reported Mineral Resource was not reported as a Mineral Reserve.*

*Commodity prices used in Mineral Resource reporting should be based on the company's long-term view of the likely range of commodity prices. If prices used for Mineral Resource estimation differ from the company's long-term view as used for reserve reporting, these differences should be documented and justified.*

*Publication of Mineral Resources is recommended but not required unless it represents material information which should be publicly disclosed. It is also recommended that, when publicly disclosing Mineral Resources, material assumptions made to estimate these Mineral Resources are also disclosed. This may include disclosure of commodity price assumptions to the extent that this is customary and does not place the company at a competitive disadvantage. It is recognized that in some cases, such as when a product is sold under long term contract whose terms must be kept confidential, there might be valid commercial reasons for non-disclosure. There are also circumstances where disclosure of long-term price assumptions used for business planning and reserve reporting can be detrimental to the company, such as when bidding for sales contracts or property acquisition. If prices are not published, the reasons for doing so must be documented. This documentation may be treated as confidential but should be available for review by auditors or regulators when required.*

*Cutoff grades, minimum thicknesses, or other quality parameters determined by the Competent Person should be used to exclude material for which there is no reasonable prospect for eventual economic extraction. Mineral Resource estimates may include material below the selected cutoff grade to ensure that the Mineral Resources comprise bodies of mineralization of adequate size and continuity to show reasonable prospects for eventual application of a feasible mining method.*

*Where considered appropriate by the Competent Person, the confidence in estimates of tonnage, grade, quality, physical characteristics and deleterious elements that may affect the ability to recover, beneficiate or produce a saleable product must be considered in determining whether a Mineral Resource can be reported and in classifying the Mineral Resource as Inferred, Indicated or Measured*

*All material assumptions made in determining the reasonable prospects for eventual economic extraction must be documented and justified.*

*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. For many gold deposits, application of the concept would normally be restricted to much shorter periods of time, but for Witwatersrand-type gold deposits long periods do apply. Interpretation is the responsibility of the Competent Person.*

*Any adjustment made to the data for the purpose of making the Mineral Resource estimate, for example by cutting or factoring grades, should be clearly documented and justified.*

*Certain reports (e.g., inventory reports, exploration reports to a 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 estimates of mineralization would not qualify as Mineral Resources by this definition.*

*Mineralized stope fill, mineralized in situ remnants, shaft and stope pillars left for ground support purposes, and stockpiles of mineralized material, old dumps and tailings can be considered when reporting Mineral Resources if they present reasonable prospects for eventual economic extraction.*

24. An **Inferred Mineral Resource** is that part of a Mineral Resource for which the overall tonnages, grades and mineral contents can be estimated with a reasonable level of confidence. It is based on geological evidence and apparent geological and grade continuity after applying economic parameters. It is derived from information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes, and which in some way is limited or of uncertain quality and reliability. An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource.

**The term 'overall' means within that part of the deposit for which Measured, Indicated and Inferred Mineral Resources are reported.**

*The category is intended to cover situations where a mineral concentration or occurrence has been identified and limited measurements and sampling completed, but the data are sufficient to allow the inference of geological and grade continuity. Commonly, it would be reasonable to expect that the majority of Inferred Mineral Resources would upgrade to Indicated or Measured Mineral Resource with continued exploration/delineation drilling or other sampling. 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 sufficient to allow the application of assumed but not verified technical and economic parameters for conceptual planning. However, confidence is usually not sufficient to allow the results of the application of these technical and economic parameters to be used for incremental planning and production scheduling. For this reason, there is no direct link from an Inferred Mineral Resource to any category of Mineral Reserves (see Figure 1). Caution should be exercised if this category is considered in technical or economic studies.*

*Inferred Mineral Resources should exclude material for which there are insufficient data to allow the inference of geological or grade continuity. Inferred Mineral Resources are intended to be sufficiently*

*defined that overall tonnages, grades and mineral contents can be estimated with a reasonable level of confidence.*

25. An **‘Indicated Mineral Resource’** is that part of a Mineral Resource for which overall tonnages, densities, shapes, physical characteristics, grades and mineral contents can be estimated with high levels of confidence, and local tonnages, densities, shapes, physical characteristics, grades and mineral contents can be estimated with reasonable levels of confidence. An Indicated Mineral Resource is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings, and drill holes. The locations are too widely or inappropriately spaced to confirm geological continuity and grade continuity but are spaced closely enough for continuity to be assumed. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource, but has a higher level of confidence than that applying to an Inferred Mineral Resource.

The term ‘overall’ means within that part of the deposit for which Measured, Indicated and Inferred Mineral Resources are reported. The term ‘local’ means within selected parts of the deposit related to mining increments which are suitable for development of mine plans and financial analyses.

*A deposit or part of a deposit may be classified as an Indicated Mineral Resource when the nature, quality, amount and distribution of data are such as to allow the Competent Person determining the Mineral Resource to confidently interpret the geological framework and to assume continuity of mineralization. Confidence in the estimate is sufficient to allow the appropriate application of technical and economic parameters to prepare incremental plans and production schedules and to enable an evaluation of economic viability. Overall confidence in the estimates is high while local confidence is reasonable. The Competent Person must recognize the importance of the Indicated Mineral Resource category to the advancement of the feasibility of the project. An Indicated Mineral Resource estimate is of sufficient quality to support detailed technical and economic studies leading to a Mineral Reserves Declaration Report which can serve as the basis for major development decisions.*

26. A **‘Measured Mineral Resource’** is that part of a Mineral Resource for which both overall and local tonnages, densities, shapes, physical characteristics, grades and mineral contents can be estimated with a high level of confidence. It is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings, and drill holes. The locations are spaced closely enough to confirm geological and grade continuity.

The term ‘overall’ means within that part of the deposit for which Measured, Indicated and Inferred Mineral Resources are reported. The term ‘local’ means within selected parts of the deposit related to mining increments which are suitable for development of detailed mine plans and financial analyses.

*A deposit or part of a deposit may be classified as a Measured Mineral Resource when the nature, quality, amount and distribution of data are such as to leave no reasonable doubt, in the opinion of the*

*Competent Person determining the Mineral Resource, that the tonnage and grade of production planning and scheduling increments can be estimated within close limits and that any variation from the estimate would not significantly affect potential economic viability of individual increments. This category requires a high level of confidence in, and understanding of, the geology and controls of the mineral deposit. A Measured Mineral Resource estimate is of sufficient quality to support detailed technical and economic studies leading to a Mineral Reserves Declaration Report which can serve as the basis for major development decisions with no additional sampling or other geologic definition required.*

27. The choice of the appropriate category of Mineral Resource depends upon the quantity, distribution and quality of data available, the level of confidence that attaches to those data, and the appropriateness of the estimation methodology applied. The appropriate Mineral Resource category must be determined by the Competent Person.

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

*In deciding between Measured Mineral Resource and Indicated Mineral Resource, the Competent Person may find it useful to consider, in addition to the phrases relating to geological and grade continuity in Clauses 25 and 26, the phrase in the guideline to the definition for Measured Mineral Resource: "... any variation from the estimate would not significantly affect potential economic viability of individual increments".*

*In deciding between Indicated Mineral Resource and Inferred Mineral Resource, the Competent Person may wish to take into account, in addition to the phrases relating to geological and grade continuity in Clauses 25 and 26, the guideline to the definition for Indicated Mineral Resource: "Confidence in the estimate is sufficient to allow the appropriate application of technical and economic parameters to prepare incremental plans and production schedules and to enable an evaluation of economic viability", which contrasts with the guideline to the definition for Inferred Mineral Resource in Clause 24: "Confidence in the estimate is sufficient to allow the application of assumed but not verified technical and economic parameters for conceptual planning. However, confidence is usually not sufficient to allow the results of the application of these parameters to be used for incremental planning and production scheduling... Caution should be exercised if this category is considered in technical or economic studies".*

28. 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 order of accuracy of the estimate by rounding off to appropriately significant figures and by qualification with terms such as 'approximately'.

*Depending on the accuracy of the estimate, rounding to the second or third significant figure should be sufficient. For example, 10,863,425 tons at 8.23 per cent could be stated as 11 million tons at 8.2 percent or 10.9 million tons at 8.23 percent. In order to emphasize the imprecise nature of a Mineral Resource or Mineral Reserve estimate, it is recommended that the final result always be referred to as an estimate not a calculation.*

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

29. Mineral Resource reports must specify one or more of the categories of “Inferred”, “Indicated” and “Measured”. Reports must not contain Inferred Mineral Resource figures combined with either of the other two categories. The Measured and Indicated categories can be combined only if also reported separately. A Mineral Resource must not be reported in terms of contained metal or product unless corresponding tonnage and grade figures are also presented. Mineral Resource figures must not be aggregated with Mineral Reserve figures.

*In situations where both Mineral Resource and Mineral Reserve figures are reported (such as tonnage, grade, mineral content), the Mineral Resource figures must not include any material reported as a Mineral Reserve.*

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

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

*Mineral Resource estimates are sometimes reported after adjustment by cutting of high grades, the application of factors such as dilution, mine or mill “call factors”, and similar modifying factors. If any of the data are materially adjusted or modified for the purpose of making the estimate, this should be clearly stated in a public Mineral Resource report and the nature of the adjustment or modification described.*

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

31. The words ‘ore’ and ‘reserves’ must not be used in stating Mineral Resource estimates as the terms imply technical feasibility and economic viability and are only appropriate when all relevant mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors have been considered. Reports and statements should continue to refer to the appropriate category or categories of Mineral Resources until technical feasibility and economic viability have been established. If re-evaluation indicates that the Mineral Reserves are no longer viable, the Mineral Reserves must be reclassified as Mineral Resources or removed from Mineral Resource/Mineral Reserve statements altogether.

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

32. As a minimum, the Competent Person should review Mineral Resource supporting documents on an annual basis. Reports must be updated if there are significant changes in technical and economic parameters.

*If such review results in material changes in, or reclassification of Mineral Resources, timely disclosure may be required.*

### **Reporting of Mineral Reserves**

33. 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. Appropriately detailed assessments and studies have been carried out and include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction could reasonably be justified. Mineral Reserves are sub-divided in order of increasing confidence into Probable Mineral Reserves and Proven Mineral Reserves.

**Before a Mineral Reserve is publicly reported, a Mineral Reserves Declaration Report must be prepared as defined later in this Guide. This report must contain a description of the appropriately detailed assessments and studies that have been carried out to demonstrate that extraction could reasonably be justified.**

*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 Competent Person making the estimates, can be the basis of a viable project after taking account of all relevant mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. Mineral Reserves are inclusive of diluting material which will be mined and delivered to the treatment plant or equivalent.*

*The term “economic” implies that extraction of the Mineral Reserve has been established or analytically demonstrated to be viable and justifiable under reasonable investment and market assumptions. The term “Mineral Reserve” need not necessarily signify that extraction facilities are in place or operative or that all governmental approvals have been received. It does signify that there are reasonable expectations of timely approvals.*

*It should be noted that the Guide does not imply that an economic operation must have Proven Mineral Reserves. Situations arise where Probable Mineral Reserves alone may be sufficient to justify extraction, as for example with some alluvial tin or gold deposits. This is a matter for judgment by the Competent Person and the management of the entity owning the information.*

*The terms "Ore Reserves" and "Mineral Reserves" can be used interchangeably where it is customary to do so, usually for metallic deposits and some industrial minerals.*

*Public disclosure of Mineral Reserves is allowed only after completion of a Mineral Reserves Declaration Report as defined later in this Guide.*

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

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

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

*A Proven Mineral Reserve represents the highest confidence category. The style of mineralization or other factors could mean that a Proven Mineral Reserve cannot be demonstrated in some deposits. Competent Persons should be aware of the consequences of declaring a Proven Mineral Reserve before satisfying themselves that all of the relevant Mineral Resource parameters and modifying factors have been established at a similarly high level of confidence. Subsequent retraction of a publicly reported Proven Mineral Reserve can lead to investor uncertainty and lack of corporate confidence.*

36. The choice of the appropriate category of Mineral Reserve is determined primarily by the classification of the corresponding Mineral Resource and after considering any uncertainties in the modifying factors. Allocation to the appropriate category must be made by the Competent Person.

*The Guide provides for a direct relationship between Indicated Mineral Resources and Probable Mineral Reserves and between Measured Mineral Resources and Proven Mineral Reserves. In other words, the level of geoscientific confidence for Probable Mineral Reserves is at least as high as that required for the determination of Indicated Mineral Resources, and the level of geoscientific confidence for Proven Reserves is the same as that required for the determination of Measured Mineral Resources.*

*The Guide provides for a two-way relationship between Measured Mineral Resources and Probable Mineral Reserves. This is to cover the 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.*

*If the uncertainties in the modifying factors that prevented the Measured Mineral Resource being converted to a Proven Mineral Reserve are removed, then the Measured Mineral Resource may be converted to a Proven Mineral Reserve. No amount of confidence in the modifying factors for conversion of a Mineral Resource into a Mineral Reserve can override the upper level of confidence which exists in the Mineral Resource. Under no circumstances can an Indicated Mineral Resource be converted to a Proven Mineral Reserve, unless new information first justifies conversion to a Measured Mineral Resource. Under no circumstances can an Inferred Mineral Resource be converted to a Mineral Reserve unless first converted to an Indicated or Measured Mineral Resource.*

*Application of the category of a Proven Mineral Reserve implies the highest degree of confidence in the estimate.*

*Refer also to corresponding Clause 25 to 27 in this Guide regarding classification of Mineral Resources.*

37. Mineral Reserve estimates are not precise calculations. Tonnage and grade figures in reports should be expressed so as to convey the order of accuracy of the estimates by rounding off to appropriately significant figures.

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

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

*Depending on the accuracy of the estimate, rounding to the second or third significant figure should be sufficient. For example, 10,863,425 tons at 8.23 per cent could be stated as 11 million tons at 8.2 percent or 10.9 million tons at 8.23 percent.*

38. Mineral Reserve reports must specify one or both of the categories of ‘Proven’ and ‘Probable’. Reports that combine Proven and Probable Mineral Reserve figures must provide estimates for each category if this information is material. Reports must not present contained metal figures unless corresponding tonnage and grade figures are also presented.
39. When reporting a Mineral Reserve, tonnages, grades and mineral or metal contents must be reported after taking into account mining loss and mining dilution. Metal contents can be reported after also taking into account processing recoveries. If processing recoveries are not taken into account, the percentage expected to be recovered or lost during processing must be reported.
40. In situations where figures for both Mineral Resources and Mineral Reserves are reported, a clarifying statement must be included in the report which clearly indicates that the Mineral Resources do not include any material reported as Mineral Reserves.

*An appropriate form of clarifying statement may be:*

*"The Mineral Resources do not include material reported as Mineral Reserves."*

*It is strongly recommended that, if there is a significant difference between a Mineral Reserve and the Mineral Resource from which this Mineral Reserve was estimated, an explanation of the reasons for the difference should be included in the report. This will assist the reader of the report in making a judgment of the likelihood of the remaining Mineral Resources eventually being converted to Mineral Reserves.*

*When converting Mineral Resources to Mineral Reserves, Mineral Reserves may incorporate material (dilution) which may not have been included in the original Mineral Resource. This fundamental difference between Mineral Resources and Mineral Reserves should be explained if of material significance.*

*Remaining Mineral Resources must be reported separately from Mineral Reserves because the resulting total may be very misleading in economic terms and may be misunderstood or, more seriously, misused to give a false impression of the prospectivity of a project.*

*Public reporting of tonnage and grade estimates other than Mineral Resources and Mineral Reserves is not permitted under the Guide. Other estimates may be useful for an entity in its internal calculations and evaluation processes, but their inclusion in public reports could cause confusion.*

*In preparing the Mineral Reserve statement, the relevant Mineral Resource statement on which it is based should first be developed. This should be reconciled with the Mineral Resource statement estimated for the previous comparable period and differences (due, for example, to mine production, exploration, etc.) should be identified. The application of appropriate factors to the Mineral Resource can then be made to develop the Mineral Reserve statement which can also be reconciled with the previous comparable Mineral Reserve statement. Mining companies are encouraged to reconcile estimates whenever possible in their reports. A detailed account of differences between Mineral Reserves and corresponding Mineral Resource figures is not essential, but sufficient comment should be made to enable significant variances to be understood by the reader.*

*Mineral Reserve estimates are sometimes reported after adjustment by cutting of high grades, the application of factors such as dilution, mine or mill "call factors", and similar modifying factors. If any of the data are materially adjusted or modified for the purpose of making the estimate, this should be clearly stated in a public Mineral Reserve report and the nature of the adjustment or modification described.*

41. As a minimum, the entity should enable the Competent Person to review Mineral Resource and Mineral Reserve supporting documents on an annual basis. Reports must be updated if there are significant changes in technical and economic parameters.

*If such review results in material changes in, or reclassification of Mineral Resources and Mineral Reserves, timely disclosure may be required. In operating mines, reconciliation reports which compare mined resources and reserves with actual production, should be reviewed annually.*

## Mineral Reserves Declaration Report

42. Public disclosure of Mineral Reserves is allowed only after completion of a technical and economic study whose results and supporting documentation form a 'Mineral Reserves Declaration Report'. The Competent Person is responsible for the content of the Mineral Reserves Declaration Report and supporting documentation.

*The content of a Mineral Reserves Declaration Report will vary depending on the project being studied. It is the responsibility of the Competent Person to determine that all applicable subjects are taken into account when preparing the report. A checklist of assessment criteria is given in Table 1. It is the responsibility of the Competent Person to determine which ones of these criteria and which additional criteria should apply to a particular project. The relative importance of these criteria will vary with the particular project and the legal and economic conditions pertaining at the time of determination.*

*The Mineral Reserves Declaration Report can be a single document in which all assessment criteria deemed applicable by the Competent Person are analyzed, or a summary document which contains supporting documentation by reference only. The Competent Person takes responsibility for the content of the Mineral Reserves Declaration Report and all supporting documentation included by reference.*

43. A **'Mineral Reserves Declaration Report'** is the result of a properly defined, adequately scoped, and professionally executed study of the viability of a mineral project. The study must have advanced to the stage where mining and mineral processing methods are defined and permitting is determined to be feasible. Realistic production and/or sales schedules must have been developed for the life of the project, including estimates of capital and operating costs. For projects with very long life the study must be sufficient to justify investments needed for current and planned production, as well as ongoing investments which will be needed to maintain long-term operations.

**For new projects, the study must include a financial analysis, based on realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors, that is sufficient for a Competent Person, acting reasonably, to determine if all or part of the Measured and Indicated Mineral Resource may be converted to a Mineral Reserve.**

**For addition of Mineral Reserves to an existing operation or project, the study must be thorough enough to ensure that, in the opinion of the Competent Person, the previously declared Mineral Reserve combined with the new addition can be reported as a Mineral Reserve.**

*In making a Mineral Reserves declaration, it is implicit that the Mineral Reserves Declaration Report and associated studies conclude that, in the opinion of the Competent Person, the material disclosed meets the requirements of technical and economic viability and that, in the opinion of the entity reporting the Mineral Reserves, development of the Mineral Reserves would meet reasonable investment criteria when compared to alternative investments with similar risk.*

*In the case of a new mine, the Mineral Reserves Declaration Report will comprise, either in its entirety or by reference, a comprehensive suite of documents, produced under the supervision of a Competent Person, which support the reserve estimates being published. It is the Competent Person's responsibility to ensure that the documentation is sufficiently complete, accurate and cohesive as a whole to demonstrate the required confidence to enable public disclosure of the Mineral Reserves.*

*In the case of an operating mine, where existing reserves and mining experience lend greater confidence to the estimation of contiguous or nearby reserves, ensuring that the work done addresses all the issues required to establish a Mineral Reserve remains the responsibility of a Competent Person. The work must be supported by a Mineral Reserves Declaration Report covering, either directly or by reference, all of the relevant factors but with selective modification and allowances based on operating data and the inclusion of the new reserves in an overall project mining plan.*

*In the case of an operating mine or a mine with historical operation, if sufficient data are available, a reconciliation report should be included in the Minerals Reserves Declaration Report. A reconciliation report is a report which, for a defined time period or volume mined, compares actual production (as estimated from ore control, mine production reports, and/or mill production reports) with expected production as determined from the deposit model used for reserve estimation.*

44. Public Reporting of a Mineral Reserve will normally indicate the intent to mine, or that a tangible asset has been defined for potential sale. Sufficient work should have been done during the study to confirm with reasonable certainty that there are no likely impediments, whether technical, economic or legal, to a mining operation being established.

*A Mineral Reserve Declaration Report must discuss and explain risk (defined as the possibility of loss or failure), and where possible provide further explanation of how uncertainty (defined as incomplete knowledge which can result in either risk or opportunities) will be handled. If representing material information, project risk must also be disclosed in terms that the lay investor can understand.*

*Where Mineral Reserves have been defined but are scheduled to be mined at a date some distance in the future (as is commonly the case in the coal industry), sufficient assurance should be available on annual basis that, in the judgment of the Competent Person, endorsed by the reporting entity, economic viability can be demonstrated and the reserves retained in inventory.*

*Once Mineral Reserves have been defined and disclosed, further optimization may take place together with other refinements designed to provide sufficiently detailed engineering to establish cost estimates, define and mitigate risks and determine an implementation plan. However, it is implicit in a reserves declaration that this phase of optimization will not materially negatively affect the quantity, quality or economic viability of the Mineral Reserves.*

*When a Mineral Reserve is published, an assurance statement must be made that the Mineral Reserve Declaration Report standard was followed.*

45. The contents of a Mineral Reserves Declaration Report may include sensitive information on product pricing strategies, marketing and sales forecasts and as such may remain confidential to the reporting entity. Where required or requested for the purposes of review or audit, the reporting entity will release this information to appropriate bodies such as the regulators or auditors on a confidential basis as supplemental information.

46. Table 1 provides, in a summary form, a list of the main criteria which should be considered when preparing reports on Exploration Results, Mineral Resources and Mineral Reserves. These criteria must be taken into account when preparing a Mineral Reserves Declaration Report, but need not be discussed in a public report unless they materially affect estimation or classification of the Mineral Reserves.

*It is not necessary, when publicly reporting Mineral Reserves, to comment on each item in Table 1, but it is essential to discuss any matters which might materially affect the reader's understanding or interpretation of the results or estimates being reported.*

47. In estimating Mineral Reserves, information on assumed metallurgical recovery factors and processing losses play a critical role. Similarly, information relating to deleterious elements and physical characteristics that affect the ability to beneficiate or sell the product is also critical. This information must be discussed in the Mineral Reserves Declaration Report and, depending on its materiality, may have to be publicly disclosed.
48. Only that part of a Mineral Resource that has been classified as a Measured or Indicated Mineral Resource can be considered for conversion to a Mineral Reserve. Under no circumstance can an Inferred Mineral Resources be converted to a Mineral Reserve unless it is first converted to an Indicated or Measured Mineral Resource. When completing production schedules and economic studies for the purpose of determining whether a Mineral Reserve can be publicly reported, no material other than Measured and Indicated Mineral Resources should be considered.

### **Mineral Reserves and Commodity Pricing**

49. Commodity prices used for the determination of 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. The basis for the selected prices must be justified and supported by appropriate documentation. The Competent Person must ascertain that these prices are consistent with historical prices or with sales agreements and marketing determinations.
50. For current mining operations, the price profile used for Mineral Reserve estimation can reflect current market conditions for short-term forecasts, while trending with time upward or downward toward the long-term price estimates based on management's expectations. For undeveloped Mineral Reserves, management should use their long-term price expectations.
51. For commodities sold under existing contracts, 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 prices applicable for the estimation and reporting of these Mineral Reserves.

52. 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 being the economically mineable part of a Measured or Indicated Mineral Resource, appropriate assessments must demonstrate at the time of reporting that extraction is reasonably justified. This requires that assumptions are made concerning the price of the commodity or product that will be sold when the mine is in production.*

*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.*

*Management's price expectations must be reasonable and supportable. 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 reserves. It is the responsibility of management and the Competent Person to determine whether the prices used for reserve estimation are reasonable and supportable, given all available information.*

*During periods of low prices, a mining company may choose to temporarily curtail operations and save the asset until prices recover. When such actions are taken, this information must be publicly disclosed. In such circumstances, previously published Mineral Reserves may not have to be written off, provided, in the opinion of management and the Competent Person higher future prices can be reasonably and supportably assumed. As discussed below, whenever applicable a Reserve Sensitivity Test must be performed as part of the Mineral Reserves estimation process, the results of which will assist investors in determining the risk associated with a project in periods of low commodity prices.*

53. The forward price profile used to estimate Mineral Reserves, including expected short-term and long-term prices, and justification of these prices, must be documented. This documentation must be included in the Mineral Reserves Declaration Report.

*It is likely that part or all of the price profile documentation will contain sensitive information which should be treated as confidential. Where required or requested for the purposes of review or audit, this information may be released to appropriate bodies such as the U.S. SEC or auditors on a confidential basis as supplemental information.*

*The documentation supporting management's expectations may include: comparison of prices with historical and current prices and forward curves, contracts and market considerations, currency exchange rates where applicable, third party sources, and supplemental information.*

54. Public disclosure of prices used for Mineral Reserve estimation is recommended but not required. When commodity prices are disclosed, disclosure can be as a single price estimate equal to that used for reserve determination, or as a range of prices

within which no material change in reserves would occur. Whether or not commodity prices used to estimate reserves are published, the overall methodology used to determine those prices should be disclosed. Such disclosure should be in a form which helps investors determine whether, in their own opinion, prices used represent reasonable views of future prices.

*It is recognized that in some cases, such as when a product is sold under long term contract the terms of which must be kept confidential, there can be valid commercial reasons for non-disclosure. There are circumstances where disclosure of long term price assumptions used for business planning and reserve reporting can be detrimental to the company and the investors, such as when bidding for sales contracts or property acquisitions. If prices are not published, the reasons for doing so must be documented. This documentation may be treated as confidential but should be available for review by auditors or regulators when required.*

## Reserves Sensitivity Test

55. When estimating Mineral Reserves, and if historical commodity prices are available, a **Reserves Sensitivity Test** should be conducted. The objective is to assess and report the sensitivity of the Mineral Reserves to recent fluctuations in commodity prices. This test is conducted based upon the realization of a positive non-discounted cumulative forward-looking cash flow at a **Test Price** equal to the average commodity price which prevailed during the most recent last three-years. The Test Price should be calculated as of the end of the financial year of the reporting entity, or within six months prior to the end of the financial year.

If the commodity price(s) used to develop the reserves is higher than the most recent three-year average price(s), the reporting entity should determine if mining the reserves at the most recent three-year average commodity price(s) generates non-discounted, forward-looking positive cumulative cash flow for each operating unit. If not, the reporting entity should disclose for those operating units (whether in production, proposed or curtailed) the commodity price(s) that is required to achieve positive cumulative cash flow.

It is recognized that there are commodities for which historical prices which reflect the value of the product sold (or to be sold) are not publicly available. In such circumstances, a Test Price cannot be calculated, and a Reserves Sensitivity Test is not required.

*A Test Price can usually be calculated for base metals and precious metals as such prices are quoted on international exchanges. There are other commodities for which publicly quoted prices may not be available or may not represent the value of the product sold or to be sold. In such cases, a Reserves Sensitivity Test cannot be meaningfully completed. The lack of necessary price information must be documented in the Mineral Reserves Declaration Report.*

*If a Mineral reserve is reported using a price lower than the test price, the forward-looking discounted cash flow must be positive, and the Reserve Sensitivity Test (based on an undiscounted cash flow) need not be performed.*

*When applicable, a statement should be made that a Reserves Sensitivity Test was completed, or that such a test was not applicable. The test results must be included in the Mineral Reserves Declaration Report. The Reserves Sensitivity Test should be applied to each mine or each reporting unit, in accordance with the format used in publicly reporting the Mineral Reserves. The test results should be listed separately for each mine or reporting unit which failed to pass the test. Mines or reporting units which successfully passed the test can be reported as a group.*

*If the Reserve Sensitivity Test was applied and failed during the current and previous reporting years, this should be taken into account to determine whether continued declaration of reserves is justified. Even if reserves can still be declared, the Competent Person may recommend additional disclosure explaining why reserves continue to be declared in spite of failing the test two years in a row.*

*When exchange rates must be taken into account to complete the Reserves Sensitivity Test, the average exchange rate which prevailed during the last three years should be used. When conducting the Reserves Sensitivity Test, all prices and costs must be on a constant price (un-escalated) basis.*

## **Permitting and Legal Requirements**

56. For a mineral deposit to be considered a Mineral Reserve, it is required that legally enforceable mineral title sufficient to allow exploration, development and extraction is controlled by the reporting entity at the time of determination. If the reporting entity is leasing or sub-leasing the mineral, the lease or sub-lease should be from an entity which has control of the necessary mineral titles. There must be no known material obstacles to mining, such as those which have caused shut down of mines or processing plants, or failure to get permits to operate. There must be a reasonable expectation that all permits, ancillary rights and authorizations required for mining, and to the extent applicable processing, can be obtained in a timely fashion, and maintained for ongoing operations.

*The reporting entity must complete a review of all legal and permitting requirements and document the results of this review. Local environmental laws and processes must be taken into account. To demonstrate reasonable expectation that all permits, ancillary rights and authorizations can be obtained, the reporting entity must show understanding of the procedures to be followed to obtain such permits, ancillary rights and authorizations. Demonstrating earlier success in getting the necessary permits can be used to document the likelihood of success. If permits are required, but there is no defined procedure to obtain such permits, reasonable expectation of success may be questioned.*

*Information which 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 reserve determination. If it is determined that obstacles arise or are eliminated, the reserve estimates must be adjusted accordingly.*

*It is recognized that some permits cannot be obtained until after a reserve has been declared. There might be sound business reasons why obtaining some permits should be postponed. It is also recognized that waiting for all permits to be on hand could result in critical information not being released to the investors in a timely fashion.*

*Documentation should include a brief description of the title, claim, lease or option under which the reporting entity has or will have the right to hold or operate the property, indicating any conditions which*

*the registrant must meet in order to obtain or retain the property. If held by leases or options, the expiration dates of such leases or options should be stated. If extension of leases or options will be needed to mine the reserves, there should be reasonable expectation that such extension will be granted.*

*Information relating to this review of legal and permitting issues must be documented in the Mineral Reserves Declaration Report 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.*

57. If the reporting entity has title in a mineral deposit which meets all the reserve criteria, and licenses, leases, or subleases the reserves to another entity for economic consideration, the Mineral Reserves that have been licensed, leased, or subleased, must be reported by the reporting entity (the lessor) as a subset of the entity's total Mineral Reserves.

If the reporting entity has licensed, leased, or subleased Mineral Reserves from another entity, the Mineral Reserves that have been licensed, leased, or subleased, must be reported by the reporting entity (the lessee) as a subset of the entity's total Mineral Reserves.

*This requirement for additional disclosure is particularly relevant to mineral holding companies whose business is leasing mineral properties.*

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

58. The Guide applies to the reporting of all potentially economic mineralized material including mineralized fill, pillars, low-grade mineralization, stockpiles, dumps, and tailings.

*For the purposes of the Guide, mineralized stope fill and stockpiles of mineralized material can be considered to be similar to in situ mineralization when reporting Mineral Resources and Mineral Reserves. Consequently the Competent Person carrying out the assessment of the fill or stockpiles must use the bases of classification outlined in the Guide. In most cases, the opinion of a mining engineer should be sought when making judgments about the mineability of fill, remnants and pillars.*

*If there are not reasonable prospects for the economic extraction of a particular portion of the fill or stockpile, then this material cannot be classified as either Mineral Resources or Mineral Reserves. If some portion 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. Such stockpile material may include old dumps and tailings dam material. 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.*

*Because processing recoveries for previously mined material (mineralized fill, stockpiles, dumps, and tailings) are usually different from those expected from un-mined in situ material, the Competent Person should obtain the professional opinion of a metallurgical engineer regarding the processing recoveries that can be expected from these types of materials.*

*The above guidelines apply equally to low-grade in situ mineralization, sometimes referred to colloquially 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 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 and of material importance, should be reported separately together with the basis for estimation.*

*Mineralized remnants, shaft pillars and mining pillars which are potentially mineable are in situ mineralization and consequently are included in the Guide definitions of Mineral Resources and Mineral Reserves.*

*Mineralized remnants, shaft pillars and mining pillars which are not potentially mineable must not be included in Mineral Resource and Mineral Reserve statements.*

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

59. The clauses in this section of the Guide address matters that relate specifically to the Public Reporting of Mineral Resources and Mineral Reserves for coal. Coal is generally sold on the basis of product specifications and market acceptance. Such factors as quality and marketability are therefore important and should be carefully considered before declaring coal resources or coal reserves. Unless otherwise stated, all other clauses in this Guide, including Figure 1 and Table 1, apply to Exploration Results, Mineral Resources and Mineral Reserves for coal.

*When reporting information and estimates for coal deposits, the key principles and purpose of the Guide apply and should be borne in mind. Because of coal specific characteristics – including geological continuity over large areas, the strategic value of controlling very long term reserves, and product pricing highly dependent on deposit location and coal quality – the most significant requirements which must be satisfied before a resource or a reserve is declared are not necessarily the same for coal as they are for other minerals.*

60. The terms 'Mineral Resource' and 'Mineral Reserve', and the subdivisions of these terms as illustrated on Figure 1, apply also to coal reporting, but if preferred by the reporting entity, the terms 'Coal Resource' and 'Coal Reserve' and the appropriate subdivisions may be substituted.

*When assessing criteria listed in this Guide which may be applicable to coal, the term 'grade' should generally be considered equivalent to 'coal quality'.*

61. As for all minerals, it is the responsibility of the Competent Person to determine in each particular situation which specific requirement must be satisfied before a Coal Resource or a Coal Reserve can be declared. The Competent Person should determine which evaluation criteria in Table 1 are applicable, which additional

evaluation criteria should be taken into account if any, and the materiality of such criteria.

*Many criteria listed in Table 1 which may be critical to the evaluation of other mineral deposits, such as base metals or precious metals, will not apply to the evaluation of coal deposits. Such criteria as coal quality, cost to markets including transportation cost, location and quality of competing coal reserves, and ability to compete with such reserves to access the market, are important and should be carefully considered before declaring a Coal Reserve.*

*Geological similarity between neighboring coal deposits can greatly simplify demonstration of a new Coal Resource, as well as reduce the technical and economic study requirements needed to demonstrate a Coal Reserve next to an operating mine. Geological similarity must be demonstrated by means of drill holes, mapping or other deposit-specific geoscientific evidence to a suitable level of confidence required to declare Measured and/or Indicated Resources. Mere inference of the continuity of coal thickness and quality from an operating mine onto a neighboring block or property is not sufficient to declare Measured and Indicated Resources and subsequently a Reserve.*

*Demonstration of geological similarity or analogy with an operating mine is usually not sufficient to demonstrate technical and economic feasibility. Factors such as access to the deposit and permitting constraints are likely to be project specific. It is the responsibility of the Competent Person to ascertain that there is sufficient information to demonstrate geological similarity and to determine which additional factors must be taken into account to demonstrate technical and economic feasibility with a reasonable level of confidence.*

*When a coal deposit is scheduled to be mined at a date some distance in the future, declaration of a Coal Reserve implies reasonable expectation at the time of reporting that the necessary permits could be obtained as needed.*

62. Coal Resources and Coal Reserves should be reported as saleable product, either as run-of-mine coal or washed coal.

*For coal deposits, it is common practice to report a saleable product rather than the "as mined" product which is traditionally regarded as the Mineral Reserve for most other minerals. It is important that a clarifying statement is included to ensure that the reader is fully informed as to what is being reported. Some coal 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 and reported.*

63. Coal Resources and Coal Reserves should be reported as Assigned or Unassigned.

*Assigned coal is coal that has been committed by the coal company to operating mine shafts, mining equipment, and plant facilities, and all coal which has been leased by the company to others. Unassigned coal represents coal that has not been committed, and which would require new mine shafts, mining equipment, or plant facilities before operations could begin on the property. The primary reason for this distinction is to inform investors which coal will require substantial capital investments before production can begin. Coal which has been leased to another company or is leased from another company must be disclosed separately.*

64. Recommendations made in this Guide, that price assumptions and sensitivity to price changes be disclosed, do not apply to coal.

*Coal is being sold in a highly competitive national and international market. Price disclosure can be viewed as price signaling and interpreted as anticompetitive. For business and legal reasons, disclosure of price assumptions made when estimating Coal Resources and Coal Reserves may be detrimental to the interest of shareholders and is usually not advisable. Other requirements concerning pricing which are included in the Guide are applicable to coal. This includes the requirement that prices be based on forward-looking estimates reflecting management's reasonable and supportable short- and long-term expectations, and that justification for such prices be documented.*

## **Reporting of Exploration Results, Mineral Resources and Mineral Reserves for Industrial Minerals**

65. The clauses in this section of the Guide address matters that relate specifically 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. Such factors as quality and marketability are therefore important and should be carefully considered before declaring Mineral Reserves. Unless otherwise stated, all other clauses in this Guide, including Figure 1 and Table 1, apply to Exploration Results, Mineral Resources and Mineral Reserves for industrial minerals.

*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 present access to market or ability to obtain access to market.*

*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 for base and precious metals and other minerals. 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.*

66. 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, transportation, cost to markets, location and quality of competing reserves, and ability to compete with such reserves to access the market, are important and should be carefully considered before declaring Mineral Reserves.

67. As a general rule, a Mineral Reserve cannot be declared unless there are reasonable expectations that all permits, ancillary rights and authorizations required for mining can be obtained. For some minerals such as sand, gravel and aggregates, permitting requirements may be such that reasonable expectations can only be defined by comparison with competing reserves. When a deposit is scheduled to be mined at a date some distance in the future, declaration of a Mineral Reserve implies reasonable expectation at the time of reporting that the necessary permits could be obtained when needed.
68. Recommendations made in this Guide, that price assumptions and sensitivity to price changes be disclosed, may not apply to all industrial minerals.

*Some industrial minerals are sold in a highly competitive local, national and/or international market. For business and legal reasons, disclosure of price assumptions may be detrimental to the interest of shareholders and may not be advisable. Other requirements concerning pricing which are included in the Guide are applicable to industrial minerals. This includes the requirement that prices be based on forward-looking estimates reflecting management's reasonable and supportable short- and long-term expectations, and that justification for such prices be documented.*

### **Reporting Exploration Results, Mineral Resources and Mineral Reserves for Diamonds and Other Gemstones**

69. The clauses in this section 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, all other clauses in this Guide, including Figure 1 and Table 1, apply to 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.*

70. 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. The lower cutoff size should be stated along with the type of bottom sieve used.

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

*In order to demonstrate that a resource has reasonable prospects for economic extraction, some appreciation of the likely stone size distribution and price is necessary, however preliminary. To determine an Inferred Mineral 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 Mineral Resource, and from there to a Probable Mineral 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.*

71. Where diamond Mineral Resource or Mineral Reserve grades (carats per ton) 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 number of stones and their weight reported by sieve size.
72. For Public Reports dealing with diamond or other gemstone mineralization, it is a requirement that a statement verifying the independence of the valuation accompany any reported valuation of a parcel of diamonds or gemstones. The valuation must be based on a report from a demonstrably reputable and qualified expert.

*If a valuation of a parcel of diamonds is reported, the weight in carats and the lower cutoff size of the contained diamonds must be stated and the value of the diamonds must be given in U.S. dollars per carat. Where the valuation is used in the estimation of diamond Mineral Resources or Mineral Reserves, the valuation must be based on a parcel representative of the size, shape and color 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. Checklist of Assessment Criteria**

Estimates of the value of mineral projects are expressions of judgment predicated on knowledge and experience. Such estimates are more than arbitrary determinations; they seek to attach value as a consequence of method. The methods employed must be scientifically valid, tested, using accepted scientific definitions of terms and accepted procedures, and best suited to the making of reliable estimates for the project in question. Evaluation of mineral projects requires periodic examination and evaluation of all new and existing data. The dynamic nature of the evaluation of mineral projects implies that a valid estimate made at a given time may be significantly changed when new information becomes available. Evaluation of a mineral project should consider all the criteria listed below and such additional criteria that may be viewed as significant. It is the responsibility of the Competent Person to determine which criteria listed below and which additional criteria should apply to the study of a particular project. The relative importance of the criteria will vary with the particular project and the legal and economic conditions pertaining at the time of determination. When information is publicly reported, it must be sufficient to enable an intelligent layman to make a reasonable and balanced assessment of the significance of this information. When and whether information should be publicly released is subject to current laws and regulations in the relevant jurisdictions.

<b>Evaluation Criteria</b>	<b>Exploration Results</b>	<b>Mineral Resource</b>	<b>Mineral Reserve</b>
<b>A. General</b>			
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.	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, township and range, easting and northing, etc.); a map showing location and access should exist.	See Exploration Results	See Exploration Results
4. Property Ownership	Description of ownership of surface rights, mineral rights, access rights, leases, concessions, royalties, and other	See Exploration Results	See Exploration Results

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
	encumbrances and liabilities.		
<b>B. Project Data</b>			
1. Location of Project Data	Maps and cross sections or other two- or three-dimensional representation of results should exist, showing location of samples, drill holes, exploration pits, underground workings, geological data, etc. When evaluating drill hole results, consideration should be given to depth to top and bottom of mineralization, to total length and average grade of intercepts, and to the accuracy of survey information including down-hole surveys.	See Exploration Results. Particular attention should be given to drill hole and other sample survey information including down-hole surveys. If the sample locations are not well known, the effect on the resource estimates should be considered.	See Mineral Resource. The location of samples and other relevant features (property lines, mine workings, etc.) should be well-known. The location of drill hole collars should be accurate and the adequacy of the down-hole surveying technique should be reviewed and commented on.
2. Geological Data	Description of the nature, detail, and reliability of geological information (rock types, structure, alterations, mineralizations, and relation to known mineralized zones, etc.). Description of geophysical and geochemical data. Reliable geological maps and cross sections should exist to support interpretations.	See Exploration Results. Particular attention should be given to drill hole logging and other sample information used in resource evaluation. Description of the thoroughness with which all significant lithologic, structural, mineralogical, alteration, or other geological or geotechnical characteristics were recorded. Significant data, or data that could materially influence the estimated quantity and quality of the resource, should be discussed.	See Mineral Resource
3. Topography	General topographic map is sufficient	Topographic map in sufficient detail to assess likelihood of eventual economic feasibility.	Detailed topographic map. Aerial surveys must be checked with ground controls and surveys, particularly in areas of rugged terrain, dense vegetation or high altitude.

<b>Evaluation Criteria</b>	<b>Exploration Results</b>	<b>Mineral Resource</b>	<b>Mineral Reserve</b>
4. Sampling			
a. Method	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.). Discussion of sample quality and representativeness (sample recovery, high grading, selective losses or contamination, and any other factors that may have resulted in sample biases, etc.). Discussion of whether duplicate samples or alternative methods of sampling were used to verify sample quality. If indirect methods of measurement were used (geophysical methods), these should be described, with attention given to errors in interpretation.	See Exploration Results. The quantity and quality of sample information is critical to the reliability of resource estimates. Particular attention should be given to this information.	See Mineral Resource. Adequate sampling verification techniques, including appropriate numbers of duplicates and appropriate statistical analyses of duplicates are required.
b. Preparation	Description of laboratory and method used for sample preparation, sub-sampling and size reduction, and likelihood of inadequate or non-representative samples (improper size reduction, contamination, etc.). Discussion of whether tests were performed to verify the suitability of sample preparation.	See Exploration Results	See Exploration Results. Verification of the suitability of sample preparation is required.
c. Analysis	Identification of laboratory and analytical method (fire assay, AA assay, emission spectroscopy, etc.). Discussion of precision and accuracy, including the use of check assays, quality control programs, and submission of samples to other laboratories for verification.	See Exploration Results	See Exploration Results. Verification of analytical techniques and quality control programs are required. Check sampling and assaying must have been performed by independent parties.

<b>Evaluation Criteria</b>	<b>Exploration Results</b>	<b>Mineral Resource</b>	<b>Mineral Reserve</b>
d. Specific Gravity and Bulk Tonnage	Generally not determined.	Discussion of how the tonnage factor was determined (assumed or measured). If assumed, which assumptions were made and on which basis. If measured, by what method and how frequently. Discussion of whether different tonnage factors were used in different parts of the deposit and why.	See Mineral Resource. The specific gravity and bulk tonnage must have been measured by methods that adequately account for void spaces (vugs, porosity, etc.) and for differences between rock and alteration zones within the deposit.
<b>C. Interpretation</b>			
1. Geological Interpretation and Model	Description of geological model and inferences made from this model. 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.	See Exploration Results. Discussion of sufficiency of data density to assure continuity of mineralization and provide an adequate data base for the estimation procedure used. 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.	See Mineral Resource.
2. Numerical Model	Generally not determined.	Detailed description of the method used and the assumptions made to estimate tonnages and grades (section, polygon, inverse distance, geostatistical, or other method). Description of how the geological interpretation was used to control the resource estimates. Discussion of basis for using or not using grade cutting or capping. If a computer method was chosen, description of programs and parameters used. Geostatistical methods are extremely varied and should be described in detail. The method chosen should be justified. The geostatistical	See Mineral Resource.

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
<b>D. Extraction</b>		parameters, including the variogram, and their compatibility with the geological interpretation should be discussed. Experience gained in applying geostatistics to similar deposits should be taken into account.	
1. Mining			
a. Method	Description of any obvious mining factors that could have a significant impact on the project feasibility.	Description of any mining factors that could have a significant impact on the project feasibility. Discussion of possible mining methods.	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 hydrological considerations, personnel requirements, dilution, and mine 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.
b. Costs	Generally not determined.	Stated reasonable assumptions.	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. Capital and operating budgets defined by year.
2. Processing			
a. Method	Description of any obvious processing factors that could have a significant impact on the project feasibility.	Description of any processing factors that could have a significant impact on the project feasibility. Discussion of possible	Description and justification of processing method(s) to be used, equipment, plant capacity and personnel

<b>Evaluation Criteria</b>	<b>Exploration Results</b>	<b>Mineral Resource</b>	<b>Mineral Reserve</b>
		processing methods.	requirements. Detailed flow sheet 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 test, or pilot plant results.
b. Costs	Generally not determined.	Stated reasonable assumptions.	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. Capital and operating budgets defined by year.
3. Recovery			
a. Mining	Generally not determined.	Stated reasonable assumptions.	Reported tonnages, grades and mineral contents must take into account mining dilution and losses. Description and justification of mining dilution and losses is required.
b. Processing	Generally not determined.	Stated reasonable assumptions.	Discussion of whether the reported tonnages and grades consist of material in place or whether processing recoveries are included. If in-place values are reported, information must be supplied concerning expected processing losses or recoveries. Justification of processing recoveries is required.
4. Cutoff Grade	Generally not determined.	Justification of the cutoff grade used to report resources.	Description of methods used to calculate cutoff grades.

<b>Evaluation Criteria</b>	<b>Exploration Results</b>	<b>Mineral Resource</b>	<b>Mineral Reserve</b>
<b>E. Infrastructure</b>			
1. Facilities	Generally not determined	Stated reasonable assumptions. It is reasonable to assume that necessary facilities could be built	Necessary facilities have been designed (which may include processing plant, tails dam, leaching facilities, waste dumps, road and/or rail accesses, power supply, offices, housing, security, etc.). Detailed map showing location of facilities. Construction schedule developed.
2. Staffing	Generally not determined	Generally not determined	Detailed staffing plan. Training. Salary scale.
3. Supplies	Generally not determined	Reasonable assumption that necessary supplies can be obtained.	All necessary supplies have been identified (electricity, reagents, fuels, etc.). Demonstration that supplies are available as needed. Requirements specified on a yearly basis.
4. Hydrology	Generally not determined	Stated reasonable assumptions.	All water requirements specified and sources of water identified. Dewatering requirements estimated on the basis of data. Water disposal and quality control.
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.
<b>F. Environmental Compliance and Reclamation</b>	Description of obvious environmental factors likely to stop the project.	Description of any environmental factors that could have a significant impact on the project feasibility. Discussion of possible means of mitigation.	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

<b>Evaluation Criteria</b>	<b>Exploration Results</b>	<b>Mineral Resource</b>	<b>Mineral Reserve</b>
			manner. Description of yearly environmental compliance methods and costs, including reclamation..
<b>G. Feasibility</b>			
1. Product Valuation	Description of valuable and potentially valuable product(s) including suitability of products to market.	See Exploration Results. Stated reasonable assumptions concerning likely product value.	Description of product to be sold. Discussion of whether there exists a ready market for the product, whether contracts for the sale of the product are in place or expected to be readily obtained. Detailed description of method used to estimate the commodity price profiles used for cutoff grade calculation, economic analysis and project valuation. Demonstration that the price assumptions are reasonable and supportable. Justification of assumptions made concerning production cost and value of product. Transportation, marketing, and other costs should be considered.
2. Cash Flow Analysis	Generally not applied.	Generally not applied. Consideration of order of magnitude capital cost, operating costs and revenue indicate reasonable prospect of eventual economic extraction.	Detailed cash flow analysis for the life of the project.
3. Valuation Method	Generally not applied.	Stated reasonable assumptions.	Detailed description of the method used to determine the economic feasibility of the project.
4. Reserve Sensitivity Test	Not applicable.	Not applicable.	Detailed description of method used and results obtained.
<b>H. Risk Analysis</b>	Generally not applied.	Sufficient risk assessment completed to justify reasonable prospect of eventual	Fatal flaw analysis. Detailed assessment of project technical and economic risk.

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
<b>I. Resource and Reserve Assurance Classification</b>	Data to support estimates with a sufficient degree of assurance is lacking. Specific quantities and grades/qualities cannot be reported.	economic extraction.  Description and justification of criteria used to classify the resource. When reported, a resource should be classified as Measured, Indicated, or Inferred. Depending on materiality Measured and Indicated resources may be combined if also reported separately. Inferred resources must be reported separately from Measured and Indicated Resources. To classify a resource as Measured or Indicated, there must be a reasonably high level of confidence with respect to the quality of the information used to calculate this resource, as well as the interpretation of this information.	Description of actions which will be taken to mitigate risk. No significant risk of project failure.  Description and justification of criteria used to classify the reserves. Reserves are classified as Proven or Probable to reflect relative degrees of geological assurance. Depending on materiality, Proven and Probable reserves may be combined if also reported separately. There should not be significant uncertainty concerning the economic viability of the project. Only Measured and Indicated resources can be considered for inclusion in the reserve. Resources classified as Inferred lack the requisite degree of assurance to be included in the reserve.
<b>J. Other Considerations</b>	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 demonstrate the presence of a resource or to evaluate this resource.	Description of any other material information that could prevent or facilitate the economic viability of the resource. Identification of work or conditions required to convert the resource to a reserve. A resource represents material that has the potential of being of economic value. It is recommended that, when publicly disclosing mineral resources, material assumptions made to estimate these resources are also disclosed. Known information that significantly reduces or increases the probability of economic feasibility should be reported.	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, marketing, and legal requirements have been eliminated. 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.

Evaluation Criteria	Exploration Results	Mineral Resource	Mineral Reserve
<b>K. Qualification of Estimator(s)</b>	Name and qualification of the Competent Person(s) preparing and reviewing the foregoing, and whether the Competent Person is independent with respect to the entity or project that is the subject of the report.	See Exploration Results	See Exploration Results

## APPENDIX A

### List of Recognized Professional Organizations (RPOs)

This list is updated from time to time by the Society for Mining, Metallurgy, and Exploration, Inc. Organizations which wish to be added to the list should contact the SME at the following address:

Chairman, Resources and Reserves Committee  
 Society for Mining, Metallurgy and Exploration, Inc.  
 8307 Shaffer Parkway  
 P.O. Box 277002  
 Littleton, CO 80127-7002  
 U.S.A.

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 in the United States of America	Licensed or Registered as a Professional Engineer
National Association of State Boards of Geology (ASBOG)	Licensed, Certified or Registered in: Alabama, Arizona, Arkansas, California, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Kansas, Kentucky, Maine, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, North Carolina, Oregon, Pennsylvania, Puerto Rico, South Carolina, Texas, Utah, Virginia, Washington, Wisconsin or Wyoming
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 (PLATO)	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 (IMMM)	Fellow or Professional Member
Institute of Geologists of Ireland (IGI)	Professional Member
Geological Society of London (GSL)	Chartered Geologist
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<b>Professional Association</b>	<b>Member Designation</b>
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
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