Comisión Calificadora de
Competencias en Recursos
y Reservas Mineras

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

*2015 Version*

SONAMI

CONSEJO MINERO

COLEGIO DE INGENIEROS DE CHILE A.G.

*The main role of the Mining Commission for the Qualification of Competencies in Mineral Resources and Mineral Reserves, created under Law No. 20.235, is to create and manage the Public Registry of Qualified Competent Persons on Mineral Resources and Mineral Reserves. The Commission is comprised by five institutions: The Institute of Mining Engineers of Chile, the Association of Geologists, the Association of Engineers, the Mining Council and the Mining National Society. Each institution has a representative on the Board of the Commission.*

*The Commission, using the exclusive functions granted to it under* ***Law No. 20.235****, adopted the* ***Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves****, prepared by the Institute of Mining Engineers of Chile, (2003) as the official document for reporting on the estimation, classification and assessment of mineral resources and mineral reserves.*

*May 2015*

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*This document was initially written by the Mineral Resources Committee of the Institute of Mining Engineers of Chile (IIMCh), by virtue of a Collaboration Agreement between IIMCh and the Ministry of Mining formalized in December 2002. In 2008 it was adopted by the Mining Commission for the Qualification of Competencies in Mineral Resources and Mineral Reserves, hereafter the Mining Commission, as the official document for reporting on the estimation, classification and assessment of mineral resources and mineral reserves.*

*Between 2013 and 2014, the code was revised by an ad-hoc Committee appointed by the Mining Commission.*

*This code synthesizes the current practice of the mining industry with regard to the standards and procedures applied to exploration prospects and mineral resources and mineral reserves so as to publicly report on financial instruments based on these mining assets in capital markets. These standards follow general criteria already adopted and applied in this area by countries that are characterized for their dynamic and vigorous mining sectors, as are Australia, Canada, South Africa, the United States of America, the European Economic Community, Mongolia and Russia.*

*This code has been recognized by the Committee for Mineral Reserves International Reporting Standards (CRIRSCO), which leads the establishment of an international code in these matters. CRIRSCO is an entity formed by two representatives of each of the aforementioned countries.*

# CODE FOR REPORTING OF EXPLORATION RESULTS, MINERAL RESOURCES AND MINERAL RESERVES

## I. INTRODUCTION

1. The changes and modifications made in the 2014 Chilean Code aim to enable the Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves in order to prepare and issue public information on these mining assets according to the rules and guidelines that regulate its technical, economic, and environmental bases, satisfying the requirements demanded by the capitals and securities market in Chile. A significant characteristic of this revised version is that, as a result of international treaties and the globalization of the mining industry, it must be consistent with other prevailing international codes that have been adopted by capital and funding markets of worldwide relevance.

   This document is an update of the Code prepared in 2003 by the Institute of Mining Engineers of Chile. The attached document has been drafted and revised by an ad-hoc committee appointed by the Mining Commission, comprised by important mining companies and consultants and all Qualified Competent Persons under Law No. 20,235.

2. As part of its general history, the following documents were written globally:

   1970 Canada established the classification of reserves required by the Canadian Securities Administrators (CSA), National Policy 2-A.

   1980 The US Bureau of Mines and the US Geological Survey published Geological Circular 831, "Principles of a Resource/Reserve Classification for Minerals".

   1989 The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves was presented in accordance with a study conducted by JORC (Joint Ore Reserves Committee). Its structure closely resembles the American system, but it includes important amendments regarding the competency of the persons responsible for the estimation of mineral resources and ore reserves.

   Subsequently, the efforts for a better definition of Mineral Reserves and Resources resulted in the following documents:

   1992 In January 1994 the Society for Mining, Metallurgy and Exploration Inc. of the United States (SME) published "A Guide for Reporting Exploration Information, Resources and Reserves".

1994 Canada's CIM (Canadian Institute of Mining, Metallurgy and Petroleum), through its Society of Mining Economists, formed a Special Committee dedicated to improve the definition of Mineral Resources and Reserves. The report written by the Special Committee was presented by the CIM Council in May and published in October, 1994.

1996 The Council for the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) accepted the Special Committee's Report on "Mineral Resource/Reserve Classification: Categories, Definitions, and Guidelines", which was published in the CIM Bulletin in September, 1996. This report is used extensively as a reference and as a system of classification and information on Resources and Reserves.

1997 The Ontario Securities Commission (OSC) and the Toronto Stock Exchange (TSE) formed the Mining Standards Task Force (MSTF) in June. The MSTF issued a draft report in June 1998 and a final report called "Setting New Standards" in January 1999. One of the first recommendations in the MSTF Report was "to adopt, for the Administrators of Canadian Values regulated by National Instrument 43-101, the CIM guidelines for the estimation, classification and information of Mineral Resources and Reserves, with the appropriate future improvements."

Since this publication was issued, the Council of Mining and Metallurgical Institutes -of which CIM is a member- has sponsored several meetings dedicated to developing a common classification, definition and information system for Australia, Canada, the United Kingdom and the United States.

3. From the point of view of the development of a universal standard:

1994 The CMMI (Council of Mining and Metallurgical Institutes) sponsored an initiative to obtain consensus on the definition of Mineral Resources and Reserves used in Australia, Canada, the United Kingdom, South Africa and the United States. This is how the Mineral Resources Committee of the CMMI was formed, which was subsequently called the Committee for Mineral Reserves International Reporting Standards (CRIRSCO).

1997 The CMMI met in Denver, U.S.A. In this meeting the representatives agreed on the definitions for the most significant mineral resources and reserves categories. The CMMI definitions were published in the CIM Bulletin in February, 1998.

1998 The Society for Mining, Metallurgy and Exploration of the United States (SME) published its definitions in accordance with CMMI. These definitions have not yet been accepted by the Securities and Exchange Commission (SEC). The SEC has its own Guide 7, which only recognizes ore reserves that are estimated on the basis of known and specific technical-economic data to the day the estimate is made. Mineral

resources, in any of their categories, are considered only informally as mineralized material.

1999 The Australasian Institute of Mining and Metallurgy (AusIMM), the Australian Institute of Geoscientists and the Minerals Council of Australia (The JORC Committee) published The JORC code was published in January 1999 in order to apply it in September 1999. This document proposed using the CMMI definitions with some minor changes.

2002 In May, the CMMI organized a meeting in Australia, where the idea of formalizing an International Code for Mineral Resources and Reserves was renewed due to the improvements made in the definition of mining resources and mineral reserves in response to the globalization and internationalization of the mining industry and to support the credibility that must apply to public information regarding the mining assets. Progress was also made in consolidating CRIRSCO.

2007 – 2014 Annual CRIRSCO meetings were held in Chile, England, China, Russia, Colombia and Mongolia, making considerable progress in the generalized adoption of the consistency of standard reports throughout the world.

2011 The CSA (Canadian Securities Administrators) in Canada adopted a new version of National Instrument NI 43-101 on disclosure standards for mining projects.

2012 A new revision of the JORC code was developed, with the aim of aligning the defined terms with the standard definitions established by PERC, NAEN, CIM Definition Standards, SME Guide, SAMREC and Mongolia.

4. In Chile, in mid-2002, IIMCh and the Ministry of Mining initiated discussions to establish a code that would rule and regulate public information on exploration prospects, mineral resources and reserves in the country. The purpose of this was to prepare a technical, legal, financial, accounting and entrepreneurial platform that would serve as a foundation for the reforms propitiated by the government in order to foster a vigorous capitals market, taking the global character of mining operations into account, and incorporating the new factors affecting the mining sector such as technical, economic, environmental and financial sustainability and the professional ethics of the Qualified Competent Persons, who should have the necessary specializations to certify and accredit the public reports to be presented before financial and stock-exchange institutions. At the same time, this regulatory effort would contribute to the efforts of other countries, such as Australia, Canada, United Kingdom, South Africa, several countries in the European Union and the United States, to establish an international code for mineral assets.

The so-called Public Reports include, but are not limited to, the Annual Balance Sheets, Quarterly Reports, Memos, Specialist Reports, Technical Articles and any other information

provided by the Stock Exchange, whether demanded by law, by agreement with companies, or by the free will of the latter.

2003 The Mineral Resources Committee of the IIMCh convened 22 mining entities -national and foreign, private and public- and consultants to work on a standard. Taking the JORC standards, Instrument 43-101, the SAMREC and the SME, the IIMCh issued the requested Code by the end of this year.

2004 – 2005 A government bill was drafted to establish (1) the concept of Qualified Competent Person to certify Exploration Prospects and Mineral Resources and Reserves, (2) the legal framework that covers the Qualified Competent Person and (3) a self-regulating National Commission in charge of administering the Registry of QCP comprised by the IIMCh, the Association of Geologists, the Association of Engineers, SONAMI and the Mining Council.

2007 Law No. 20,235, which creates the Mining Commission for the Qualification of Competencies in Mineral Resources and Reserves, is enacted, adopting the Certification Code for Exploration Prospects, Mineral Resources and Reserves prepared by IIMCh in 2003.

2008 The CRIRSCO Annual Meeting was held in Santiago, Chile, and along with this the Mining Commission for the Qualification of Competencies in Mineral Resources and Reserves (Mining Commission) was officially launched.

2013 The Code Revision Committee was organized to update the existing Code, finishing its work during the first semester of 2014. Subsequently an open consultation to all Competent Persons members of the Commission was conducted for a final update.

5. The purpose of the Revision Committee's work was to update the minimum set of regulations, in accordance with the progress of international criteria, that guide the certification of mining assets **in Chile** and that, governed by a code of ethics, assure the technical, economic, environmental and financial sustainability of these assets.

6. The application of Code CH 20235 is governed by the principles of ***Transparency***, ***Materiality*** and ***Competence,*** defining each as the following:

   ***Transparency*** implies that a Public Report must provide sufficient information, presented in a clear and unambiguous manner, to be understood correctly and without generating confusing interpretations.

   ***Materiality*** implies that a Public Report contains all the relevant information required for the purpose of making a reasonable and balanced judgment regarding the reported Exploration Results, Mineral Resources and Mineral Reserves.

***Competence*** requires a Public Report to be certified by adequately qualified and experienced professionals, subject to Ethical and Professional Codes of Conduct (Qualified Competent Person).

7. The updated 2014 version, called Code CH 20235 that is presented below, emphasizes, in regular letters, the minimum formal requirements to be demanded of exploration prospects, mineral resources and mineral reserves for the purpose of informing the public and capital markets in Chile; the guidelines and criteria that complement these directives are detailed in *italics*.

   *The application of Code CH 20235 is mandatory to issue documentation prepared for the purpose of informing investors or possible investors and their advisers, as well as regulatory authorities and governmental institutions such as the Chilean Securities and Insurance Commission (SVS), the Chilean Economic Development Agency (CORFO), the National Geological and Mining Service (SERNAGEOMIN) and others who may require it, about exploration results, mineral resources or mineral reserves, for example, for financing, mine closure laws and IFRS standards, as appropriate.*

   *This documentation includes, but is not limited to, annual and quarterly company reports, stock market reports, mine closure reports, press releases, information notes, technical documents, publications on websites, public presentations, and others.*

## II. FOUNDATIONS

8. When speaking of codes, regulations and guidelines in relation to the code for reporting of exploration results, mineral resources and ore reserves, it should be considered that the countries with the most vigorous capital markets have headed this activity. In the United States, for example, Mining Engineer and President Herbert Hoover proposed the classification of reserves into proved, probable and prospective in his book "The Principles of Mining" (1909), paving the way for Geological Circular 831 of the US Bureau of Mines and the US Geological Survey, which served to discriminate among resources and reserves (1980). In Canada, on the other hand, the Canadian Securities Administrators established this requirement for mineral reserves in the 1970s.

   In 1989 the JORC code was released in Australia, which for the first time advanced the concept of a Competent Person who would be responsible for the estimation of mineral resources and reserves. This code was incorporated immediately to the regulations set out by the Australian Stock Exchange (ASX). In 1998 the South African SAMREC was introduced, using the JORC as its foundation. This compilation was recognized and adopted by the Johannesburg Securities Exchange (2000). In 1999 a mineral resources and reserves working group was formed under the Institution of Mining, Metallurgy and Materials (IMMM) in the United Kingdom as a response to similar efforts in other countries. The European Federation of Geologists, the Geological Society of London and

the Institute of Geologists of Ireland united in this effort, issuing the so-called Reporting Code.

Since 2002, CRISCO has remained an independent entity and is also a strategic partner of the International Council on Mining and Minerals (ICMM).

The initiative to develop a template, largely based on the JORC Code, was initiated by CRIRSCO for the purpose of helping countries to develop their own code in line with global best practices. The template has been recognized by UNFC 2009.

The initiative advanced considerably towards the generalized adoption of consistent information standards worldwide. These standards are currently incorporated in the codes and directives that have been published and approved by the pertinent professional agencies in Australia, Canada, South Africa, Chile, the United States, England, Russia, Mongolia and others countries.

The above mentioned codes have been adopted, formally or informally, by the authorities and institutions responsible for regulating activities associated with the capital and securities markets specialized in the mining industry. All the relevant texts have served as a foundation to facilitate the establishment of this document.

## III. APPLICATIONS AND LIMITATIONS

9. The scope of Code CH 20235 is applicable to all solid minerals, including precious stones and minerals industrial. This code does not consider hydrocarbons or maritime resources. Furthermore, the issue of valuation is not within the scope of this document.

   The Mining Commission recognizes that this code will need to be periodically revised, improved and updated, so as to incorporate the advances in knowledge and technologies within the mining industry.

## IV. PUBLIC REPORTS, SUSTAINABILITY, AND TECHNICAL COMPETENCE

10. A Public Report on Exploration Prospects, Mineral Resources and Mineral Reserves is a report issued under the responsibility of the ownership entity of these assets through its Board. The Public Report contains relevant information on assets that may significantly influence the perception of their economic value. This report should be based on, and reflect in a reliable manner, the grounds and support upon which the exploration prospects and the mineral resources and reserves have been prepared by a Qualified Competent Person(s).

    *Regarding the relevant information that should guide the definition of exploration prospects, mineral resources and mineral reserves, Appendix 1 provides a matrix of minimum requirements to be applied to the techniques, criteria and procedures that support*

*these definitions. This matrix is a guideline, and its application should be evaluated in each case.*

*A company issuing a public report must reveal the name of the Qualified Competent Person responsible for the report and declare if this professional is a full-time employee of said company; if this is not the case, the company must reveal the name of this professional's employer.*

*The report should be issued with a certificate of authorship including the written and explicit consent of the Qualified Competent Person(s) with regards to its form and content.*

*All reports must include documents that comply with the following minimum requirements:*

- *Certificate of Qualified Person standing issued by the Mining Commission to act as a Qualified Competent Person in the preparation of the respective document.*
- *Letter or statement of authorship and competence of the signatory, which must comply with the following minimum format: "(insert the name of the Qualified Competent Person, registry number) has enough experience that is relevant to the style of mineralisation, the nature of the deposit that is being considered and the type of activity being carried out, to certify him/her as a Qualified Competent Person in accordance with Code CH 20235".*
- *Information about limitations of the study and declaration of responsibilities.*

*Both reports and documentation must be well organized and archived such that competence is clearly demonstrated, and any forthcoming reviews (e.g., internal or external audits) can be conducted efficiently.*

*In any case, whether the relevant information is in the report itself or in an annex or appendix, these documents must identify clearly that "The information and data regarding exploration prospects, mineral resources and reserves contained in this report have been compiled by (insert the name of the Qualified Competent Person) who is (insert the relevant technical qualifications of the Qualified Competent Person)".*

11. **A Qualified Competent Person who reports publically about Exploration Prospects, Mineral Resources and Mineral Reserves** is a person who is registered in the Public Registry of Qualified Competent Persons, with a University degree that dates back at least 10 years in one of the specialities associated to the mining business in the geo-mining-metallurgical area, with a minimum of five years' relevant experience in the area of geoscientific data analysis, modelling, estimation and assessment of prospects, mineral resources and reserves, and that, furthermore, possesses comprehensive knowledge of the geo-mining-metallurgical foundations associated to the nature and style of the mineralisation being studied and the entire value chain of the mining business.

As there are different mineralisation styles in nature, such as gold veins, massive, disseminated and structurally controlled copper deposits, nitrate and iodine crusts, lime deposits, artificial tailings and rubble deposits and others, the Qualified Competent Person shall have to assess his/her own merits and strengths in order to take responsibility for the issuing of a Public Report regarding a particular deposit. The above stated assessment relates to the proper level of engineering and the key disciplines for the estimation of resources and reserves, such as geology, geostatistics, mining, geomechanics, metallurgy, etc.

*If the Qualified Competent Person is directing the works at an Exploration Prospects, the professional's relevant experience must be in quality assurance and control of the exploration, sampling, mapping and analysis works, in the interpretation and conceptualization of geological models and in the definition of geoscientific units for the estimation of mineral resources; if the Qualified Competent Person is estimating or overseeing the estimation of Mineral Resources, his/her relevant experience must be, in addition to the aforementioned activities for an exploration target, in the estimation and categorization of those Resources; if the Qualified Competent Person is estimating or overseeing the estimation of Mineral Reserves, the relevant experience must basically be in the estimation, planning and technical-economical assessment of the extraction and consumption of these Reserves. The key qualifying expression in the definition of a Qualified Competent Person is* ***"relevant experience".*** *Determining what constitutes relevant experience may be a difficult area to define, therefore, common sense should be used. For example, when estimating Mineral Resources for gold veins , experience in vein mineralisation with a high nugget effect will probably be relevant, while experience in massive base metal deposits may not be. As a second example, for a person to be classified as a Qualified Competent Person in the estimation of Reserves for alluvial gold deposits, he or she would have to have considerable experience in the economic assessment and extraction of this type of mineralisation, due to the characteristics of gold in alluvial systems, the size of the host sediment particles and the low grades involved. Experience with placer type deposits containing minerals other than gold would not necessarily contribute appropriate relevant experience.*

*The key word "relevant" also means that it is not always necessary for a person to have five years' experience in every type of deposit in order to act as a Qualified Competent Person, if this person already has relevant experience in other types of deposits and has at least 10 years' professional development in the mining industry and in the corresponding area of specialization.*

*For instance, a person with 20 year of experience in the estimation of Mineral Resources in a variety of metalliferous hard-rock deposits may not require five years of experience in, for example, porphyry copper deposits in order to act as a Qualified Competent Person. Relevant experience in other types of deposits could be considered, in this case, as the required experience for porphyry copper deposits.*

*On the other hand, a Qualified Competent Person that is preparing or is overseeing the estimation of Mineral Resources should have, aside from experience in mineralisation types and styles, enough experience in sampling and testing techniques for the type of deposit under consideration to be aware of the problems that could affect the reliability of the data and, above all, their quality assurance and control (QA/QC). Duly documented protocols and procedures are mandatory in this type of analysis, as it is the use of certified laboratories and reference materials for a correct characterization of the materials obtained during the geological recognition. An assessment of the mine and the processing techniques applicable to that type of deposit could also be important.*

*As a general guide, the persons that are nominated to act as Qualified Competent Persons should feel fully confident of presenting themselves in front of their peers to demonstrate competency in the product, type of deposit and situation being considered. If any doubts arise on the matter, the person shall request the opinion of other colleagues or shall refuse to act as a Qualified Competent Person.*

*Depending on the complexities of the mineralisation being studied, the Qualified Competent Person responsible for the certification and issuance of the public report will be able to detect the need to have other Qualified Competent Persons who are specialists in relatively complex areas, such as geological modelling, geotechnical considerations, sampling, resources estimation, or others, so that this person, who exercises leadership over the certification, may call on these other Qualified Competent Persons to request their contribution.*

*In these cases, even though the **Lead** Qualified Competent Person may assume the general responsibility for the preparation and issuance of the report, each participating Qualified Competent Person is responsible for the work for which he/she is certified as such. Likewise, the head Qualified Competent Person may request the contribution of other specialists who are not necessarily Qualified Competent Persons (for example, specialists in mining property, engineering designs, security, environmentalists, etc.), who are obliged to assume full professional responsibility for the sections of the Public Report they sign, in which case the responsibility of the leader consists in having the technical background to substantiate their participation.*

*The estimation of Resources comprises often, and very frequently, teamwork. Within this team, geologists are usually responsible for the greater part of the characterization and estimation work. The estimation of reserves usually implies teamwork involving a number of technical disciplines, and within this team, mining engineers usually take the central role. The documentation for the estimation of Resources or Reserves must be compiled by, or under the supervision of, a Qualified Competent Person or Persons, either a geologist, mining engineer or member of another discipline. However, in those cases where there is a clear division of responsibilities within a team, each Qualified Competent Person must accept responsibility for his/her particular contribution. For example, a Qualified Competent Person might accept responsibility for gathering data associated to Mineral*

*Resources, another for the estimation process for the Mineral Reserves, another for the consumption of these Reserves according to a production program, while the project leader shall accept responsibility for the document in its entirety.*

***The Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves*** *must constitute a compiled report, presented and defended by the Qualified Competent Person in charge of this certification. If there is any doubt or questioning of the certification conducted under a Qualified Competent Person's responsibility, he/she will reply professionally, before the entities that accredited its quality, as well as legally before the financial institutions associated to the Chilean public system and others that require. Such procedures may vary from country to country, but the international agreements between the national organizations to inform through "ROPO" (Professional Foreign Recognized Organization) system are incentivized to standardize practices Competent Persons wherever possible.*

*When a company that is registered in the Chilean capitals market wishes to inform the public about an exploration target or about the estimation of Mineral Resources or Reserves abroad, that company will have to name a Qualified Competent Person(s), registered by the Mining Commission, to be made responsible for the results of the exploration target or the estimation of the aforementioned Mineral Resources or Reserves. It will be understood that the professionals affiliated to foreign institutions with which the Mining Commission has reciprocity agreements or international agreements as a Professional Foreign Recognized Organization (ROPO). In any case, the report for the Chilean capital market must be made of according to CH 20235 code, and other requirements if they are required by the organism regulator.*

*Due to all that has been expressed in the above paragraphs, t****he Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves*** *is a multidisciplinary task that, due to the nature of the mining business, requires the participation of experts, specialists, and Qualified Competent Persons in the different areas of the mining business value chain. While this participation is not only useful but also necessary, a distinction should be made between the general responsibility assumed by the head Qualified Competent Person for the preparation and issuance of the report, and that assumed by the Qualified Competent Persons in their speciality areas in the geo-mining-metallurgical scope.*

*Accordingly, the head Qualified Competent Person should demonstrate his/her knowledge, experience and judgment to consider the matters related to the technical, economic, environmental and legal sustainability of the mining business.* ***Knowledge****, through specialized studies in the area of technical-economic sustainability of Exploration Prospects, Mineral Resources and Mineral Reserves;* ***experience****, through relevant works in which he/she has participated, either in directing studies or as an expert in specific areas; and* ***judgment*** *shown as a function of a solid and well-established professional career.*

*The Qualified Competent Person, in addition to his/her capacity to identify the potentiality/vulnerability of a mining project, should make him/herself responsible for compiling the relevant information, preparing the corresponding documentation, specifying uncertainties and risks, coordinating and monitoring the flow of technical-economic information, ensuring economic-financial data and supervising, in its entire scope and all its objectives, the geo-mining-metallurgical sustainability of the Exploration Prospects, Mineral Resources and Mineral Reserves to be certified.*

*The responsibility of the Qualified Competent Person in charge of this certification should be absolute. If the Qualified Competent Person in charge of reporting on said certification recognizes he/she is lacking in any particular technical or economic area, he/she should assume the responsibility for including another Qualified Competent Person or an expert, specializing in this particular area, in the team, so as to rectify the insufficiencies that the Qualified Competent Person in charge of the study has recognized.*

*In addition to the competency and technical qualification requirements, Appendix 2 establishes certain regulations and professional conduct guidelines that every Qualified Competent Person should comply with.*

12. **Geo-mining-metallurgical sustainability** includes the interpretation, analysis, assessment and validation of all technical aspects that support the results obtained in each of the activities associated with the mining business value chain, according to how the technical and economic information captured through the phases of identification and conversion of resources into reserves progresses, namely: Exploration, Scoping, Prefeasibility and Feasibility.

    Geo-mining-metallurgical sustainability is constituted by the technical-economic information generated to evaluate the qualitative and quantitative potential, vulnerabilities and risks associated to the Exploration Prospects, Mineral Resources and Mineral Reserves under study.

13. **The business value chain** refers to the sequence of activities the Mineral Resources transit through until their economic benefit materializes, which comprise: exploration, verification of mining and land ownership, geoscientific reconnaissance, sampling, sample analysis and testing, geological, geometallurgical and geotechnical modelling, resources estimation and classification, definition of technical-economic parameters for the valuation of the specific mineral resources and mining assets being studied, mining design, production plans, metallurgical behaviour, productive capacity studies, determination of reserves, resolution of environmental, legal, infrastructure and social issues, commercialization of final products and economic-financial assessment.

## V. TECHNICAL TERMINOLOGY

14. **The Phases of the Conversion from Resources to Reserves:**
Include the Exploration Prospects that give rise to the Idea, the technical-economic analysis that gives rise to Scoping Study and subsequently to the Pre-feasibility Study. Finally, the Feasibility Study closes the conversion process and constitutes the foundation of the financing of the identified mining assets.

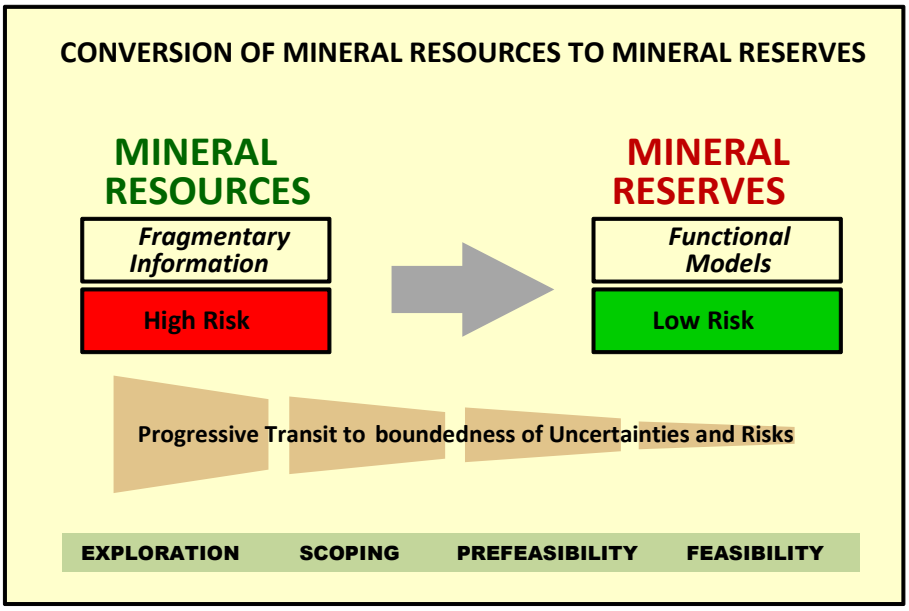


**Figure 1. Phases of the Conversion and Levels of Studies**

15. **The modifying factors:** Considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not limited to, mining, processing, metallurgical, infrastructure, economic, market, legal, environmental, social and government factors.

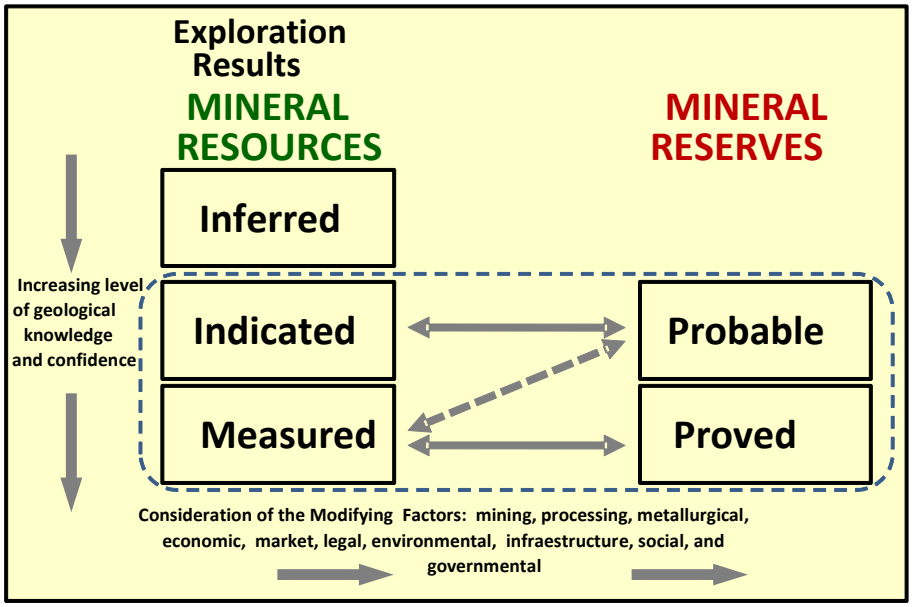


**Figure 2. General relationship between Exploration Results, Mineral Resources and Mineral Reserves**

16. **<u>The Exploration Results:</u>** 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.

    These results are based on the initial studies and analysis carried out in mineralized sectors, often isolated, perceived as having economic interest. The available information, most of the time, only allows conceptualizing the probable continuity or discontinuity of the mineralisation, establishing analogies with other known deposits, identifying outcroppings and carrying out reconnaissance surveys, including samples for analysis and, in some cases, exploration drillings strategically situated in the area to visualize the continuity of the detected mineralisation. However, this information does not allow deducing tonnage and grades, as these mineralisation cannot be delimited and classified as mineral resources.

    When reporting on the potential of these mineralisation, the Qualified Competent Person should specify that this type of information, more than a foundation for estimations, constitutes a foundation for conceptualizations.

    *This is the case in which ditches, outcroppings, old works and other works (eventually exploration-type drillings) are used to support the prospect characteristics reported to investors, but whose information does not allow a reasonable estimate of tonnages and grades. In these cases a clear record must be made of the nature and limits of the information.*

*In these circumstances, it may be interesting to provide geological and historical production information about the mines located in the prospect area, describe the nature of the neighbouring mineral deposits with similar characteristics as the prospect and any other information that may be of interest to a possible investor.*

*It is also useful to provide information about the potentiality of these results as a supply source for any mineral processing centre in the district being observed. However, the Qualified Competent Person cannot provide information about tonnages, grades and productive programs.*

17. **The Scoping or Diagnostic 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.

    It is based on the information from preliminary studies on the technical and economic potential of the mineral deposit, in which the geological continuity, structural controls, type of alteration, the mineralisation, lithology and the estimation and classification of the resource have been inferred based on the initial information from surface samplings and exploratory drillings, chemical analysis, initial metallurgical tests and projected or assumed techno-productive parameters in accordance with the criteria normally applied in the mining industry. The quality of these data is backed up by quality assurance and control procedures (QA/QC).

    At this stage it is not possible to define Mineral Reserves.

18. **The Prefeasibility 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.

    It is based on the information from detailed and substantiated studies about the technical and economic viability of a mineral deposit, in which the geological continuity, structural controls, type of alteration, the mineralisation, lithology and the estimation and

categorization of the resource have been duly validated based on an appropriate sampling density, chemical analysis, metallurgical tests and parameters consistent with the standard industry practice for this engineering level. The quality of these data is backed up by quality assurance and control procedures (QA/QC).

This information allows the generation of a technically feasible and economically viable mining plan in which all modifying factors (mining, metallurgical, economic, financial, marketing, legal, environmental, infrastructure, social and governmental) have been considered. As of this stage, the Qualified Competent Person may certify the portion of the Mineral Resources that may be converted and counted as Mineral Reserves.

Depending on the degree of reliability assigned to the Mineral Resource, the Mineral Reserve that is generated may become Proved -originating solely from Measured Mineral Resources- at the same time the Probable Mineral Reserves -come from Indicated Mineral Resources or Measured Mineral Resources. The Indicated Mineral Resources can be converted, first, into Measured Mineral Resources in order to subsequently be converted into Proved Mineral Reserves (see graph No. 2). Indicated Mineral Resources may not be converted directly into Proved Mineral Reserves.

Once the Prefeasibility study has been concluded, i.e., with an explicitly identified technical and economic scenario, the project can pass to the Feasibility stage.

19. **The 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 Feasibility studies must contain geoscientific, engineering, environmental, and legal and economic information with the highest possible level of certainty.

    The confidence level of the study will be higher than that of a Pre-Feasibility Study.

20. **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 localization, tonnages, content of the elements or minerals of interest, geological characteristics and the degree of continuity of the mineralisation is estimated, known or interpreted from specific geological, metallurgical and technological evidence.

*The term Mineral Resource covers mineralisation and natural materials of intrinsic economic interest that have been identified and estimated through exploration, reconnaissance and sampling activities. According to the existing degree of reliability, the Mineral Resources are categorized as Inferred, Indicated and Measured.*

21. **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

*The term 'reasonable prospects for eventual economic extraction' implies a judgement (albeit preliminary) by the Competent Person in respect of the technical and economic factors likely to influence the prospect of economic extraction, including the approximate mining parameters. In other words, a Mineral Resource is not an inventory of all mineralisation drilled or sampled, regardless of cut-off grade, likely mining dimensions, location or continuity. It is a realistic inventory of mineralisation which, under assumed and justifiable technical and economic conditions, might, in whole or in part, become economically extractable. Portions of a deposit that do not have potential for eventual economic extraction, or which contain significant amounts of deleterious elements/minerals for which adequate test work has not been carried out, cannot be included.*

*Due to the uncertainty associated to the Inferred Resource, there is no certainty that as a result of additional reconnaissance all this mineral or a part of it will become, definitively, part of the Indicated Resource or Measured Resource category.*

*The reliability in the estimation of these Resources is insufficient to guarantee a significant application of the technical and economic parameters associated to them or to enable an assessment on their economic viability in a prefeasibility or feasibility study in order to report it publicly and in a substantiated manner.*

*Care must be taken if the inferred mineral resources are used to support the technical and economic studies. They can only be used in a preliminary economic assessment which should be justified and clearly specified.*

22. **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.

These characterizations and estimations are based on the reconnaissance, samplings, and analysis carried out on places that are representative of the mineralization from which the resources originate. These places generate an information matrix such that the geological continuity and characterization, as well as the content of the element or mineral of interest, can be estimated with an acceptable degree of reliability. Section III of Appendix 1 provides details.

In addition, the Mineral Resource can be codified as an Indicated Resource when the nature, quality, amount and distribution of the data are such that they allow a correct interpretation of the geological context, so that the continuity and characterization of the mineralisation can be reasonably assumed between points of observation.

*The Qualified Competent Person should have the capacity, knowledge and judgment to recognize the importance of the Indicated Resource category when preparing and advancing a feasibility study. The estimation of the Indicated Resource should be of such quality to support preliminary alternative productive scenarios, which may be used as a foundation to make significant decisions about the most promissing scenario from the technical and economic point of view.*

23. **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. Section III of Appendix 1 provides details.
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.

These estimations and characterizations are based on detailed, reliable and verifiable reconnaissance, and on representative analysis and tests located according to an information matrix such that the continuity of the grades and geological-metallurgical characteristics enables their validation.

*The Qualified Competent Person may classify the Mineral Resource as a Measured Resource when the nature, quality, quantity and distribution of the data are such that they enable a solid interpretation of the geological context so that the continuity of the mineralisation can be confirmed, the estimation of tonnages and grades can be established within narrow limits of acceptability, and potential variations on these estimations do not significantly affect the economic viability of those resources. This category demands a high level of confidence in the geological interpretation, in the mineralisation controls, in the*

*type of lithology, alteration and mineralisation, and in the definition of its geoscientific estimation units. The confidence in this type of resource is such that it enables the unrestricted application of technical and economic concepts to assess the economic viability of these resources.*

24. **Mineral Resource Categorization:** In the categorization applied to the Resource it is important to consider the degree of knowledge about its continuity and its geological characteristics. The term Inferred Mineral Resource, for example, does not mean unknown resource or hypothetical resource. Inferred implies certain preliminary information; reduced and fragmentary information but, nonetheless, real, so that an inference can be established. The Inferred Mineral Resource is an informed play. Uncertainty may be high and significant, but can be measured, modelled, and bounded. However, Inferred Mineral Resources cannot be transformed into Mineral Reserves.

    Mineral Resource classification is a matter of judgment and the Competent Persons should take into account elements of Table 1 that refer to the confidence in the estimation of Mineral Resources

    Resources that are not based on minimal information are bets under ignorance; these bets cannot be characterized or counted, only considered as potential, to be hypothetical exploration targets. The exploration targets may be referenced, but has no place in the technical terminology of Mineral Resources and Mineral Reserves.

    *Regarding the relevant information that should guide the definition of Exploration Prospects, Mineral Resources and Mineral Reserves, Appendix 1 provides a matrix of minimum requirements that should be applied to the techniques, criteria and procedures that sustain these definitions. This matrix is a guide, and its application should be assessed case by case.*

25. **Mineral Resources Estimates:** These estimations do not constitute precise determinations, as the information captured and used is restricted. These estimations correspond to expected values with a certain probability of occurrence, depending on the quantity and quality of the available information.

    *The practice of estimating Mineral Resources covers methodologies based only on conventional statistical methods (sectional, polygons, inverse distance) to those that introduce the spatial characteristics of the data captured in-situ (kriging and its variants). Naturally, wherever possible, the latter shall be given priority. Additionally, it is always highly convenient to validate the estimations obtained, either by examining the consistency of the results by using at least two methods, or by some other criteria.*

26. **Mineral Reserve:** Is that portion of the Measured or Indicated Resource that is economically mineable according to a productive, environmental, economic and financial scenario derived from a mining plan and in which assessment all modifying factors (mining,

metallurgical, economical, financial, marketing, legal, environmental, infrastructure, processing, social and governmental) have been considered. Mineral Reserves include losses and dilutions due to the foreign material surrounding the Resource, which, for the effects of mining extraction, contaminates it.

The assessment may stem from Prefeasibility or Feasibility studies and should be updated as per the realistic conditions at the time the Mineral Reserves are reported. The Mineral Reserve is categorized into Probable Mineral Reserves and Proved Mineral Reserves, with the latter having a greater degree of confidence.

*Mineral Reserves are constituted by those portions that, after applying mining parameters and factors, result in tonnages and contents which, in the opinion of the Qualified Competent Person, may be the foundation of a viable project, considering the relevant technical, economic, environmental, infrastructure, social, legal, and governmental factors.*

*Mineral Reserves should include dilution material -material not identified as mineral- which, due to the extraction conditions, must be extracted and transported to the processing plant along with the Mineral Reserves.*

*The factors that are taken into account, in this case, imply that the feasibility of an extractive operation based on Mineral Reserves has been established, demonstrated and justified analytically under reasonable technological, operational, environmental and investment assumptions. This does not imply that the installations are already operational or that all governmental permits have been obtained. What it does imply is that there are reasonable expectations to obtain said approvals.*

27. **Probable Mineral Reserves:** It is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource.

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

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

    These Reserves consider diluting material and tonnage losses that may occur as a consequence of mining extraction.

    The definition of Probable Reserve is based on assessments that may include feasibility studies that include parameters for mining, metallurgical, technological, economic, marketing, legal, environmental, infrastructure and other factors.

28. **Proved Mineral Reserve:** It is the economically mineable part of a Measured Mineral Resource. A Proved Mineral Reserve implies a high degree of confidence in the Modifying Factors.
A Proved Mineral Reserve represents the highest confidence category of reserve estimate.

These Reserves consider diluting material and tonnage losses that may occur as a consequence of the mining extraction. The definition of Proved Mineral Reserve is based on feasibility studies that include parameters for mining, metallurgical, technological, economic, marketing, legal, environmental, infrastructure and other factors.

*The categorization of Mineral Reserve is determined primarily by the corresponding classification of the Mineral Resource and an assessment of the uncertainty of the modifying factors and should be made by the Qualified Competent Person.*

*The Code provides a direct relation between Measured Mineral Resources and Proved Mineral Reserves and between Indicated Resources and Probable Mineral Reserves. The geoscientific level of confidence for Probable Mineral Reserves is the same as that required for the in-situ determination of Indicated Resources; the geoscientific level of confidence for Proved Mineral Reserves is the same as that required for the in-situ determination of Measured Mineral Resources.*

*Indicated Mineral Resources can only become Probable Mineral Reserves. Only when this Resource has been transformed into a Measured Mineral Resource the corresponding Reserve can be converted into a Proved Mineral Reserve. Indicated Resources may not pass directly to Proved Mineral Reserves. (See Figure 2).*

*Measured Mineral Resources may give rise to Proved Mineral Reserves or Probable Mineral Reserves, depending on some modifying factors, and this is determined by the Qualified Competent Person's judgment given the level of confidence of the information in association with the feasibility of its exploitation.*

29. **Categorization of Reserves:** For the categorization imposed on Mineral Reserves it is important to consider the degree of knowledge of the economic, technological, environmental, legal, social and other factors that affect the Reserves under analysis. Both terms, Proved and Probable, imply a bounded uncertainty of their geoscientific knowledge and of the abovementioned factors. Inferred Mineral Resources should not be considered in the Mineral Reserves determination process. (See Figure 2).

*Regarding the relevant information that should guide the definition of Mineral Resources and Mineral Reserves, Appendix 1 provides a matrix of minimum requirements that should be applied to the techniques, criteria and procedures that substantiate these definitions. This matrix is a guideline, and its application should be assessed case by case.*

30. **Inventory of Mineral Resources and Mineral Reserves:** The estimation of Mineral Resources and Mineral Reserves is not accurate and, therefore, the tonnages and grades in the public reports should be expressed in such a way that the accuracy associated to these estimations is rounded to significant figures.

    *This way, the figures for tonnages and grades are usually delivered with 2 to 3 significant figures. For example, if the estimation of a resource has a result of 9,247,523 tons of 1.45675% Cu and 0.83455 g/ton Au, it will be reported as 9,250,000 tons (or 9,250 thousand tons) of 1.46% Cu and 0.83 g/ton Au. In the report, the Qualified Competent Person will refer to figures as "estimated" and not as "calculated" and, within possible limits of uncertainty, will incorporate a comment that allows the precision of these estimates to be determined.*

    The inventories may not include combined categories, but should refer explicitly to the category to which both Mineral Resources and Mineral Reserves belong. That is, Measured, Indicated and Inferred Resources (with the possibility of including the sum of Measured + Indicated) will be reported separately from Proved and Probable Mineral Reserves (with the possibility of also including the total sum of Mineral Reserves).

    In the same manner, inventories should contain explicit tonnages and grades, without prejudice to their also reporting the metal or mineral content they represent. Furthermore, the grades or cut-off parameters used to estimate mineral resources and mineral reserves should also be reported.

    *When reporting Mineral Reserves, the recoveries derived from metallurgical processes and their variations over time should also be indicated, by the nature of the mineralisation or by some other parameter.*

    *In the estimation of Mineral Reserves, the dilution criteria used and the impact of this dilution on the result should be specified.*

    *When reporting Mineral Reserves categories it should be specified whether these categories are or are not included in some of the Mineral Resources categories, in order to avoid double quantification.*

    *If there is a substantial difference between the Mineral Resources and the Mineral Reserves declared in a Public Report, an explanation of the reasons for this difference must be included therein. This allows the reader to gauge the possibility of converting the remaining Mineral Resources to Mineral Reserves.*

    *A terminology other than that of Mineral Resources and Mineral Reserves cannot be used in a Public Report of tonnage and grade estimations, in accordance with Law No. 20,235.*

31. **Reconciliations:** When preparing the Mineral Reserves statement, the Mineral Resources statement on which these mineral reserves are based should be prepared first.
When a new report or statement of Mineral Resources and/or Mineral Reserves is published, it should include a reconciliation of the previously published figures, identifying the differences between both sets of figures and stating the reasons for these differences, such as, for example, productive aspects, explorations, changes in category, or others. It is not necessary for the reconciliation to detail the differences, but it should allow the reader to have a clear knowledge of what happened.
The application of cut-off grades and other criteria to the Mineral Resources may then be performed, in order to develop the Mineral Reserves statement, which may be reconciled with previous statements.

*Companies must reconcile the estimations in their Mineral Resources and Mineral Reserves Reports every time the figures are different from the information previously published. It is not essential to provide a detailed explanation on the differences between estimations, but an adequate comment should be made so that the reader may be familiar with significant deviations.*

*Appendix I provides a synthesis of the main criteria that should be considered when preparing reports on the results of Exploration Results, Mineral Resources and Mineral Reserves. These criteria need to be discussed in the Public Reports, especially if they materially affect the estimation and classification of Mineral Reserves. Changes in the economic, governmental and other factors may constitute, in and of themselves, the cause for significant changes in the Mineral Reserves and should be reported accordingly.*

32. **Non-Metallic Deposits:** In the case of non-metallic deposits the basic focus is the quality of the material to be extracted, processed and commercialized in terms of the continuity of the deposit and the content and variability of the mineral species of interest and contaminating elements, and in relation to market requirements, supply contracts and the restrictions imposed on contaminating materials. The activities linked to quality assurance and control (QA/QC) are of capital importance. The mix, granulometries, and faults analysis and the control of geological structures that may influence the quantity and quality of the product constitute essential aspects that must be informed for deposits of this nature.

33. **Artificial Deposits:** When artificial deposits (e.g. piles, dumps, tailings, "cakes" and others) are reported in terms of tonnage, grade, geo-mining-metallurgical characteristics and classification, an itemized detail of the information associated with these deposits should be provided. This information should include, at least, grades, metallurgical recoveries, granulometry, chemical and mineral variability of the stockpiled material, moisture content, densities, percolation indicators and other data that are fundamental for the possible processing of these materials, the design of the corresponding facilities, and the volume and quality of the marketable product obtained.

# APPENDIX 1

**INFORMATION ON**

- **SAMPLING TECHNIQUES AND DATA**
- **EXPLORATION PROSPECTS**
- **ESTIMATION OF MINERAL RESOURCES**
- **ESTIMATION OF MINERAL RESERVES**

The following table is a checklist and guideline that should be used as a reference by those preparing reports on Exploration Results, Mineral Resources and Mineral Reserves. The list is not exclusive and, as always, the relevance and materiality are the fundamental principles that determine what information must be publicly reported. Nevertheless, it is important to report any matter that may materially affect a reader's understanding and interpretation of the results or estimates that are being reported. This is particularly important when inadequate or uncertain data affect the accuracy of, or the confidence in, a statement of Exploration Results or an estimation of Mineral Resources and/or Mineral Reserves.

The order and grouping of the criteria in the table reflect the normal systematic focus for exploration and assessment. The criteria in the first group, "Sampling Techniques and Data" apply to all the following groups. In the rest of the list, the criteria indicated in the previous groups are often applied to successive groups and must be considered when estimating and reporting.

## SECTION 1 SAMPLING TECHNIQUES AND DATA

| CRITERIA | EXPLANATION |
|---|---|
| **SAMPLING TECHNIQUES** | - *Sampling type and quality (channels, random chips, others) and the measures taken to ensure sample representativeness.* |
| **DRILLING TECHNIQUES** | - *Drill type (diamond drill, reverse circulation, sonic, etc.) and details (core sample diameter, triple or standard tube, sampling characteristics, orientation of the core sample, etc.).* |
| **SAMPLE RECOVERY** | - *Core sample and/or detritus recovery logs and results obtained.*<br>- *Measures taken to maximize sample recovery and ensure sample representativeness.*<br>- *Whether any relationship exists between grade and sample recovery and whether there may be sample bias related to preferential loss/gain of fine/coarse material.* |
| **LOGGING** | - *Whether core samples or detritus have been described with a level of detail to support appropriate Mineral Resource estimation and mining and metallurgical studies.*<br>- *Logging methodology of the geological and geotechnical characteristics of the cores and other samples (scale, qualitative or quantitative variables, mapping supports, mineralogical and structural domains, geotechnical measurements, and photographs).*<br>- *Methodologies for obtaining and managing samples for geotechnical, metallurgical, density, petro-chalcography, quantitative mineralogy tests, etc.* |
| **SUB-SAMPLING TECHNIQUES AND SAMPLE PREPARATION** | - *For core samples, whether cut with a saw or a guillotine and the fraction obtained (half, quarter, or total).*<br>- *In the case of fragments or detritus, equipment used (riffle, tube, rotating), dry or moist samples.*<br>- *For all sample types, the nature, quality and suitability of the sample preparation techniques.*<br>- *Quality control procedures adopted for all sub-sampling stages to maximize the representativeness of the samples.*<br>- *Measures taken to ensure that the samples obtained are representative of the in-situ material.*<br>- *Whether sample sizes are appropriate and consistent to the grain size of the material being sampled.*<br>- *Whether sample support is adequate and consistent with the variability in grade and geology.*<br>- *It is recommended to state the safety measures adopted to guarantee the integrity of the sample.* |
| **QUALITY OF TESTING DATA AND LABORATORY TESTS** | - *Laboratories must be certified by competent external entities (use of protocols, use of reference materials, validation tests, among others).*<br>- *Chain of custody between the place of origin of the sample and the laboratory performing the analysis.*<br>- *Testing nature, quality and suitability and laboratory procedures and whether the technique is considered partial or total.* |

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| | - *Quality control procedures adopted (standards, blanks, duplicates, external laboratory checks) and acceptable levels of accuracy (lack of bias) and precision that have been established.* |
| **SAMPLING AND TESTING VERFICATION** | - *The verification of significant intersections by either company personnel or by third parties.*<br>- *Use of twinned holes or duplicate samples.*<br>- *Adjustment criteria and procedures for the testing data.* |
| **LOCATION OF DATA POINTS** | - *Accuracy and quality of the surveys used to locate drill holes (collar and trajectories), ditches or trenches, mine workings and other works used in Mineral Resource estimation.*<br>- *Quality and adequacy of topographic control. Location plans.* |
| **SAMPLE SPACING AND DISTRIBUTION** | - *Data density (spacing).*<br>- *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resources and Mineral Reserves estimation procedure(s) and classifications applied.*<br>- *Sample compositing procedures.* |
| **DATA AND SAMPLES BACKUP FILES** | - *Documentary information of the original data (data entry, verification and physical and/or digital storage procedures) that sustains the preparation of the report.*<br>- *Description of the drilling samples and geotechnical and metallurgical tests, preparation rejects and analysis slurry storage, which ensure the reproducibility of the data and the execution of additional studies.* |
| **ORIENTATION OF DATA IN RELATION TO GEOLOGICAL STRUCTURE** | - *Whether the sampling orientation achieves the unbiased sampling of possible structures and the extent to which this is known, considering the nature of the deposit.*<br>- *If the relationship between the drilling orientation and the orientation of key mineralized structures is considered to have introduced a sampling bias, this should be assessed and reported.* |
| **AUDITS AND REVIEWS** | - *The results of any audits or reviews of sampling techniques and data.* |

## SECTION 2 EXPLORATION RESULTS

| CRITERIA | EXPLANATION |
|---|---|
| **MINERAL RIGHTS AND LAND OWNERSHIP** | - *Type, reference (name, number), location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.*<br>- *The security of the tenure held at the time of reporting along with any known impediments for obtaining a license to operate in the area.* |
| **REFERENCE SYSTEM** | - *Type, origin and quality of the coordinates system used. Where local coordinates are used, their relation in terms of height, horizontal offset and angle with the standardized system in the country.* |
| **EXPLORATION BY THIRD PARTIES** | - *Acknowledgment and appraisal of exploration by other parties on the property.* |
| **GEOLOGY** | - *Nature of the deposit, geological setting and style of mineralisation.*<br>- *Reliable maps and geological sections that sustain the interpretations.*<br>- *Geological information, grades and tests performed on the exploration works (surface, channels, ditches, drillings, tunnels, etc.) consigned in formal databases.* |
| **DRILLING INFORMATION** | - *Summary of all the basic information for understanding the exploration results, including a tabulation of the following drilling information: type, number, East/North/collar elevation coordinates azimuth, slope and length. It should also record the execution date (start and finish) and the drilling executor.*<br>- *Support the information exclusions and explain that they do not affect understanding the report.* |
| **DATA AGGREGATION METHODS** | - *The weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are fundamental data which should be stated.*<br>- *Description of the procedure used in aggregation of intercepts that incorporate short lengths of high grade results and longer lengths of low grade results, illustrated with some typical examples of such aggregations in detail.*<br>- *The criteria applied to calculate metal equivalent values must be clearly specified.* |
| **RELATIONSHIP BETWEEN MINERALIZATION WIDTHS AND INTERCEPT LENGTHS** | - *These relationships are particularly important in the reporting of Exploration Results.*<br>- *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported. If it is not known, a clear statement to the effect that the length of the recognized intercept is only measured in the axis of the drill hole should be made.* |
| **DIAGRAMS** | - *Wherever possible, include appropriate maps and sections (with scales) and tabulations of mineralized intervals, if they help to significantly clarify data.* |
| **BALANCED REPORTING** | - *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and their respective widths should be practiced to avoid an erroneous interpretation of the results.* |
| **OTHER SUBSTANTIVE EXPLORATION DATA** | - *Other exploration data, if meaningful and material should be reported including (but not limited to): geological observations; geophysical and geochemical survey results; bulk samples (size and method of treatment); metallurgical test results; bulk density,* |

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| | *groundwater, geotechnical characteristics; potential deleterious or contaminating substances.*<br>- *The professionals responsible for the works carried out in the different areas (geology, geophysics, geochemistry, estimation, etc.) must be specified, as well as the execution dates of the works.* |
| **FURTHER WORK** | - *The nature and scale of planned additional work (e.g. lateral extensions or depth extensions reconnaissance or large-scale drilling), backed by diagrams and geological interpretation.* |

## SECTION 3 ESTIMATION OF MINERAL RESOURCES

| CRITERIA | EXPLANATION |
|---|---|
| **DATA INTEGRITY** | - *Measures taken to ensure that data have not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.*<br>- *Data verification and/or validation procedures used.* |
| **GEOLOGICAL INTERPRETATION** | - *Degree of confidence or uncertainty in the geological interpretation of the mineral deposit.*<br>- *Nature of the data used and of any assumptions made.*<br>- *The effect, if any, of alternative interpretations on Mineral Resource estimation.*<br>- *Description of the lithological, structural and mineralogical domains that serve as a foundation for the definition of grades, geometallurgical, geotechnical and hydrogeological estimation units. Quality and suitability of the data collection procedures used.*<br>- *The use of geology to guide or control Mineral Resources estimation.*<br>- *Factors affecting the continuity of both grade and geology.* |
| **DIMENSIONS** | - *The extent and variability of the Mineral Resource expressed in its three dimensions (length, width, and depth).* |
| **ESTIMATION AND MODELLING TECHNIQUES** | - *The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, mineralized domains, interpolation parameters and maximum distance of extrapolation from data points.*<br>- *Criteria used for geological modelling when the data are collected in different exploration campaigns and/or from different sample types (e.g. trenches, RC drillings, DDH, etc.).*<br>- *The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.*<br>- *The assumptions made regarding recovery of by-products.*<br>- *Estimation of deleterious elements or other non-grade variables of economic significance (e.g. sulphur for acid mine drainage characterization).*<br>- *In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.*<br>- *Any assumptions behind modelling of selective mining units.*<br>- *Any assumptions about correlation between variables.*<br>- *The validation process used, the comparison of model data to drill hole data and use of reconciliation data, if available.*<br>- *Detailed description of the method and assumptions used to estimate tonnage and grades (sections, polygons, inverse distance, geostatistics or others).*<br>- *Description of how the geological interpretation is used to control resources estimation.*<br>- *Discussion of the foundations on whether to use or not use grade cut-off or truncation. If a computer method is chosen, describe the programs and parameters used.*<br>- *Geostatistical methods are very varied and should be described in detail. The chosen method must be justified. The compatibility of geostatistical parameters, including the* |

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| | *variogram, with the geological interpretation must be discussed. The experience acquired in the application of geostatistics in similar deposits should be considered.* |
| **GRADE CUT OFF PARAMETERS** | - *The basis of the adopted cut-off grade(s) or quality parameters applied, including those related to the equivalent metals equations, if applicable.* |
| **MINING FACTORS OR ASSUMPTIONS** | - *Assumptions adopted in relation to possible extraction methods, minimum mining dimensions and internal/external dilution. It may not always be possible to make these assumptions at a Mineral Resource level, so it is necessary to specify when these aspects are relevant and are not being adequately considered.*<br>- *In order to demonstrate realistic prospects for eventual economic extraction, basic assumptions are necessary. Examples include the type of access (shafts, slopes, etc.), geotechnical parameters (pit slopes, stope dimensions, etc.), infrastructure requirements and estimated mining costs. All assumptions should be clearly stated.* |
| **METALLURGICAL FACTORS OR ASSUMPTIONS** | - *The metallurgical process proposed and the appropriateness of that process to the nature of the mineralisation. It may not always be possible to make these assumptions at a Mineral Resource level, so it is necessary to specify when these aspects are relevant and are not being considered.*<br>- *In order to demonstrate realistic prospects for eventual economic extraction, basic assumptions are necessary. Examples include the scope of the metallurgical test work, recovery factors, allowances for by-product credits or deleterious elements, infrastructure requirements and estimated processing costs. All assumptions should be clearly stated.* |
| **TONNAGE FACTORS (IN-SITU DENSITIES)** | - *If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* |
| **CLASSIFICATION** | - *The basis for the classification of the Mineral Resources into varying confidence categories.*<br>- *Whether appropriate account has been taken of all relevant factors, i.e. relative confidence in tonnage/grade estimations, confidence in the geological continuity and metal values, quality, quantity and distribution of the data.*<br>- *Whether the results appropriately reflect the Competent Person(s)' view of the deposit.* |
| **AUDITS OR REVIEWS** | - *The results of any audits or reviews of the Mineral Resource estimates.* |
| **DISCUSSION OF RELATIVE ACCURACY/CONFIDENCE** | - *Where appropriate, a statement of the relative accuracy and/or confidence in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Qualified Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the Mineral Resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the risks involved.*<br>- *The statement should specify whether the statement of relative accuracy and/or confidence relates to global or local estimates, and, if local, state the relevant tonnages or volumes, which should be relevant to the technical and economic evaluation. The documentation should include the assumptions made and the procedures used.*<br>- *These risk statements should be compared with production data, where available.* |

## SECTION 4 ESTIMATION OF MINERAL RESERVES

| CRITERIA | EXPLANATION |
|---|---|
| **MINERAL RESOURCE ESTIMATE FOR CONVERSION TO MINERAL RESERVES** | - *Description of the Mineral Resource estimate used as a basis for the conversion to a Mineral Reserve.*<br>- *Clear statement as to whether the Mineral Resources are reported in addition to, or inclusive of, the Mineral Reserves.* |
| **STUDY STATUS** | - *The nature and level of the study undertaken to enable Mineral Resources to be converted to Mineral Reserves.*<br>- *To convert Mineral Resources to Mineral Reserves requires at least a Pre-Feasibility Study, in which a technically achievable and economically viable mining plan that considers all modifying factors (mining, metallurgic, economic, marketing, legal, environmental, infrastructure, social and governmental) has been determined. (See Appendix 2).* |
| **CUT-OFF PARAMETERS** | - *The basis of the cut-off grade(s) or quality parameters applied, including the basis, if appropriate, of equivalent metal formulae. The cut-off parameter may be the economic value per block rather than grade.* |
| **MINING FACTORS OR ASSUMPTIONS** | - *The method and assumptions used to convert the Mineral Resource to a Mineral Reserve (i.e. either by application of appropriate optimisation factors or by preliminary or detailed mine design).*<br>- *The choice of, the nature and technical viability of the selected mining method(s), the size of the selected production unit (length, width, height) and other mining parameters related to design, access, stripping, and others.*<br>- *The assumptions made regarding geotechnical parameters (e.g. pit slopes, stope sizes, etc.), grade control and pre-production drilling.*<br>- *The major assumptions adopted in the Mineral Resource model with regards to pit or stope optimization, if appropriate.*<br>- *The mining dilution and mining recovery factors, and minimum mining widths used.*<br>- *The way the inferred mineral resources in the mining studies are used and the effect resulting from their inclusion.*<br>- *The infrastructure requirements of the selected mining methods. Where available, the historic reliability of the performance parameters.* |
| **METALLURGICAL FACTORS OR ASSUMPTIONS** | - *The metallurgical process proposed and the technical viability of that process to the nature of the mineralisation.*<br>- *Whether the metallurgical process uses well-tested technology or if it is novel in nature.*<br>- *The nature, amount and representativeness of the backup metallurgical tests and the metallurgical factors applied.*<br>- *Any assumptions or allowances made for deleterious elements.*<br>- *The existence of any bulk sample or pilot scale test work and the degree to which such samples are representative of the orebody as a whole.*<br>- *The tonnages and grades reported for Mineral Reserves should state clearly whether these are in respect of material to the plant or after recovery. Comment on existing plant and equipment, including an indication of replacement and residual value.* |

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| | - *In the case of definite products under specification, if the backup estimation is based on an appropriate mineralogical characterization to comply with such specification.* |
| **ENVIRONMENTAL AND SOCIAL FACTORS** | - *The status of studies of potential environmental impacts of the mining and metallurgical operations. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps.*<br>- *The status of agreements with key stakeholders and matters leading to obtaining a licence to operate.* |
| **COST AND REVENUE FACTORS** | - *The derivation of, or assumptions made, regarding projected capital and operating costs.*<br>- *The assumptions made regarding revenue including head grade, product prices, transportation and treatment charges, penalties, etc.*<br>- *The allowances made for royalties payable, both Government and private.*<br>- *Basic cash flow inputs for a stated period.*<br>- *Mine closure costs and eventual residual values at the end of the operation.* |
| **MARKET ASSESSMENT** | - *The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future.*<br>- *A customer and competitor analysis in order to identify market expansion possibilities for the product.*<br>- *Price and volume forecasts and the basis for such forecasts.*<br>- *For industrial minerals, customer specification, testing and acceptance requirements prior to a supply contract.* |
| **ECONOMIC ASSESSMENT** | - *The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.*<br>- *Analysis of the applicable tax charge.*<br>- *NPV ranges and sensitivity to variations in the significant assumptions and inputs.* |
| **OTHERS** | - *The effect, if any, of natural risk, infrastructure, environmental, legal, marketing, social or governmental factors on the likely viability of a project and/or on the estimation and classification of the Mineral Reserves.*<br>- *The status of titles and approvals critical to the viability of the project, such as mining leases, discharge permits, government and statutory approvals.*<br>- *Environmental descriptions of anticipated liabilities. Location plans of mineral rights and titles.* |
| **CLASSIFICATION** | - *The basis for the classification of the Mineral Reserves into varying confidence categories.*<br>- *Whether the results appropriately reflect the Qualified Competent Person(s)' view of the deposit and the modifying factors.*<br>- *The proportion of Probable Mineral Reserves which have been derived from Measured Mineral Resources (if any).* |

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|---|---|
| **AUDITS AND REVIEWS** | - *The results of any audits or reviews of Mineral Reserve estimates.* |
| **DISCUSSION OF RELATIVE ACCURACY/CONFIDENCE** | - *Where appropriate, a statement of the relative accuracy and/or confidence in the Mineral Reserve estimate using an approach or procedure deemed appropriate by the Qualified Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the Mineral Reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the risks involved.*<br>- *The statement should specify whether the statement of relative accuracy and confidence relates to global or local estimates, and, if local, state the relevant tonnages or volumes, which should be relevant to the technical and economic evaluation. The documentation should include the assumptions made and the procedures used.*<br>- *Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Mineral Reserve viability, or for which there are remaining areas of uncertainty at the current study stage.*<br>- *These risk statements should be compared with production data, where available.* |

# APPENDIX 2

## Study Accuracy Ranges for Capital and Operating Cost Estimates

| Capital Cost Category | Scoping Study | Pre-Feasibility Study | Feasibility Study |
|---|---|---|---|
| Basis of Estimate to include the following areas::<br><br>Civil/structural, architectural, piping/HVAC, electrical, instrumentation, construction labour, construction labour productivity, material take offs/quantities, material/equipment, pricing, infrastructure | Order-of-magnitude, based on historic data or factoring. Engineering<br><br>< 5% complete. | Estimated from historic factors or percentages and vendor quotes based on material take offs. Engineering at 5-15% complete. | Detailed from engineering at 15% to 25% complete, estimated material take-off quantities, and multiple vendor quotations |
| Contractors | Included in unit cost or as a percentage of total cost | Percentage of direct cost by area for contractors; historic for subcontractors | Written quotes from contractor and subcontractors |
| Engineering, procurement, and construction management (EPCM) | Percentage of estimated construction cost | Percentage of detailed construction cost | Calculated estimate from EPCM |
| Pricing | FOB mine site, including taxes and duties | FOB mine site, including taxes and duties | FOB mine site, including taxes and duties |
| Owner's costs | Historic estimate | Estimate from experience, factored from similar project | Estimate prepared from detailed zero-based budget |
| Environmental compliance | Factored from historic estimate | Estimate from experience, factored from similar project | Estimate prepared from detailed zero-based budget for design engineering and specific permit requirements |

| Capital Cost Category | Scoping Study | Pre-Feasibility Study | Feasibility Study |
|---|---|---|---|
| Escalation | Not considered | Based on entity's current budget percentage | Based on cost area with risk |
| Accuracy range | ± 50% | ± 25% | ± 15% |
| Contingency Range (Allowance for items not specified in scope that will be needed) | ± 25% | ± 15% | ± 10% (actual value to be determined based on risk analysis) |
| Basis | Order-of- magnitude estimate | Quantified estimates with some factoring | Describes the basis of the estimate; detailed from zero-based budget; minimal factoring |
| Operating quantities | General | Specific estimates with some factoring | Detailed estimates |
| Unit costs | Based on historic data for factoring | Estimates for labour, power, and consumables, some factoring | Letter quotes from vendors; minimal factoring |
| Accuracy range | ± 35% | ± 25% | ± 15% |
| Contingency Range (Allowance for items not specified in scope that will be needed) | ± 25% | ± 15% | ± 10% (actual value to be determined based on risk analysis) |

*Modified from Society for Mining, Metallurgy and Exploration Inc (SME)Mining Engineering Handbook, 3rd Edition, 2011, pages 300 and 301, Tables 5.1-1, 5.1-2 and 5.1-3.*

# APPENDIX 3

## GENERIC TERMS AND EQUIVALENTS

Throughout this Code, certain words are used in a general sense when a more specific meaning might be attached to them by particular commodity group within the industry. In order to avoid unnecessary duplication, a list of generic terms is detailed below together with other terms that may be regarded as synonymous for the purposes of this document. The translation of a word into English is shown in *italics.*

| **Generic term (*Generic term*)** | **Synonyms or similar terms** | **Generally accepted meaning** |
|---|---|---|
| Minería (*Mining*) | Quarrying | All activities related to the extraction of metals, minerals and gemstones from the earth, whether surface or underground, and by any method (e.g. quarries, open pit, block or panel caving, solution mining, dredging). |
| Tonelaje (*Tonnage*) | Quantity, Volume | An expression of the amount of material of interest irrespective of the units of measurement (which should be stated when figures are reported). In general, metric tons or multiples thereof are used. |
| Ley (*Grade*) | Quality, Assay, Analysis (Value) | Any physical or chemical measurement of the characteristics of the material of interest in samples or product. In general, the chemical content of an element, expressed in percentage, g/ton or other units is used. |
| Metalurgia (*Metallurgy*) | Processing, Beneficiation, Preparation Concentration | Physical and/or chemical separation of constituents of interest from a larger mass of material. Methods employed to prepare a final marketable product from material as mined. Examples include screening, flotation, magnetic separation, leaching, washing, roasting etc. |
| Recuperación (*Recovery*) | Yield | The percentage of material of initial interest that is extracted during mining and/or processing. A measure of mining or processing efficiency. |

| **Generic term (*Generic term*)** | **Synonyms or similar terms** | **Generally accepted meaning** |
|---|---|---|
| Mineralización (*Mineralisation*) | Type of deposit, orebody, style of mineralisation. | Any single mineral or combination of minerals of economic interest occurring in a mass or deposit. The term is intended to cover all forms in which mineralisation might occur, whether by the nature of the deposit, mode of occurrence, genesis or composition. |
| Mineral Resources<br>Mineral Reserves | | In this version of the Code the term "mining", used in the previous version, has been replaced by the term "mineral", which is the term used in the other Codes.<br><br>For resources there is consensus in the term *Mineral resources*, while for reserves the terms *Mineral reserves* (NI 43-101, CRIRSCO) or *Ore reserves* (JORC) are used. The latter is of common use and is also acceptable. Other descriptors can be used to clarify the meaning, e.g. coal reserves, diamond reserves etc. |
| Mena (*Ore*) | Mineral | Fraction of the deposit that corresponds to the minerals that contain elements of economic interest. Another meaning for the term mineral, as well as for the English term *"ore"*, is that used in mining to refer to rocky material whose average grade is above the cut-off grade that is extracted from the mine and put through the metallurgical process. |
| Lastre (*Waste*) | Sterile | Fraction of the deposit with a very low or non-existent content of the minerals of interest, which is not put through the metallurgical process and must be discarded after being mined. |
| Dilución (*Dilution)* | Contamination | Material originating from the surroundings of a mineralised volume, which is mined along with it, forming part of the mineral reserves. It may correspond to in-situ material or to a previous mining operation and may be incorporated from above or sideways. This material is frequently of a lower grade and/or of a different mineral quality, so that it negatively impacts the mining-metallurgical process. |
| Ley de corte (*Cut-off grade*) | Product specifications | The lowest grade, or quality, of mineralised material that qualifies as economically mineable and available in a given deposit. In general, it corresponds to the content of an element expressed as a percentage, g/Ton or other (grade) in the material being considered. It may be defined on the basis |

| Generic term (*Generic term*) | Synonyms or similar terms | Generally accepted meaning |
|---|---|---|
| | | of economic evaluation, or on physical or chemical attributes that define an acceptable product specification. |
| Vida útil (*Useful life*) | | Refers to the time frame (duration in years) of the mining operation and the processing of mineral reserves. For the Mine Closure law in Chile, this is established in accordance with Law 20551. |
| Extraíble (*Mineable*) | | Economic or subeconomic part of the deposit that can be mined during the mine's normal operation. |
| Qualified Competent Person | Competent Person (JORC, CRIRSCO) , Qualified Person (NI 43-101) | Refers to Title I of Law 20235. Qualified Competent Persons registered in the Mining Commission for the Qualification of Competencies in Mineral Resources and Mineral Reserves (the Mining Commission). |
| Prospecto de Exploración (*Exploration Prospects*) | | A certain extension of territory where the existence of a potential mineral deposit has been identified in a determined geological environment, where a statement or estimation, expressed as a range of tons and grades, refers to a mineralisation for which there is insufficient information to estimate Mineral Resources. |
| Estudio de perfil (*Scoping study*) | Evaluación preliminar (*Preliminary assessment*) | Study based on preliminary information to assess the technical and economic potential of the deposit. (See Appendix 2).<br><br>This stage does not allow defining mineral reserves. |
| Estudio de Prefactibilidad (*Pre-Feasibility Study*) | Preliminary Feasibility Study | A Pre-Feasibility Study is a comprehensive study of the viability of a mineral project that has advanced to a stage where the mining method, in the case of underground mining, or the pit configuration, in the case of an open pit, has been established, where an effective method of mineral processing has been determined, and includes a financial analysis based on reasonable assumptions of technical, engineering, legal, operating and economic factors and the assessment of other relevant factors which are sufficient for a Qualified Competent Person, acting reasonably, to determine if all or part of the Mineral resource may be classified as a Mineral Reserve. (See Appendix 2). |

| Generic term (*Generic term*) | Synonyms or similar terms | Generally accepted meaning |
|---|---|---|
| | | |
| Estudio de Factibilidad (*Feasibility Study*) | | A Feasibility Study is a comprehensive study of a mineral deposit in which all geological, engineering, legal, operating, economic, social, environmental and other relevant factors are considered in sufficient detail that it could reasonably serve as the basis for a final decision by a financial institution to finance the development of the deposit for mineral production. (See Appendix 2). |
| AC/CC (*QA/QC*) | | Quality Assurance and Control |

# COMMONLY USED ACRONYMS

| CHILEAN | |
|---|---|
| Comisión Minera (*Chilean Mining Commission*) | Short term for referring to the Mining Commission for the Qualification of Competencies in Mineral Resources and Mineral Reserves, the entity responsible for, under Law No. 20,235, administering the Public Registry of Qualified Competent Persons in Mineral Resources and Reserves. (www.comisionminera.cl) |
| Mining Council | The Mining Council, created in 1998, is the association that gathers the largest copper, gold, silver and molybdenum production companies operating in Chile, both national and foreign capital, of public or private ownership. (www.consejominero.cl) |
| CORFO | The Chilean Economic Development Agency (CORFO), created in 1939, is the Chilean state agency responsible for fostering national productive activities, whose mission is to "foster entrepreneurship and innovation to improve productivity in Chile and attain global leadership positions in competitiveness matters." (www.corfo.cl) |
| SERNAGEOMIN | The National Geological and Mining Service (SERNAGEOMIN)'s objective is to advise the Ministry of Mining and contribute to government programs for the development of mining and geological policies. Its mission is to "execute, in a decentralized manner, the policies put in place to regulate and oversee a safe, |

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| | sustainable, competitive and inclusive mining industry, and to generate geological information on the national territory in order to provide technical geological assistance, guaranteeing the population's safety, by means of a specialized team". (www.sernageomin.cl) |
| SONAMI | The National Society of Mining (SONAMI), founded on 26 September 1883, is the union institution that groups and represents small-, medium- and large-scale mining operations, both metallic and non-metallic, in Chile (www.sonami.cl) |
| SVS | The Chilean Securities and Insurance Commission (SVS) is an autonomous institution with a legal role and its own equity that relates to the Government through the Ministry of Finance. Its main objectives include ensuring the transparency of the markets it oversees by means of the timely and ample dissemination of the public information it keeps, and contributing to the knowledge and education of investors, policyholders and the general public. (www.svs.cl) |

| **OTHER COUNTRIES** | |
|---|---|
| ASX | Australian Securities Exchange<br><br>Main stock exchange in Australia. The Stock Exchange began as a separate state stock exchange established in early 1861. Today commerce is completely electronic and the stock exchange is a public company, which quotes in its own market. (www.asx.com.au) |
| AusIMM | Australasian Institute of Mining and Metallurgy<br><br>The AusIMM was founded in 1893 and provides services to professionals engaged in all facets of the minerals sector. (www.ausimm.com.au) |
| CIM | Canadian Institute of Mining, Metallurgy and Petroleum<br><br>Founded in 1898, the CIM is the leading technical society of professionals in the Canadian Minerals, Metals, Materials and Energy industries. (www.cim.org) |
| CMMI | Council of Mining and Metallurgical Institutes<br><br>Established in 1924, it groups the institutions related to the British community's mining industry: Australasian Institute of Mining and Metallurgy, Canadian Institute of Mining and Metallurgy, Geological Society of South Africa, Institute of Petroleum, Institution of Metallurgists, Institution of Mining and Metallurgy, Institution of |

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| | Mining Engineers, Metals Society, Mining, Geological and Metallurgical Institute of India, South African Institute of Mining and Metallurgy, South Wales Institute of Engineers. |
| CRIRSCO | Committee for Mineral Reserves International Reporting Standards<br><br>Established in 1994 under the sponsorships of the CMMI, it is a grouping of representatives of organisations that are responsible for developing mineral reporting codes and guidelines in Australasia (JORC), Canada (CIM), Chile (Mining Commission), Europe (National Committee PERC), Mongolia (MPIGM), Russia (NAEN), South Africa (SAMREC) and the USA (SME). (www.crirsco.com) |
| ICMM | International Council of Mining and Metals<br><br>Founded in 2001 to improve sustainable development performance in the mining and metals industry. The ICMM brings together many of the leading mining and metals companies in the world, as well as regional, national and commodities associations. (www.icmm.com) |
| IMMM | Institution of Mining, Metallurgy and Materials / The Institute of Materials, Minerals and Mining (IOM3)<br><br>Formed from the merger of the *Institute of Materials* and the *Institution of Mining and Metallurgy* in June 2002. IOM3 is a major engineering institution that covers the complete cycle of materials in order to promote and develop the science and engineering aspect of materials (geology, mining, metals metallurgy and petroleum). (www.iom3.org) |
| JORC<br><br>JORC Code | Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geosciences and the Minerals Council of Australia<br><br>The *Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the 'JORC Code')* is a professional code of practices that sets out minimum standards for public reporting of exploration results and mineral resources and reserves. (www.jorc.org) |
| MSTF | Mining Standard Task Force<br><br>"Task force" formed in July 1997 by the association of the *Ontario Securities Commission ("OSC")* and *The Toronto Stock Exchange ("TSE")* to review the need for better standards in relation to the execution of exploration and mining activities and the reporting of their results. (www.pdac.ca) |
| SAMREC | South African Mineral Resource Committee<br><br>Committee formed in 1992 by the *Geological Society of South Africa (GSSA)* for the purpose of compiling the first South African code for reporting mineral resources and reserves. The 2007 version incorporated the *Southern African Institute of Mining and* |

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| | *Metallurgy*.<br>(www.samcode.co.za) |
| SME | Society for Mining, Metallurgy & Exploration Inc.<br><br>A society of professionals related to the mining industry, its roots can be traced to 1871, when a group of mining engineers in the coal industry founded the *American Institute of Mining, Metallurgical and Petroleum Engineers (AIME)*. *(www.smenet.org)* |
| TSE | Toronto Stock Exchange<br><br>(www.tmx.com) |
| UNFC | United Nations Framework Classification<br><br>The *United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources* is a plan developed by the *United Nations Economic Commission for Europe* in 2009 to classify/estimate mineral and energy reserves and resources whose objective is to facilitate international communication by providing a simple, uniform and user-friendly format for reporting resources and reserves. (www.unece.org) |
| USBM | United States Bureau of Mines<br><br>Established in 1910 after a series of mining catastrophes, the organization was aimed at managing data on mining works and the organization of environmental, health and safety matters until it was abolished in 1995. Its functions regarding mineral data information were transferred to the USGS. |
| USGS | United States Geological Survey<br><br>This government service, established in 1879, aims to provide reliable scientific information to describe and understand the Earth, minimize the loss of life and property in natural disasters and manage water, biological, energy and mineral resources to privilege and protect quality of life. (www.usgs.gov) |

# APPENDIX 4

## RULES OF CONDUCT AND GUIDELINES

## OF THE

## QUALIFIED COMPETENT PROFESSIONAL

## RULES OF CONDUCT AND GUIDELINES

The following Rules of Conduct apply to the Qualified Competent Professionals engaged in the practice of preparing or contributing to public reports that include statements of Mineral Exploration Prospects, Mineral Resources or Mineral Reserves. These Rules are in addition to the Professional Codes of Ethics that may apply due to the Qualified Competent Professionals who are members of a recognised professional body. The following Rules of Conduct are listed under various areas of responsibility.

**The Public and Society**

**The Qualified Competent Professionals must discharge their duties with fidelity to the public, and at all times carry out their work with integrity and professional responsibility.**

In particular they should,

*Recognise at all times, that the responsibility of the Qualified Competent Professional towards the Public overrides all other specific responsibilities including responsibility to professional, sectional, or private interests or to other Qualified Competent Professionals.*

*Ensure that public comments on geological, engineering and metallurgical and related matters are made with care and accuracy, without unsubstantiated, exaggerated, or premature statements; they should be made clearly and concisely.*

*Base documentation underpinning Public Reports on Exploration Prospects, Mineral Resources and Mineral Reserves on sound and relevant estimation techniques, adequately validated databases and unbiased judgement.*

*When required to do so, give evidence, express opinions or make statements in an objective and truthful manner on the basis of adequate knowledge and understanding.*

*Recognise that, when required to do so, Qualified Competent Professionals should be prepared to disclose details of their qualifications, professional affiliations and relevant experience in all public reports.*

**The Profession, Employers and Clients**

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

In particular, they should:

*Act with due skill, care and diligence at all times in conducting their activities.*

*Perform work only in their area of competence.*

*Never knowingly mislead or deceive others, falsify or fabricate data.*

*Respect and safeguard confidential information.*

*Acknowledge and avoid wherever possible both real and perceived conflicts of interest.*

*Distinguish between fact and opinion so that it is clearly evident what is interpretation of fact and what is professional judgement. Qualified Competent Persons may give a considered professional opinion based on facts, experience, interpretation, extrapolation or a combination of these.*

*Ensure the scientific and technological contributions are thorough, accurate and unbiased in design, implementation and operation.*

*Ensure that sound and relevant estimation techniques, adequately validated data and unbiased judgement are applied to the documentation upon which public reports on Mineral Resources and Mineral Reserves are based.*

*Comply with all laws and regulations relating to the mineral industry and all rules, regulations and practices as established and promulgated by the relevant regulatory authorities.*

*Use their best endeavours to ensure that their employer or client complies with the rules, regulations and practices of the relevant regulatory authorities.*

**Professional Bodies, Colleagues and Associates**

**Qualified Competent Persons must uphold the honour, integrity, reputation and dignity of their profession and maintain the highest level of conduct in all professional matters. Qualified Competent Persons must at all times conform to the rules of the professional bodies to which they belong and respect and acknowledge the contributions of colleagues and other experts in enabling them to conduct their work.**

In particular, they should:

*Accept responsibility for their own errors.*

*Demonstrate a willingness to be judged by their professional peers.*

*Agree to be bound by the disciplinary code and the code of conduct imposed by the corresponding regulatory authorities.*

*Encourage others to accept the same responsibilities, to join a recognised professional body and to be bound by its code of conduct and disciplinary code.*

**The Environment, Health and Safety**

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

In particular, they should:

*Ensure that consideration of the modifying factors used to determine Mineral Reserves fully recognises the need to provide a safe working environment.*

*Ensure that Mineral Reserve estimates acknowledge the likely environmental impact of development and ensure that appropriate allowances are made for mitigation and remediation.*