



IGI GUIDE TO PUBLIC REPORTING FOR MINERAL COMPANIES IN EUROPE

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Prepared by the
Institute of Geologists of Ireland
Founding Member of PERC



The IGI Guide is not a substitute for the *PERC Reporting Standard* and any *Competent Person* preparing a *Public Report* must consult the full text of the *PERC Reporting Standard* at www.percstandard.eu

IGI GUIDE TO PUBLIC REPORTING FOR MINERAL COMPANIES IN EUROPE

1. Scope of the IGI Guide

The IGI Guide has been prepared by the Institute of Geologists of Ireland (IGI) to provide a background to the regulatory framework for *Public Reporting* of information on the size, quality and potential value of *Mineral Deposits* by *Companies* which own an interest in *Mineral Properties*.

2. Background

Mineral Companies are defined by the *European Stock Market Regulators* as *Companies* with *Material Mineral Projects* (ESMA, 2013). Such *Companies* rely on investors for financing the evaluation and the development of *Mineral Projects*. As mining may be regarded as a risky business. It is, therefore, important that *investors* and their *professional advisors* are not purposely misled by unregulated publicity reports issued by *Mineral Companies*.

To reduce this risk, most of the major *Securities Exchanges* on which *Mineral Companies* are traded have introduced regulations to control the *Public Reporting* on *Mineral Projects*, and specifically the *Public Reporting* of *Exploration Results*, *Mineral Resources* and *Mineral Reserves*. These regulations are based on the use of *Codes* and *Standards* governing the reporting terminology and the way in which information on *Mineral Projects* should be presented to investors and their professional advisors. The international *CRIRSCO* family of *Codes* and *Standards* are based on a common set of definitions and an agreed template for developing *National Reporting Standards*.

The *Pan-European Reserves and Resources Reporting Committee* (PERC), of which the IGI is one of the four founding *Professional Organisations*, is the European member of *CRIRSCO*. PERC developed the *PERC Reporting Standard* for use by European *Mineral Companies*. The IGI Guide provides a summary of the principles underlying the *CRIRSCO* family of *Codes* with specific reference to the *PERC Reporting Standard* (2013 edition).

With this in mind, the IGI Guide has been written primarily for persons not familiar with, or not working in the *Minerals Sector*, to explain the language, common usage terms and the definitions used in the reporting of *Exploration Results*, *Mineral Resources*, and *Mineral Reserves* under the *PERC Reporting Standard*.

Any person seeking to understand the *solid mineral raw materials* industry should familiarise themselves with the language of the sector, and the

IGI Guide provides a useful starting point. In particular, the proper use of the terms *Exploration Results*, *Mineral Resources* and *Mineral Reserves* should be noted. It is critical that the specialist minerals geologist, the non-specialist minerals geoscientist, or any other interested person, understands the use of these terms, when to use them and more importantly when not to use them. Any person commenting upon or reporting on *solid mineral raw materials* should meet the requirements of a *Competent Person*.

The *PERC Reporting Standard* sets out minimum standards, recommendations, and guidelines for the *Public Reporting* of *Exploration Results*, *Mineral Resources* and *Mineral Reserves* in Europe [1].

The IGI Guide provides the key points to *Reporting* for *Mineral Companies* in Europe and also provides the associated definitions [15] within the *PERC Reporting Standard*, as an easy reference for both non-technical and expert users.

For *Oil and Gas Reporting*, the user of the IGI Guide is directed to the *Petroleum Resources Management System (SPE-PRMS)*, designed to provide a comprehensive classification framework for both *conventional* and *unconventional oil and gas volumes* that a *Company* may have associated with its portfolio of *Oil and Gas Resources* and *Oil and Gas Reserves* see www.spe.org

3. Responsibilities

The responsibilities of the main interested parties involved in *Public Reporting* on *Mineral Properties* are outlined below:

- **Mineral Companies:** must conform to the relevant government legislation, and *Securities Exchange* and *Market Regulations* for the countries in which their shares are listed. These regulations typically require *Public Reporting* to be done in compliance with specific *Reporting Codes* or *Standards*. It is the responsibility of the *Company*, acting through its *Board of Directors*, to use the appropriate professional standards for the reporting of information on *Mineral Properties*, which in Europe, would normally follow the *PERC Reporting Standard*. Any *Public Reports* must be based on, and fairly reflect the documentation which has been prepared by a *Competent Person(s)* [8]. To comply with such regulations, *Mineral Companies* would need to employ or contract a suitably qualified professional geologist or engineer to act as a *Competent Person* with respect to such *Reporting*;

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Cross-references to **PERC** clauses are presented as [XX], while references to **ESMA** are presented as (13Xx).

- **Competent Person(s):** are required to assess exploration data, prepare reports on *Exploration Results*, prepare estimates and reports on *Mineral Resources* and/or *Mineral Reserves* in compliance with the applicable *Reporting Standard*. The *Codes* and *Standards* require *Public Reports* to fairly reflect the *Exploration Results*, *Mineral Resource* and/or *Mineral Reserve* estimates and supporting documentation [5]. These *Reports* must be prepared by *Competent Person(s)* who are required to follow best practice and should be clearly satisfied in their minds that they could face their peers and demonstrate competence[10] and should be able to defend their work in a court of law;
- **Professional Geologists and Engineers:** would be required to conform to the Rules of Association of the *Professional Organisations* to which they belong; to the *Code of Ethics* applying to the members of *Professional Organisations*; and to the *Rules of Conduct for Mineral Resource and Mineral Reserve estimators* [3]. The *PERC Standard* has been adopted by the *Institute of Geologists of Ireland* (IGI) and is, therefore, binding on their individual members[3]. As such all IGI members are obliged to apply the principles and appropriate terminology of the *PERC Reporting Standard* when preparing estimates and documentation to be used as the basis for, or to support, a *Public Report* [10] or *Public Reporting by Mineral Companies*;
- **Investors and their professional advisors:** should check that *Public Reports* by *Mineral Companies* state which *Reporting Standard* has been used, and provide the written consent of the named *Competent Person(s)* as to the form and context, in which the information presented in the *Public Report* appears [9]. As a matter of due diligence, they should also contact the relevant *Professional Organisation* to confirm that the named *Competent Person* is a member in good standing;
- **Other Interested Parties:** should be aware that there are internationally agreed standards for *Public Reporting* of information on *Mineral Properties*, and if necessary contact the relevant *National Reporting Organisation* (*PERC* in the case of Europe) or *Professional Organisation* (e.g. IGI) for further information.

4. The PERC Reporting Standard

The *Pan-European Reserves and Resources Reporting Committee* (*PERC*), which serves as the *National Reporting Organisation* for Europe,

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including but not limited to member countries of the European Union, developed the *reporting standard* known as *The PERC Reporting Standard*. Representation on the *PERC Committee* covers the major and junior mining sectors, industrial minerals, aggregates, coal, the investment and financial community and the professional accreditation organisations.

The IGI Guide is not a substitute for the *PERC Reporting Standard* and any *Competent Person* preparing a *Public Report* should consult the full text of the *PERC Reporting Standard* at www.percstandard.eu

The *PERC Reporting Standard* (2013 Edition) is the European equivalent of a family of *Codes* and *Standards* following the *CRIRSCO International Reporting Template* for the reporting of *Exploration Results*, *Mineral Resources*, and *Mineral Reserves*. The *Committee for Mineral Reserves International Reporting Standards* (*CRIRSCO*) is an international grouping of representative organisations that are responsible for developing *Mineral Reporting Codes* and guidelines in Australia, Brazil, Canada, Chile, Mongolia, Russia, South Africa, Europe and the USA. The aim of *CRIRSCO* is to promote high standards of reporting of *Mineral Deposit* estimates (*Mineral Resources* and *Mineral Reserves*) and reporting of *Exploration* progress (*Exploration Results*) see www.criresco.com

The key terms and *CRIRSCO* definitions used in *Public Reporting by Mineral Companies* are presented in Appendix 1.

The *European Securities and Markets Authority* (*ESMA*) is an independent EU Authority that contributes to safeguarding the stability of the European Union's financial system. *ESMA* allows for the use of the *CRIRSCO* family of *Reporting Codes* and *Standards*, including the *PERC Reporting Standard* for the *Public Reporting of solid mineral raw materials*.

The *PERC Reporting Standard* applies to all *solid mineral raw materials* for which *Public Reporting of Exploration Results*, *Mineral Resources*, and *Mineral Reserves* is required by the relevant *Regulatory Authorities* [6].

The *Institute of Materials, Minerals, and Mining*, the *Geological Society of London*, the *European Federation of Geologists* and the *Institute of Geologists of Ireland* (IGI), have adopted the *PERC Reporting Standard*, and therefore the terminology, the use of terminology and the requirements of the *PERC Reporting Standard* are binding on their individual members and the members of its constituent organisations [3].

The term ***Solid mineral raw materials*** includes, but is not limited to, ***precious metals, base metals, diamonds and other gemstones, industrial minerals, cement feed materials and construction raw materials, coal [6], oil shales, tar sands, oil sands, peat*** and any other ***hydrocarbon minerals*** extracted by processing of mined rock [52], and all ***potentially economic mineralised material***, which, in addition to the above, includes ***mineralised fill, remnants, pillars, low-grade mineralisation, stockpiles, dumps, tailings (remnant materials) [40]*** and products produced by ***solution mining***.

A ***Mineral Company*** means a *company* with material *Mineral Projects* (131a).

- A *Mineral Company* involved in *Exploration* and/or *Mining* listed on a *Stock Exchange* must report on their *Mineral Assets* using a balanced approach to providing reliable, transparent information for investors, potential investors and their professional advisers, to allow them to make an informed assessment of the *Mineral Company's* prospects.

Mineral Projects means exploration, development, planning or production activities (including royalty interests) in respect of minerals including: metallic ore including processed ores such as concentrates and tailings; industrial minerals (otherwise known as non-metallic minerals) including stone such as construction aggregates, fertilisers, abrasives, and insulants; gemstones; hydrocarbons including crude oil, natural gas (whether the hydrocarbon is extracted from conventional or unconventional reservoirs, the latter to include oil shales, tar sands, gas shales and coalbed methane), and solid fuels including coal and peat (131b).

- A *Mineral Company* may also be required to provide information on their *Mineral Assets* to other *Regulatory Authorities*, including governmental, inter-governmental or non-governmental organisations for the reporting of *solid mineral raw materials* estimates and for preparing forecasts of *Mineral Inventory* to underpin minerals policies required to attract inward investment and *Exploration* activity.

5. Principles of Public Reporting

Public Reporting, in the context of *solid mineral raw materials*, is any written or verbal communication concerning *Mineral Projects*, written so as not to mislead any member of the *Public*, either intentionally or inadvertently, as to the presence or otherwise of *solid mineral raw materials* in, or on the Earth's crust, or of their *value*.

The intent of the *PERC Reporting Standard* is to provide a minimum standard for *Public Reporting*,

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and to ensure that such reporting contains all information which investors, potential investors and their professional advisers would reasonably require, and reasonably expect to find, for the purpose of making a reasoned and balanced judgement regarding the *Exploration Results*, *Mineral Resources*, and/or *Mineral Reserves* being reported [5].

Public Reporting or ***Public Reports*** are reports prepared for the purpose of informing investors, potential investors and their professional advisers on ***Exploration Results, Mineral Resources or Mineral Reserves***. They include but are not limited to ***annual, and quarterly Mineral Company reports, press releases, information memoranda, technical papers, website postings and public presentations*** [5]. In cases where summary information is presented, it should be clearly stated that it is a summary, and a reference should be attached giving the location of the publically available *PERC Reporting Standard* compliant *Public Report(s)* or *Public Reporting* on which the summary is based.

The main principles governing the operation and application of the *PERC Reporting Standard* are *transparency, materiality, competence, and impartiality* [4].

- ***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 available at the date of disclosure, which investors, potential investors and their professional advisers would reasonably require, and reasonably expect to find in a *Public Report*, for the purpose of making a reasoned and balanced judgement. *Materiality* should be assessed from an *investor* point of view to enable an informed assessment of the prospects of the *Mineral Company*. The materiality of *Mineral Projects* should be assessed having regard to all the *Company's Mineral Projects* relative to the *Issuer* and its group taken as a whole (131a);
- ***Competence*** requires that the *Public Report* is based on work that is the responsibility of a suitably qualified and experienced person(s), who is subject to an enforceable professional code of ethics and rules of conduct; and
- ***Impartiality*** requires that the author of a *Public Report* is satisfied and able to state without any qualifications that his or her work has not been

unduly influenced by the organisation, *Mineral Company* or person commissioning a *Public Report*; that all assumptions are documented; and that adequate disclosure is made in all *material* aspects.

6. Corporate Responsibility for Public Reporting

The **Competent Person** is a *minerals industry professional*, defined as a corporate member, registrant or licensee of a recognised professional body **with enforceable disciplinary processes including the powers to suspend or expel a member. The Competent Person must have a minimum of five years relevant experience in the style of mineralisation or type of Mineral Deposit under consideration and in the activity which that person is undertaking** [10].

The *Competent Person* must discharge their duties with fidelity to the Public, and at all times in their professional or employed capacities carry out their work with integrity and professional responsibility. The *Competent Person(s)* engaged in the practice of preparing or contributing to *Public Reports* that include statements of *Exploration Results, Mineral Resources* or *Mineral Reserves* must be familiar with the *Rules of Conduct*, in addition to the *Codes of Ethics* that may apply due to the *Competent Person's* membership of a recognised *Professional Organisation* (See Appendix 2 *Rules of Conduct* and Guidelines of *PERC*).

The *Mineral Company*, acting through its *Board of Directors* (8), is responsible for a *Public Report* concerning the *Company's Exploration Results, Mineral Resources, and/or Mineral Reserves*.

The *Mineral Company* must also:

- Disclose any relevant information concerning a *Mineral Deposit* that could materially influence the economic value of that *Mineral Deposit* to the *Company* [3];
- Declare the *Company's* economic interest in the *Mineral Project(s)* [5];
- Ensure that any documentation detailing *Exploration Results, Mineral Resources* and/or *Mineral Reserves* estimates from which a *Public Report* is produced, must be prepared by, or under the direction of, and signed by, the *Competent Person(s)* [7];
- Disclose the name(s), qualifications, professional affiliation(s), relevant experience and employment status of the *Competent Person(s)*, and must be issued with the written consent of the *Competent Person(s)* as to the form and context, including the effective date, in which the *Public Report* appears [9];

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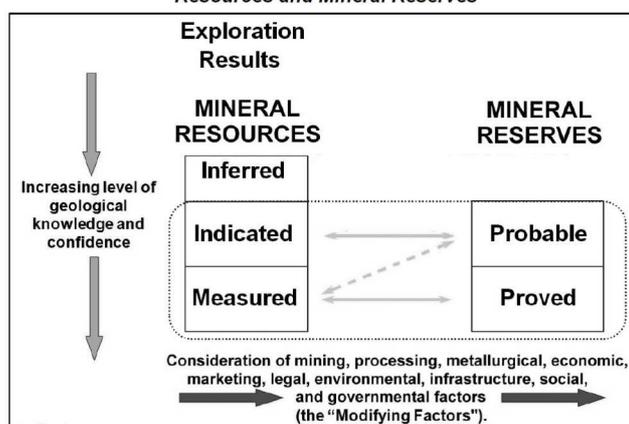
- Include a description of the style and nature of mineralisation [12];
- Promptly report any *material* changes in the *Company's Exploration Results, Mineral Resources* and/or *Mineral Reserves* [13]; and
- At least annually review and prepare a *Public Report* on their *Exploration Results, Mineral Resources* and/or *Mineral Reserves* [14].

7. Relationship between Exploration Results, Mineral Resources, and Mineral Reserves

Figure 1 of the *PERC Reporting Standard* sets out the framework for classifying tonnage and grade or quality estimates to reflect the different levels of geological confidence and the various degrees of technical and economic evaluation used to define *Exploration Results, Mineral Resources, and Mineral Reserves*. *Public Reports* dealing with *Mineral Resources* and/or *Mineral Reserves* must only use the terms set out in **Figure 1** [11].

Table 1 of the *PERC Reporting Standard* provides a list of the main criteria which should be considered [27, 39] when evaluating a *Minerals Project* to facilitate a reasoned and balanced approach to *Public Reporting* [6]. Public disclosure is required for those items in **Table 1** [6] most likely to *materially* affect the estimation, classification or accuracy of the estimates of the *Mineral Resources*

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



and/or *Mineral Reserves* made in the *Public Report*.

8. Reporting of an Exploration Target

An **Exploration Target** is a statement or estimate of the exploration potential of a *Mineral Deposit* in a defined geological setting where the statement or estimate, quoted as a range of tonnes and a range of grade or quality, relates to mineralisation for which there has been insufficient exploration to estimate *Mineral Resources* [19].

Although not encouraged, an *Exploration Company* or *Mineral Company* may, in the early stages of an exploration programme, report on an *Exploration Target* and/or *Exploration Results* by stating that the *Company* intends to search for the stated *Exploration Target* in a defined geologically prospective setting, area or region. If a *Mineral Company* reports an *Exploration Target*, investors, potential investors and their professional advisers must be informed that the *Public Reporting* of the *Exploration Target* is conceptual in nature, and although apparently reasonable, is purely speculative.

- The *Mineral Company* must include a clarification statement in respect of the *Exploration Target* in the *Public Report*, stating that the potential quantity and grade or quality is conceptual in nature, that there has been insufficient exploration to estimate a *Mineral Deposit* or *Mineral Resource*, and that it is uncertain whether further exploration would result in the estimation of a *Mineral Resource* [19]; and
- If a *Public Report* includes an *Exploration Target*, there is a requirement to detail the proposed exploration activities designed to test the validity of the *Exploration Target* and also to specify a timeframe within which those activities are expected to be completed [19].

9. Reporting of Exploration Results

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

- If an *Exploration Company* or *Mineral Company* reports on *Exploration Results* relating to mineralisation or a *Mineral Deposit*, then the *Exploration Results* can only be presented as substantive ‘raw’ exploration data, as defined by the *Competent Person*;
- If a *Mineral Company* reports *Exploration Results* in relation to mineralisation not classified as a *Mineral Resource* or *Mineral Reserve*, then estimates of tonnage and associated average grade or quality must not be reported [17].
- *Public Reports* of *Exploration Results* must contain sufficient information to allow a considered and balanced judgement of the significance of the results and must not be presented so as to imply unreasonably that potentially economic mineralisation has been discovered [18].

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A ***Mineral Deposit*** is an accumulation of any single mineral or combination of minerals occurring in a mass, or *deposit*, of economic interest. The term is intended to cover all forms in which *mineralisation* might occur, whether by class of deposit, mode of occurrence, genesis or composition ([CRIRSCO App 1](#)).

A ***Mineral Inventory*** represents the total accumulation of minerals of potential economic interest, including material that does not have ‘reasonable prospects for eventual economic extraction’. see CRIRSCO [21]

- Such *Mineral Inventory* estimates include potentially economic or marginally economic mineralisation that would not qualify as *Mineral Resources*, but may be required for full disclosure of all occurrences of the mineral(s) of potential economic interest in reports to government, inter-governmental or non-governmental organisations or agencies.

10. Reporting of Mineral Resources

A ***Mineral Resource*** is a concentration or occurrence of solid material of economic interest in or on the Earth’s crust in such form, grade or quality, and quantity that there are *reasonable prospects for eventual economic extraction*. The location, quantity, grade or quality, continuity and other geological characteristics of a *Mineral Resource* are known, estimated or interpreted from specific geological evidence and knowledge, including sampling [20].

Mineral Resources are subdivided, in order of increasing geological confidence, into the *Inferred Mineral Resource*, *Indicated Mineral Resource*, and *Measured Mineral Resource* categories. The choice of the appropriate category of *Mineral Resource* depends on the quantity, distribution and quality of data available and the level of confidence attached to the data [24]. *Public Reports* of *Mineral Resources* must specify one or more of the categories of ‘*Inferred*’, ‘*Indicated*’ or ‘*Measured*’ [26]. *Mineral Resource* estimates of quantity and grade or quality are inherently subject to some level of uncertainty and inaccuracy:

- For an ***Inferred Mineral Resource***, although the estimates are based on limited geological evidence and sampling, the geological evidence is sufficient to imply, but not verify, geological and grade or quality continuity [21]. The important words in the definition are ‘limited’ and ‘imply’;
- For an ***Indicated Mineral Resource***, the geological evidence is derived from adequately detailed and reliable exploration,

sampling and testing and is sufficient to assume geological and grade or quality continuity between *points of observation* [22]. The important words in the definition are ‘adequately’ and ‘assume’; and

- For a **Measured Mineral Resource**, the geological evidence is derived from detailed and reliable exploration, sampling and testing to confirm geological and grade or quality continuity between *points of observation* [23]. The important words in the definition are ‘detailed’ and ‘confirm’.

Mineral Resources are estimates of mineralisation in the ground within those portions of a *Mineral Deposit* that have ‘reasonable prospects for eventual economic extraction’, estimated from the geological information, with some input from other relevant disciplines regarding technical factors and economic factors.

- Portions of a *Mineral Deposit* that do not have ‘reasonable prospects for eventual economic extraction’ must not be included in a *Mineral Resource* [20];
- ‘Reasonable prospects for eventual economic extraction’ are based upon a judgement (albeit preliminary) made by the *Competent Person* in respect of the technical and economic factors [20];
- Any material assumptions made in determining the ‘reasonable prospects for eventual economic extraction’ must be clearly stated in the *Public Report* [20];
- *Mineral Resource* estimates are not precise calculations, being dependent on the interpretation of limited information relating to the location, shape and continuity of the occurrence and on the available sampling results. Reporting of tonnage and grade or quality figures should reflect the relative uncertainty of the estimate [25]; and
- A **Measured Mineral Resource** and an **Indicated Mineral Resource** are that part of a *Mineral Resource* for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of *Modifying Factors* in sufficient detail to support mine planning and the evaluation of the economic viability of the *Mineral Deposit* [22, 23]. The words ‘Ore’ and ‘Reserves’ must not be used in stating *Mineral Resource* estimates, as the terms imply technical feasibility and economic viability [28].

11. Level of Technical and Economic Study Undertaken

The conversion of *Mineral Resources* to *Mineral Reserves* requires the consideration of factors affecting extraction (*‘Modifying Factors’*), and should be estimated with input from a range of disciplines, and always with consideration of the range of the factors [11]. Any specific legal, permitting, social, environmental and other factors that would have a material bearing on the conversion of *Mineral Resources* to *Mineral Reserves* should be reported.

‘Modifying Factors’ are considerations which impact on the feasibility of the *Mineral Project*, used to convert **Mineral Resources to Mineral Reserves**. These include, but are not restricted to mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors [11].

Should a *Mineral Company* report *Mineral Reserves*, then the *Company* must have undertaken an appropriate *technical and economic study* (whether a *Pre-feasibility Study* or a *Feasibility Study*), to determine realistically assumed *Modifying Factors* and to develop a *Life of Mine Plan* with a mine plan and process flowsheet that is technically achievable, environmentally and socially acceptable, and economically viable.

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

- *Mineral Reserves* cannot be declared following the completion of a *Scoping Study*, as the low level of confidence in the technical and economic assessments are insufficient to support the estimation of *Mineral Reserves* or to provide assurance of an economic development case.

A **Pre-Feasibility Study** is a comprehensive study of a range of options for the technical and economic viability of a *Mineral Project* that has advanced to a stage where a preferred mining method is established, and an effective method of mineral processing is determined. It includes a financial analysis based on reasonable assumptions on the **Modifying Factors** and the evaluation of any other relevant factors which are sufficient for the **Competent Person**, acting reasonably, to

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determine if all or part of the **Mineral Resource** may be converted to a **Mineral Reserve** at the time of reporting [37].

- At least a *Pre-Feasibility Study* must have been carried out to ensure that all *Modifying Factors* have been considered [38] to the appropriate level of confidence to be able to convert all or part of the *Mineral Resources* to *Mineral Reserves*, and that in the opinion of the *Competent Person* making the estimates, form the basis of a viable and economic project [29], from which *Mineral Reserves* can be declared.

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

A *Life of Mine Plan* is a design and costing study of an existing operation in which appropriate assessments have been made of realistically assumed geological, mining, metallurgical and all other *Modifying Factors*, which are considered in sufficient detail to demonstrate at the time of reporting that extraction is reasonably justified. An *Operation* should have a defined *Life of Mine Plan* to be able to declare *Mineral Reserves*. www.samcode.co.za

12. Reporting of Mineral Reserves

A **Mineral Reserve** is the economically mineable part of a **Measured Mineral Resource** and/or **Indicated Mineral Resource**. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at *Pre-Feasibility Study* or *Feasibility Study* level as appropriate, that include the application of *Modifying Factors*. Such studies must demonstrate that, at the time of reporting, extraction could reasonably be justified [29].

Mineral Reserves are those portions of *Mineral Resources* which, after the application of the *Modifying Factors*, result in an estimated tonnage and grade or quality, that in the opinion of the *Competent Person* making the estimates, can be the basis of a viable and economic project [29].

Mineral Reserves are subdivided in order of increasing confidence into *Probable Mineral Reserves* or *Proved Mineral Reserves*, which is determined primarily by the relevant level of confidence in the *Mineral Resource* and secondly after considering the *degree of confidence* or uncertainty in the *Modifying Factors* [32].

A Probable Mineral Reserve is the economically mineable part of an **Indicated Mineral Resource**, and in some circumstances, a **Measured Mineral Resource**. The confidence in the *Modifying Factors* applying to a **Probable Mineral Reserve** is lower than that applicable to a **Proved Mineral Reserve** [30].

A Proved Mineral Reserve is the economically mineable part of a **Measured Mineral Resource**. A **Proved Mineral Reserve** implies a high degree of confidence in the *Modifying Factors* [31].

- *Mineral Reserve* estimates are not precise calculations. Reporting of tonnage and grade or quality figures should reflect the relative uncertainty of the estimate [33];
- *Public Reports* of *Mineral Reserves* must specify one or both of the categories of 'Proved' and 'Probable' [34];
- *Inferred Mineral Resources* are by definition always additional to *Mineral Reserves* [35];
- In situations where figures for both *Mineral Resources* and *Mineral Reserves* are reported, a clarifying statement must be included in the *Public Report* which clearly indicates whether the *Measured Mineral Resources* and *Indicated Mineral Resources* are 'inclusive of', or 'additional to' the *Mineral Reserves* [35]; and
- *Mineral Reserve* estimates must not be added to *Mineral Resource* estimates to report a single combined figure [35].

13. European Securities Exchange and Stock Market Reporting Requirements

The **European Securities & Markets Authority** (ESMA) defines the regulations for the European Economic Area (EEA) *Stock Exchanges* for both *solid mineral raw materials* and hydrocarbons, (ESMA/2013/319). ESMA is an independent European Union Authority that contributes to safeguarding the stability of the European Union's financial system by ensuring the integrity, transparency, efficiency and orderly functioning of financial markets, as well as by enhancing the protection of investors, www.esma.europa.eu *Mineral Companies Prospectuses Regulation* for *European Stock Exchanges and Markets* allows for the use of the CRIRSCO family of *Reporting Codes*

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and *Standards*, including the *PERC Reporting Standard* for the reporting of *solid mineral raw materials*, including:

- Details of *Mineral Resources*, and where applicable *Mineral Reserves* (presented separately) and *Exploration Results* /prospects in accordance with one or more of the *Reporting Standards* that is acceptable (132a);
- Anticipated mine life and/or exploration potential or similar duration of commercial activity in extracting the *Mineral Reserves* (132b);
- An indication of the duration and main terms of any licences or concessions and legal, economic and environmental and social conditions for exploring and developing those licences or concessions (132c);
- The current and anticipated progress of the mineral exploration and/or extraction and processing, including a discussion of the accessibility of the *Mineral Deposit* (132d); and
- An explanation of any exceptional factors that have influenced (132a) to (132d) above in the declaration of *Exploration Results*, *Mineral Resources* and/or *Mineral Reserves* (132e).

14. Complaints in respect of Public Reporting

Complaints made regarding the professional work of the *Competent Person* are dealt with under the disciplinary procedures of the *Professional Organisation* to which the *Competent Person* belongs [10]. The IGI Code of Ethics and Conduct includes the following obligations:

- A member of the IGI may not take on the functions of an expert in fields other than his or her own, or accept professional obligations he or she is not competent to discharge; and
- A member of the IGI may not give a professional opinion, make a report, or give legal testimony without being as thoroughly informed as might be reasonably expected considering the purpose for which the opinion, report or testimony is desired. The degree of completeness of information upon which it is based should be made clear.

2. APPENDIX 1 - CRIRSCO STANDARD DEFINITIONS (October 2012 see www.crirSCO.com)

Public Reports: Public Reports are reports prepared for the purpose of informing investors or potential investors and their advisers on Exploration Results, Mineral Resources or Mineral Reserves. They include but are not limited to annual and quarterly company reports, press releases, information memoranda, technical papers, website postings and public presentations [5].

Competent Person: A Competent Person¹ is a minerals industry professional (*National Reporting Organisation to insert appropriate membership class and organisation including Recognised Professional Organisations*) with enforceable disciplinary processes including the powers to suspend or expel a member. A Competent Person must have a minimum of five years relevant experience in the style of mineralisation or type of deposit under consideration and in the activity which that person is undertaking [10].

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IGI Complaint and Disciplinary Procedures: A complaint that a member of the IGI has breached the Institute's *Code of Ethics* in force at the time shall be referred to the Ethics Committee for a hearing as expeditiously as possible (IGI Code of Ethics 28).

Complaints made in respect of the declared *Competent Person*, who is a Professional Member of the Institute of Geologists of Ireland, responsible for *Public Reporting* for a *Mineral Company*, or in respect of the professional work of the *Competent Person*, should be presented in writing to the IGI, following the IGI Complaint and Disciplinary Procedure outlined on the IGI's website, www.igi.ie

15. Source Material

- PERC REPORTING STANDARD 2013: PAN-EUROPEAN STANDARD FOR REPORTING OF EXPLORATION RESULTS, MINERAL RESOURCES AND RESERVES ("THE PERC REPORTING STANDARD"), The Pan-European Reserves and Resources Reporting Committee (PERC), as approved and published 15 March 2013 (revision 2: 29 November 2013) www.percstandard.eu (References [1] to [40])
- CRIRSCO, Committee For Mineral Reserves International Reporting Standards, www.crirSCO.com
- ESMA/2013/318: Consultation Paper on proposed amendments to the ESMA update of the CESR recommendations for the consistent implementation of the Prospectuses Regulation regarding Mineral Companies, 20 March 2013, European Securities and Markets Authority, www.esma.europa.eu
- ESMA/2013/319: ESMA update of the CESR recommendations: The consistent implementation of Commission Regulation (EC) No 809/2004 implementing the Prospectus Directive, 20 March 2013, European Securities and Markets Authority, www.esma.europa.eu (References (131a) to (132e))
- Institute of Geologists of Ireland, www.igi.ie
- SAMREC 2016, The South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves 2016 Edition. www.samcode.co.za
- Guidelines for the Application of the Petroleum Resources Management System (SPE-PRMS), Nov 2011, www.spe.org/industry/docs/PRMS_guide_non_tech.pdf

Exploration Target: An Exploration Target is a statement or estimate of the exploration potential of a mineral deposit in a defined geological setting where the statement or estimate, quoted as a range of tonnes and a range of grade or quality, relates to mineralisation for which there has been insufficient exploration to estimate Mineral Resources [19].

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

Mineral Resource: A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling [20].

Inferred Mineral Resource: An Inferred Mineral Resource is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity. An Inferred Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration [21].

Indicated Mineral Resource: An Indicated Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve [22].

Measured Mineral Resource: A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proved Mineral Reserve, or to a Probable Mineral Reserve [23].

Modifying Factors: Modifying Factors are considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors [11].

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

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

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

Mineral Reserve: A Mineral Reserve is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include the application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified. The reference point at which Reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported [29].

Probable Mineral Reserve: A Probable Mineral Reserve is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a Proved Mineral Reserve [30].

Proved Mineral Reserve: A Proved Mineral Reserve is the economically mineable part of a Measured Mineral Resource. A Proved Mineral Reserve implies a high degree of confidence in the Modifying Factors [31].

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