

COMMENTARY

JULY 2012

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**COMMENTARY FROM  
THE SAMREC/SAMVAL WORKING GROUP  
ON THE  
CRIRSCO REVISED DEFINITIONS  
NOV 2011**

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## Historical Context and Mandate

The 1998 Denver Accord established a set of standard definitions to be used in the public reporting of mineral assets. Subsequently, 'The Committee for Mineral Reserves International Reporting Standards' ("CRIRSCO"), published the "International Reporting Template for the Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves" in July 2006 ("2006 Template"). The 2006 CRIRSCO Template was to serve as the basis for the codes developed by all National Reporting Organisations ("NRO") who are CRIRSCO members.

However, over the last decade, all NROs have departed from the original Denver Accord and 2006 Template definitions and therefore CRIRSCO began an initiative in 2010 to establish fundamental standard definitions to be used as the basis for and inclusion into, the reporting standards of all CRIRSCO members, subject to the agreement of the respective NROs.

The purpose of the CRIRSCO initiative is to realign the fundamental core definitions through all the CRIRSCO family of Standards and Codes and to facilitate greater international harmonisation in reporting standards. The revised standard core definitions will be included in a new edition of the CRIRSCO Template to be published. Uniformity of the core standard definitions throughout all reporting codes will facilitate uniform reference to these Codes and the CRIRSCO Template by the 'International Accounting Standards Board' ("IASB") in a potential international financial reporting standard for the extractive industries and the 'United Nations Economic Commission for Europe' ("UNECE") in the UN Framework Classification.

The original definitions in the 2006 Template are presented in Appendix 1 as a reference for the following discussions. Revisions to these definitions were agreed in principle at CRIRSCO meetings on 28<sup>th</sup> and 29<sup>th</sup> September 2010 in Moscow and circulated to the NROs for comment. The intention being that the revised definitions would form part of the new CRIRSCO Template and that the definitions would be included in anticipated revisions to the NRO Codes. The Revised CRIRSCO Definitions (29<sup>th</sup> September 2010) are presented in Appendix 2.

In addition, the CRIRSCO Board was made aware that litigations, especially in Canada, occurred as the wording of the definitions in the 2006 Template are different to the NRO Codes. Minor changes to the Revised CRIRSCO Definitions (29<sup>th</sup> September 2010) were proposed, particularly by lawyers, to clarify meaning and these changes are highlighted in yellow in the CRIRSCO Nov 2011 Revised Definitions document ("Nov 2011 Revised Definitions") presented in Appendix 3.

The SAMREC Working Group was requested as a directive from the SAMREC/SAMVAL Committee ("SSC") and by Mr Ferdi Camisani, a nominated member of both CRIRSCO and its 'Expert Group on Resource Classification' ("EGRC"), to review the changes proposed in the Nov 2011 Revised Definitions and present any objections to the SSC and thereafter to CRIRSCO, so that they can be assessed from a South African perspective before the new edition of CRIRSCO template is agreed by the member bodies. The sub-group created for this purpose has been defined as the SAMREC/SAMVAL Definitions Working Group (SSDWG).

The Nov 2011 Revised Definitions have been adopted with minor changes, in the:-

- "Consultation Draft of the Pan-European Standard for Reporting of Exploration Results, Mineral Resources and Reserves" (25<sup>th</sup> February 2012) ("PERC 2012"); and
- Joint Ore Reserves Committee 2011 Code Review ("JORC 2011")

The SSDWG extracted the definitions from these Codes into summary documents presented in Appendix 4 and used them as a basis for its deliberations.

Given that the mandate from the SSC to the SSDWG was to comment on the Nov 2011 Revisions and that the stated aim of the revisions is to simplify and unify the NRO Codes, the SSDWG restricted its deliberations to the highlighted edits in the Nov 2011 document, without comment on any of the more fundamental issues relating to the definitions.

The SAMREC and SAMVAL Working Groups are currently approving substantial papers on Inferred Resources, Competent Persons and Standardised Formatting of Reporting on Mineral Resources and Mineral Reserves. These Issue Papers will address the Working Group's fundamental concerns with the CRIRSCO and SAMREC/SAMVAL definitions and propose critical improvements to them. The CRIRSCO Board is therefore alerted to the fact, that whilst the current SSDWG deliberations are restricted in scope, more expansive and critical definition issues will be raised by the SAMREC/SAMVAL Working Groups' Issue Papers. The issues raised in the SAMREC/SAMVAL Issue Papers will have significant impact on the wording, adoption and scope of the Revised Definitions and new CRIRSCO Template, which will require consultation and consideration before a new CRIRSCO Template is approved or published. Furthermore, the considerations raised in these Issue Papers will significantly impact the current initiatives for global consolidation of the mineral asset valuation codes and the development of an international financial reporting standard for the extractive industries.

## The SAMREC/SAMVAL 'Definitions' Working Group

The SSDWG and SSC which reviewed and commented on the Nov 2012 Revised Definitions document included the following:-

F Harper	SSC Working Group - K Kenyon, C Dohm, G Chunnet, M Mc Gwa, T Marshall, K Lomberg, S Rupprecht
G Njowa	
A Clay	
C Telfer	
T Marshall	

## SSDWG Deliberations

Each of the 13 definitions presented in the Nov 2011 Revised Definitions document is discussed separately below.

The text highlighted in yellow represents the changes in the Nov 2011 Revised Definitions on which SSDWG/SSC should comment.

The text in highlighted in tan indicates SSGWG/SSC preferred text.

Definition : Public Reports
<p><b>CRIRSCO Revised Definition</b> Public Reports comprise reports prepared for the purpose of informing investors or potential investors and their advisers on Exploration Results, Mineral Resources or Mineral Reserves.</p> <p>They include, but are not limited to annual and quarterly company reports, press releases, information memoranda, technical papers, website postings and public presentations.</p>
<p><b>SSDWG and SSC:-</b> No previous definition of a Public Report existed in the 2006 Template. The definition is acceptable to SSDWG/SSC and has also been accepted by PERC 2012 and JORC 2011.</p>

The SSDWG considered whether the requirement for the use of the CRIRSCO definitions and Code should be extended to include non-public reporting as well and recommends that discussion of this issue be included in future Working Group deliberations.

Definition : Competent Persons
<p><b>CRIRSCO Revised Definition</b> Section 10: A Competent Person is a minerals industry professional (<i>NRO to insert appropriate membership class and organisation including mutually recognised international professional organisations</i>) with enforceable disciplinary processes including the powers to suspend or expel a member.</p> <p>A Competent Person must have a minimum of five years relevant experience in the style of mineralisation <b>or</b> type of deposit under consideration and in the activity which that person is undertaking.</p>
<p><b>SSDWG and SSC:-</b>The SSDWG/SSC consider it mandatory that the word "and" be retained.</p>
<p>A Competent Person must have a minimum of five years relevant experience in the style of mineralisation and/or type of deposit under consideration and in the activity which that person is undertaking.</p>

Definition : Modifying Factors
<p><b>CRIRSCO Revised Definition</b> Modifying Factors are used to convert Mineral Resources to Mineral Reserves and include mining, processing, metallurgical, <b>infrastructure</b>, economic, marketing, legal, environmental, social and governmental considerations.</p>
<p><b>SSDWG and SSCX:-</b> The SSDWG/SSC accepts the inclusion of the word "infrastructure".</p>

Definition : Exploration Results
<p><b>CRIRSCO Revised Definition</b> Exploration Results include data and information generated by mineral exploration programmes that might be of use to investors but which do not form part of a declaration of Mineral Resources or Mineral Reserves.</p>
<p><b>SSDWG and SSC:-</b> The SSDWG/SSC has completed an in depth Issue Paper on the definition of Exploration Results which should be reviewed by CRIRSCO. The Issue Paper suggests the following definition which should be considered in the deliberations:-</p>
<p>Exploration results include data and information generated by exploration programmes that may be of use to investors. Exploration results may or may not be part of a formal declaration of Mineral Resources or Mineral Reserves, but must not be presented in a way that unreasonably implies the discovery of potentially economic mineralisation.</p>
<p>Exploration results include all available and relevant data/information relating to the mineral property (both positive and negative). Exploration data/information may include survey, geological, geophysical, geochemical, sampling, drilling, trenching, analytical testing, assaying, mineralogical, metallurgical and other information, where available. The data/information may be derived from the specific property under discussion or from adjacent or nearby properties if the Competent Person can provide justification of continuity for such an association. At least some physical evidence of assumed continuity of the mineralisation on the property of interest must be presented by the Competent Person. Historical data/ information may also be included if, in the considered opinion of the Competent Person, such is relevant, giving reasons for such conclusions. Any negative historical exploration results as well as excluded results should also be discussed. The reliability of all results/data/information used must be discussed and the location of all data points used must be shown on a map at an appropriate scale.</p>

In South Africa, the JSE Limited requested clarification on the term 'Exploration Results', as some interpretations of the SAMREC Code Clause 18 on exploration results, suggested that this applies only to information gathered on the property of relevance or that gathered by the current owner of the property. An Issue Paper on this ambiguity is currently being approved by the SAMREC/SAMVAL Committee for distribution to CRIRSCO.

**Definition : Mineral Resource****CRIRSCO Revised Definition**

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

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

**SSDWG and SSC:**– The SSDWG/SSC prefers the PERC 2012 definition as follows, which includes the terms 'grade and/or quality' instead of 'quality'.

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

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

**Definition : Inferred Mineral Resource****CRIRSCO Revised Definition**

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

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

**SSDWG and SSC:**– The SSDWG/SSC accepts the inclusion of "must" but does not approve of the insertion of "It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration".

The SSDWG notes the inconsistency in the use of terms quality and grade and suggests standardisation in each appropriate definition as "grade and/or quality".

The SSDWG/SSC suggests that it is not always reasonably expected that Inferred Mineral Resources can be upgraded to Indicated Mineral Resources and that inclusion of this comment has implications for the valuation of Inferred Mineral Resources. Furthermore, the Canadian National Instrument 43-101 Standards of Disclosure for Mineral Projects insists that the following statement be included in any Preliminary Economic Assessment of Inferred Mineral Resources ".....it is uncertain if further exploration will result in the target being delineated as a mineral resource." (Section 2.3 (2)). The inclusion of the proposed comment into the CRIRSCO definition will therefore result in a direct contradiction between CRIRSCO and the Canadian National Instrument.

**Definition : Indicated Mineral Resource****CRIRSCO Revised Definition**

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

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

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

**SSDWG:**– The SSDWG accepts this definition without objection but notes the inconsistency in the use of terms quality and grade and suggests standardisation in each appropriate definition as "grade and/or quality".

**Definition : Measured Mineral Resource****CRIRSCO Revised Definition**

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

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

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

**SSDWG and SSC:**– The SSDWG/SSC accepts the inclusion of “ between points of observation” without objection but notes the inconsistency in the use of terms quality and grade and suggests standardisation in each appropriate definition as “grade and/or quality”.

The SSC points out that some qualification in the definition of “points of observation” may be required with regards extrapolation of information beyond the last point of observation.

#### Definition : Mineral Reserve

##### CRIRSCO Revised Definition

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

**SSDWG and SSC:**– The SSDWG/SSC accepts the inclusion of the phases “mined or extracted” and “application”, without objection..

#### Definition : Probable Mineral Reserve

##### CRIRSCO Revised Definition

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

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

**SSDWG and SSC:**– The SSDWG/SSC recommends that the definition should read as follows:-

The confidence in the modifying factors applying to a Probable Mineral Reserve **may be** lower than that applying to a Proved Mineral Reserve

#### Definition : Proved Mineral Reserve

##### CRIRSCO Revised Definition

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

A Proved Mineral Reserve implies a high degree of confidence in the modifying factors.

**SSDWG and SSC:**– The SSDWG/SSC accepts this definition without objection.

#### Definition : Pre-Feasibility Study

##### CRIRSCO Revised Definition

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

**SSDWG and SSC:**– The SSDWG/SSC accepts the inclusion of the phrase “at the time of reporting” without objection.

#### Definition : Feasibility Study

##### CRIRSCO Revised Definition

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

**SSDWG and SSC:**– The SSDWG/SSC accepts the inclusion of the phrase “applicable” without objection.

## **APPENDIX 1 : COMMITTEE FOR MINERAL RESERVES INTERNATIONAL REPORTING STANDARD (CRIRSCO) INTERNATIONAL REPORTING TEMPLATE 2006**

### **Public Reports**

Section 4: Reference in this Template to a Public Report or Public Reporting refers to any report on Exploration Results, Mineral Resources or Mineral Reserves, prepared for the purpose of informing investors or potential investors and their advisers, or to satisfy regulatory requirements. The Template indicates the required minimum standard for Public Reporting and is recommended as a minimum standard for other reporting. Companies are encouraged to provide information in their Public Reports, which is as comprehensive as possible.

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

### **Competent Person**

Section 10: A 'Competent Person' is a person who is a Member or Fellow of a recognised professional body relevant to the activity being undertaken, and who is subject to enforceable Rules of Conduct.

A Competent Person must have a minimum of five years experience relevant to the style of mineralisation and type of deposit under consideration and to the activity which that person is undertaking. If the Competent Person is preparing a report on Exploration Results, the relevant experience must be in exploration.

If the Competent Person is estimating, or supervising the estimation of Mineral Resources, the relevant experience must be in the estimation, assessment and evaluation of Mineral Resources. If the Competent Person is estimating, or supervising the estimation of Mineral Reserves, the relevant experience must be in the estimation, assessment, evaluation and economic extraction of Mineral Reserves. The key qualifier in the definition of a Competent Person is the word 'relevant'. Determination

### **Modifying Factors**

The term 'Modifying Factors' is defined to include mining, metallurgical, economic, marketing, legal, environmental, social and governmental considerations.

### **Exploration Results**

Section 16: Exploration Results include data and information generated by exploration programmes that may be of use to investors but which may not be part of a formal declaration of Mineral Resources or Mineral Reserves. This is common in the early stages of exploration when the quantity of data available is generally not sufficient to allow any reasonable estimates of tonnage and grade to be made. Examples include discovery outcrops, single drill hole intercepts or the results of geophysical surveys.

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

*"The information provided in this report/statement/release constitutes Mineral Exploration Results as defined in the International Reporting Template, Clause 16. It is inappropriate to use such information for deriving estimates of tonnage and grade".*

### **Mineral Resource**

Section: 19 A 'Mineral Resource' is a concentration or occurrence of material of economic interest in or on the Earth's crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence, sampling and knowledge. Mineral Resources are subdivided, in order of increasing geological confidence into Inferred, Indicated and Measured categories.

### **Inferred Mineral Resource**

Section 20 An 'Inferred Mineral Resource' is that part of a Mineral Resource for which tonnage, grade and mineral content can be estimated with a low level of confidence. It is inferred from geological evidence, sampling and assumed but not verified geological and/or grade continuity. It is based on information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes which is limited or of uncertain quality and reliability.

### **Indicated Mineral Resource**

Section 21: An 'Indicated Mineral Resource' is that part of a Mineral Resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a reasonable level of confidence. It is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. The locations are too widely or inappropriately spaced to confirm geological and/or grade continuity but are spaced closely enough for continuity to be assumed.

**Measured Mineral Resource**

Section 22: A 'Measured Mineral Resource' is that part of a Mineral Resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a high level of confidence. It is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. The locations are spaced closely enough to confirm geological and grade continuity.

**Mineral Reserve**

Section 28: A 'Mineral Reserve' is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined. Appropriate assessments and studies have been carried out, and include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction could reasonably be justified. Mineral Reserves are sub-divided in order of increasing confidence into Probable Mineral Reserves and Proved Mineral Reserves.

**Probable Mineral Reserve**

Section 29: A 'Probable Mineral Reserve' is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. It includes diluting materials and allowances for losses which may occur when the material is mined. Studies to at least Pre- Feasibility level will have been carried out, including consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. The results of the studies demonstrate at the time of reporting that extraction could reasonably be justified.

**Proved Mineral Reserve**

Section 30: A 'Proved Mineral Reserve' is the economically mineable part of a Measured Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined. Studies to at least Pre-Feasibility level will have been carried out, including consideration of, and modification by, realistically assumed mining, metallurgical, Page 15 of 36 economic, marketing, legal, environmental, social and governmental factors. These studies demonstrate at the time of reporting that extraction is justified.

**Pre-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 evaluation of other relevant factors which are sufficient for a Competent Person, acting reasonable, to determine if all or part of the Mineral resource may be classified as a Mineral Reserve.

**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.

**APPENDIX 2 : REVISED CRIRSCO DEFINITIONS (SEPT 2010)**



COMMITTEE FOR MINERAL RESERVES INTERNATIONAL REPORTING STANDARDS

The following summarises the outcome of discussions on establishing a set of 'core' or standard CRIRSCO Definitions for inclusion in reporting standards of all CRIRSCO members subject to the agreement of the respective National Reporting Organisations. The definitions below were agreed in principle at the CRIRSCO meetings on 28<sup>th</sup> and 29<sup>th</sup> September in Moscow.

The following are proposed as defined terms:

<ul style="list-style-type: none"><li>• Public reports</li><li>• Competent Person</li><li>• Modifying Factors</li><li>• Exploration results</li><li>• Mineral Resource</li><li>• Inferred Resource</li><li>• Indicated Resource</li></ul>	<ul style="list-style-type: none"><li>• Measured Resource</li><li>• Mineral Reserve</li><li>• Probable Reserve</li><li>• Proved Reserve</li><li>• Pre-Feasibility Study</li><li>• Feasibility Study</li></ul>
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In the proposed definitions below, proposed text is in black. Defined terms (where referred to in definitions) are underlined. Terms that may require further clarification (in subsequent code) are shown in blue

### **Public Reports**

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

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

### **Competent Person**

A Competent Person<sup>1</sup> is a minerals industry professional (*NRO to insert appropriate membership class and organisation including mutually recognised international professional organisations*) with enforceable disciplinary processes including the powers to suspend or expel a member.

A Competent Person must have a minimum of five years **relevant** experience in the style of mineralisation and type of deposit under consideration and in the **activity** which that person is undertaking.

### **Modifying Factors**

'Modifying Factors' are used to convert Mineral Resources to Mineral Reserves and include mining, processing, metallurgical, economic, marketing, legal, environmental, social and governmental considerations.

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<sup>1</sup> Note that various CRIRSCO members use a different term for the Competent Person, e.g. Canada (Qualified Person) and Chile (Qualified Competent Person). These alternative terms are considered to be directly equivalent to Competent Person.



## COMMITTEE FOR MINERAL RESERVES INTERNATIONAL REPORTING STANDARDS

### **Exploration Results**

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

### **Mineral Resource**

A 'Mineral Resource' is a concentration or occurrence of material of economic interest in or on the Earth's crust in such form, quality and quantity that there are [reasonable](#) prospects for [eventual economic](#) extraction.

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

### **Inferred Mineral Resource**

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

Geological evidence is sufficient to [imply but not verify](#) geological and grade continuity.

An Inferred Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and may not be converted to a Mineral Reserve.

### **Indicated Mineral Resource**

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

Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to [assume](#) geological and grade continuity between points of observation.

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

### **Measured Mineral Resource**

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

Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to [confirm](#) geological and grade continuity.

A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proved Mineral Reserve or [under certain circumstances](#) to a Probable Mineral Reserve.



## COMMITTEE FOR MINERAL RESERVES INTERNATIONAL REPORTING STANDARDS

### **Mineral Reserve**

A 'Mineral Reserve' is the economically mineable part of a Measured and/or Indicated Mineral Resource.

It includes diluting materials and allowances for losses, which may occur when the material is mined and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include consideration of realistically assumed Modifying Factors.

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

### **Probable Mineral Reserve**

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

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

### **Proved Mineral Reserve**

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

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

### **Preliminary Feasibility Study (Pre-Feasibility Study)**

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

### **Feasibility Study**

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

## APPENDIX 3 : NOV 2011 REVISED DEFINITIONS

### REVISED COMMON DEFINITIONS

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#### Public Reports – CRIRSCO

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

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

#### Competent Person – CRIRSCO

A Competent Person<sup>1</sup> is a minerals industry professional (*NRO to insert appropriate membership class and organisation including mutually recognised international professional organisations*) with enforceable disciplinary processes including the powers to suspend or expel a member.

A Competent Person must have a minimum of five years **relevant** experience in the style of mineralisation **or** type of deposit under consideration and in the **activity** which that person is undertaking.

#### Modifying Factors – CRIRSCO

'Modifying Factors' are used to convert Mineral Resources to Mineral Reserves and include mining, processing, metallurgical, **infrastructure**, economic, marketing, legal, environmental, social and governmental considerations.

#### Exploration Results – CRIRSCO

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

#### Mineral Resource – CRIRSCO

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

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

#### Inferred Mineral Resource – CRIRSCO

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

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

#### Indicated Mineral Resource – CRIRSCO

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

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

<sup>1</sup> Note that various CRIRSCO members use a different term for the Competent Person, e.g. Canada (Qualified Person) and Chile (Qualified Competent Person). These alternative terms are considered to be directly equivalent to Competent Person.  
CRIRSCO Revised Definitions (Nov 2011)

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

### **Measured Mineral Resource - CRIRSCO**

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

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

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

### **Mineral Reserve – CRIRSCO**

A 'Mineral Reserve' is the economically mineable part of a Measured and/or Indicated Mineral Resource.

It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of modifying factors.

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

### **Probable Mineral Reserve – CRIRSCO**

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

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

### **Proved Reserve – CRIRSCO**

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

A Proved Mineral Reserve implies a high degree of confidence in the modifying factors.

### **Pre-Feasibility Study – CRIRSCO**

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

### **Feasibility Study - CRIRSCO**

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

## APPENDIX 4 : REVISED DEFINITIONS ADOPTED BY OTHER NROS

### EXTRACTS FROM 25 February 2012 CONSULTATION DRAFT OF PERC REPORTING STANDARD 2012 PAN-EUROPEAN STANDARD FOR REPORTING OF EXPLORATION RESULTS, MINERAL RESOURCES AND RESERVE

(The Pan-European Reserves and Resources Reporting Committee (PERC))

The text below is extracted from the Consultation draft and is the proposed CRIRSCO standard core definitions

#### Public Reports

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

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

#### Competent Person

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

A Competent Person must have a minimum of five years relevant experience in the style of mineralisation or type of deposit under consideration and in the activity which that person is undertaking.

#### Modifying Factors

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

#### Exploration Results

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

#### Mineral Resource

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

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

#### Inferred Mineral Resource

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

Geological evidence is sufficient to imply but not verify geological and grade 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.

#### Indicated Mineral Resource

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

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

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

#### Measured Mineral Resource

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

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

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

#### **Mineral Reserve**

A 'Mineral Reserve' is the economically mineable part of a Measured and/or Indicated Mineral Resource.

It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of modifying factors.

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

#### **Probable Mineral Reserve**

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

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

#### **Proved Reserve**

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

A Proved Mineral Reserve implies a high degree of confidence in the modifying factors.

#### **Pre-Feasibility Study**

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

#### **Feasibility Study**

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

**EXTRACT FROM THE 2011 JORC CODE REVIEW – ISSUES PAPER****Public Reports**

Reports comprise reports prepared for the purpose of informing investors or potential investors and their advisers on Exploration Results, Mineral Resources or Ore Reserves.

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

**Competent Person**

A 'Competent Person' is a minerals industry professional who is a Member or Fellow of The Australasian Institute of Mining and Metallurgy, or of the Australian Institute of Geoscientists, or of a 'Recognised Overseas Professional Organisation' ('ROPO') included in a list promulgated from time to time, with enforceable disciplinary processes including the powers to suspend or expel a member.

A 'Competent Person' must have a minimum of five years relevant experience in the style of mineralisation and type of deposit under consideration and to the activity which that person is undertaking.

**Modifying Factors**

Modifying Factors' are used to convert Mineral Resources to Mineral Reserves and include mining, processing, metallurgical, economic, marketing, legal, environmental, social and governmental considerations.

**Exploration Results**

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

**Mineral Resource**

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

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

**Inferred Mineral Resource**

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

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

An Inferred Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to an Ore Reserve. Did not include upgrading comment

**Indicated Mineral Resource**

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

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

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

**Measured Mineral Resource**

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

Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade continuity. Missing comment

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

**Ore (Mineral) Reserve**

An 'Ore Reserve' is the economically mineable part of a Measured and/or Indicated Mineral Resource.

It includes diluting materials and allowances for losses, which may occur when the material is mined missing and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include consideration of realistically assumed Modifying Factors.

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

**Probable Ore Reserve**

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

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

**Proved Ore Reserve**

A 'Proved Ore Reserve' is the economically mineable part of a Measured Mineral Resource.

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

**Preliminary Feasibility Study**

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

**Feasibility Study**

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