Progress on
International Standards for
Reporting of Mineral Resources and Reserves

By

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ABSTRACT

Substantial progress has been made over the last ten years in the development of uniform national and international standards covering the definition, estimation and public reporting of mineral resources and mineral reserves. Agreement between the major participating countries has been reached, which include the requirement that a Competent Person prepares and approves publication of mineral resources and reserves. Most national regulatory organizations have accepted the new standards and have included them in the rules that must be followed by mining companies operating under their jurisdiction. These developments are the result of a concerted effort on the part of professional societies, national regulatory agencies, international organizations, and many dedicated individuals.

The historical development of these standards is summarized in this paper. Accepted definitions of mineral resources and mineral reserves are discussed, as well as the definition and role of the Competent Person. Additional effort is needed before the international standards are fully understood, accepted and followed by mining companies, regulatory agencies, the investment community and the general public.

Steps being taken toward development of a Mineral Reserves International Reporting Code Template (International Template) that will be available for all countries to use in deriving their specific country reporting codes, are outlined

BACKGROUND

This paper is a revision and update of that given by N Miskelly and JM Rendu at the Council of Mining and Metallurgical Institutions (CMMI) Congress 2002 at Cairns, Queensland, on 27-28 May 2002.

International standards have long been recognized as desirable to create a common language, facilitate communications, and improve the quality of the information being released to the public by the mining industry. Such standards are required if rational decisions are to be made on the basis of well-understood information. Mining companies need uniformly accepted means to describe exploration projects, mineral deposits they discover or acquire, and mines they develop. Investors, governments, community leaders, international agencies, regulators and the public need to understand the representation made by the mining companies, and must have reason to believe and have confidence in the information they are given. Only if meaningful international standards are available and enforced can any of the parties involved make sound decisions concerning their participation in the mineral industry.

The quality of mineral resource and reserve reporting has significantly increased over the last decades. The evolving reporting process has now reached the point where most major industrial countries are working to common definitions and to nearly identical public reporting standards. More work is required before truly international standards are developed and accepted, and processes are in hand on several fronts to bring this to fruition.

Attempts to establish standards for classifying and publicly reporting mineral resources and reserves go back a long way. For example, in 1909, Herbert Hoover, a mining engineer who was to become president of the United States of America, published "Principles of Mining", in which he recommended a three-fold division of ore reserves into proved, probable and prospective. In 1980 the US Bureau of Mines and the US Geological Survey published Circular 831 "Principles of a Resource/Reserve Classification for Minerals", which established for the first time a clear division between mineral resources and reserves.

But the events which truly motivated the accelerated development of international definitions and standards were a number of reporting scandals. In the 1960s the so-called Poseidon nickel boom and bust resulted in warnings from the Australian government and regulatory bodies that, unless the mining industry developed appropriate reporting standards, the regulators would do so. In response the Australian industry established a committee known as the Joint Ore Reserves Committee (JORC). This committee published the first version of the JORC Code in 1989, a code which was to become the foundation on which all recently accepted national codes are built.

In 1997 the need for international standards and stronger control of the reporting of mineral information was made painfully obvious by the Bre-X scandal concerning the

fictitious Busang gold deposit in Indonesia. Even though it was recognized that regulations alone could not have stopped Bre-X from happening, the lack of standards, and the lack of procedure to ensure that these standards are followed, was perceived as a significant contributing factor. The Canadian regulatory agencies formed a Mining Standards Task Force whose final report, "Setting New Standards, Recommendations for Public Mineral Exploration and Mining Companies", published in 1999, contained specific recommendations on standards to be followed, including a recommendation that the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) work with the other international mining professional societies to develop international standards.

Stimulated partly by the outcry over Busang and similar events elsewhere and partly by a successful push by the Council of Mining and Metallurgical Institutions (CMMI) to establish internationally accepted resource/reserve definitions, Australia, the US, Canada, South Africa and the UK revised their existing or introduced new reporting standards in the late 1990s. Work with the United Nations has resulted in general acceptance of the same definitions. In June 2001 the Institution of Mining and Metallurgy (IMM), now the Institute of Materials, Minerals and Mining in conjunction with the European Federation of Geologists (EFG) and the Institute of Geologists of Ireland (IGI), adopted their joint Code for Reporting of Mineral Exploration Results, Mineral Resources and Mineral Reserves (the Reporting Code). The Geological Society of London (GSL) adopted the code early in 2002. Development of an International Code is closer to becoming a realistic objective.

DEVELOPMENT OF INTERNATIONAL REPORTING STANDARDS

Until the 1990s little progress was made toward establishing international standards for the classification and reporting of mineral resources and reserves. The first significant move was in 1989 when the "Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves" (the JORC Code) was published. The code was immediately incorporated into the Australian Stock Exchange (ASX) listing rules. In 1991, the US Society for Mining, Metallurgy, and Exploration (SME) published "A Guide for Reporting Exploration Information, Resources, and Reserves". Also in 1991, the Institution of Mining and Metallurgy (IMM) in the UK revised its standards for reporting of mineral resources and reserves. The US Guide and UK revisions were both based on the 1989 JORC Code.

In 1993 the Council of Mining and Metallurgical Institutions (CMMI) set up a Mineral Resources/Reserves International Definitions Working Group, with representatives from Australia (AusIMM), Canada (CIM), South Africa (SAIMM), the United Kingdom (IMM) and the United States (SME). The CMMI Group as it was initially called, now known as the Combined Reserves International Reporting Standards Committee (CRIRSCO) first met during the 1994 Fifteenth CMMI Congress in South Africa. Several years of negotiations followed, primarily led by Norman Miskelly, CRIRSCO Convener and then Chairman of JORC. A provisional agreement, known as the Denver Accord, was reached in 1997 in Denver, Colorado, on definitions for the two major categories,

Mineral Resources and Mineral Reserves, and for their respective sub-categories, Measured, Indicated and Inferred Mineral Resources, and Proved and Probable Mineral Reserves.

Independently, starting in 1992, the United Nations Economic Commission for Europe (UN–ECE) was developing a UN Framework Classification (UNFC) to enable comparison of different national mineral resource and reserve classifications, particularly for those countries in transition to market economies. The CMMI Group and the UN-ECE met in Geneva in 1998 and 1999 and produced an agreement to incorporate CMMI standard reporting definitions into the UNFC for categories common to both systems.

Following the Denver and Geneva meetings, the agreed upon definitions were first incorporated into the 1999 JORC Code and subsequently, largely unchanged, into similar codes for the other four participating countries, South Africa, Canada, the United States and the UK. The Australian code (the JORC Code) and the South African code (the SAMREC Code) are recognized by their respective stock exchanges and must be followed by companies listed on these exchanges. Effective February 2001, the Canadian Securities Administrators (CSA) issued National Instrument 43-101 (NI 43-101), "Standards of Disclosure for Mineral Projects". These standards require compliance with the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) definitions of mineral resources and reserves, and that a Qualified Person estimates such resources and reserves. There is no material difference between the Qualified Person in the Canadian code and the Competent Person in the other national codes. (In this paper reference to Competent Person includes reference to Qualified Person in Canada). Recognition of the international standards by the UK regulatory agencies is exemplified by the UK Listing Authority's likelihood of endorsing and accepting the new IMMM Reporting Code. For a number of reasons, including differences in the regulatory and legal environment, recognition by the US regulatory agencies still has room to travel.

The success of the CRIRSCO initiative is such that consideration is now actively being given to developing an International Template. This would include the formulation of an international definition for a Competent Person, reciprocal recognition of Competent Persons between participating nations, a list of principles which would constitute minimum requirements for professional rules of conduct for Competent Persons, and an international reporting code and guidelines.

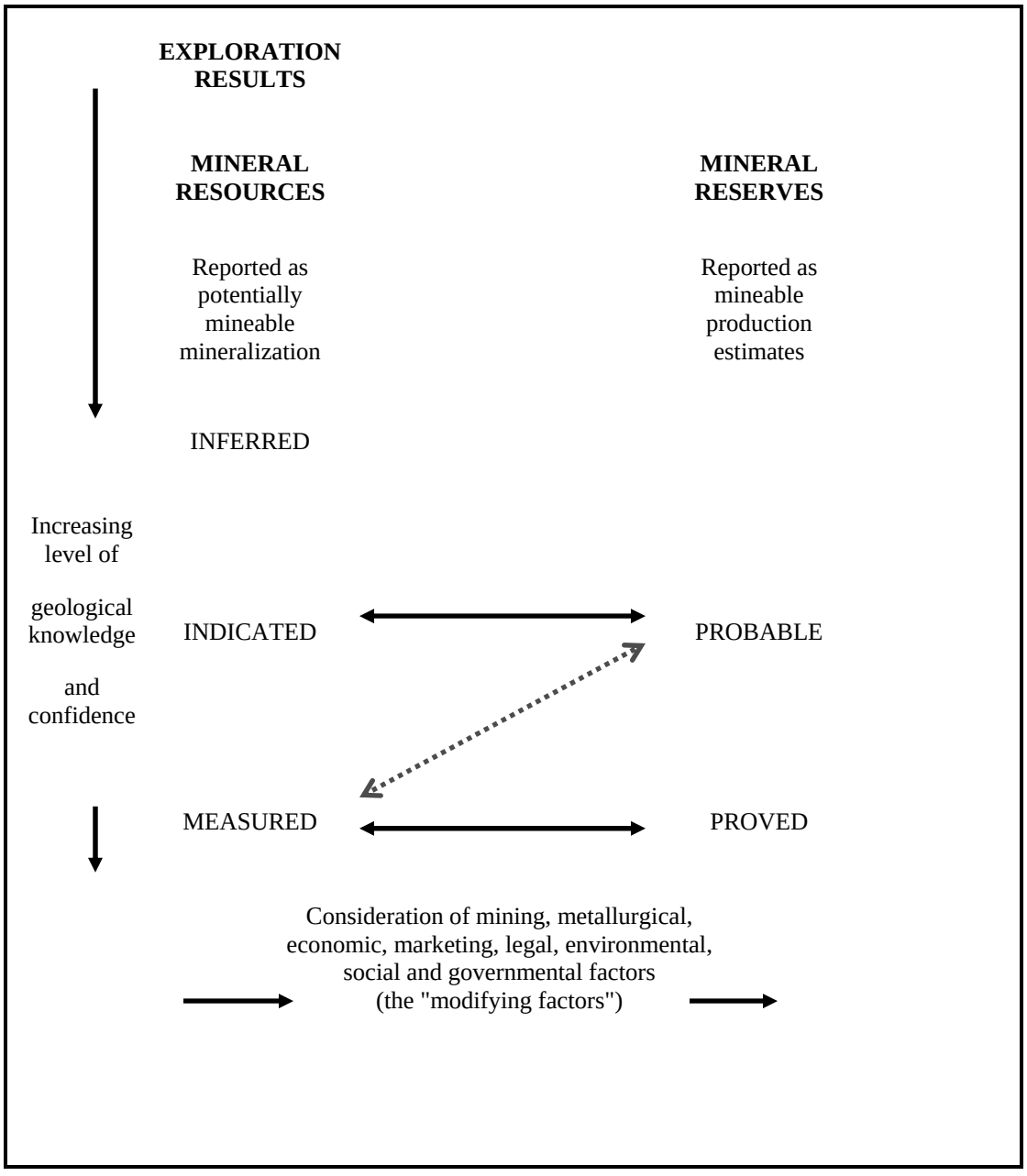
INTERNATIONAL DEFINITIONS OF MINERAL RESOURCES AND MINERAL RESERVES

Figure 1 illustrates the framework for classifying Exploration Results, Mineral Resources and Mineral Reserves. A Mineral Resource must be classified as Measured, Indicated or Inferred, a Mineral Reserve as Proved or Probable. These classifications reflect different levels of geological confidence and different degrees of technical and economic evaluation. The choice of the appropriate category of Mineral Resource or Mineral Reserve must be made by a Competent Person (Qualified Person in Canada). When

Mineral Resources or Reserves are publicly reported, the Competent Person must be aware of the differences which exist between various jurisdictions. For example the United States Securities and Exchange Commission (SEC) does not allow the use of the term “mineral resource”.

A Mineral Resource can be estimated mainly on the basis of geoscientific information with some input from other disciplines. A Mineral Reserve, which is a modified sub-set of a Measured or Indicated Mineral Resource, requires consideration of all factors affecting extraction, including mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors, and should in most instances be estimated with input from a range of disciplines.

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



In certain situations a Measured Mineral Resource could convert to a Probable Mineral Reserve rather than to a Proved Mineral Reserve because of uncertainties associated with the modifying factors which are taken into account in the conversion from Mineral Resource to Mineral Reserve. This relationship is shown by the broken arrow in Figure 1. In certain situations, a previously reported Mineral Reserve could convert back to a Mineral Resource because of new information according to which a Mineral Reserve can no longer be reported. The resulting two-way relationship is shown by the two-headed arrows in Figure 1.

When **'Exploration Results'**, as defined in the IMMM, IGI, GSL and EFG Reporting Code (in the SME Guide, Exploration Information) is reported in relation to mineralization not classified as a Mineral Resource or a Reserve, the results of individual drill hole intercepts or geologic observations can be reported, but estimates of tonnage, average grade, and metal content must not be reported. It is anticipated the JORC Code will move into line with this requirement when its revised Code is finalised later in 2003.

A **'Mineral Resource'** is a concentration or occurrence of material of intrinsic economic interest in or on the Earth's crust (a deposit) in such form and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. Portions of a deposit that do not have reasonable prospects for eventual economic extraction must not be included in a Mineral Resource.

The term "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.

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

This category is intended to cover situations where mineralization has been identified and limited measurements and sampling completed, but where the data are insufficient to allow the geological and/or grade continuity to be confidently interpreted. It cannot be assumed that all or part of an Inferred Mineral Resource will be upgraded to an Indicated or Measured Mineral Resource as a result of continued exploration. Confidence in the estimate is not sufficient to allow the evaluation of economic viability.

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 continuity and/or grade continuity but are spaced closely enough for continuity to be assumed. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource, but has a higher level of confidence than that applying to an Inferred Mineral Resource.

A deposit may be classified as an Indicated Mineral Resource when the nature, quality, amount and distribution of data are such as to allow the Competent Person to confidently interpret the geological framework and to assume continuity of mineralization. Confidence in the estimate is sufficient to enable an evaluation of economic viability.

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/or grade continuity.

A deposit may be classified as a Measured Mineral Resource when the nature, quality, amount and distribution of data are such as to leave no reasonable doubt, in the opinion of the Competent Person, that the tonnage and grade of the deposit can be estimated within close limits. Confidence in the estimate is sufficient to enable an evaluation of economic viability.

The appropriate mineral resource category must be determined by the Competent Person. Mineral Resource figures must not be aggregated with Mineral Reserve figures. If re-evaluation of Mineral Reserves indicates that they are no longer economically viable, the Mineral Reserves must be reclassified as Mineral Resources or removed from mineral resource/mineral reserve statements altogether. It is not intended that re-classification from Mineral Reserves to Mineral Resources should be applied as a result of changes expected to be of a short term or temporary nature, or where management has made a deliberate decision to operate on a non-economic basis. Examples of such situations might be a commodity price drop expected to be of short duration or a mine emergency of a non-permanent nature.

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

Mineral Reserves are those portions of Mineral Resources which, in the opinion of the Competent Person making the estimates, can be the basis of a viable project after taking account of all relevant metallurgical, economic, marketing, legal, environmental, social and governmental factors.

The term "economic" implies that extraction of the Mineral Reserve has been established or analytically demonstrated to be viable and justifiable under reasonable investment and market assumptions. The term Mineral Reserve need not necessarily signify that all governmental approvals have been received but it does signify that there are reasonable expectations of timely approvals.

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

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. Appropriate assessments, which may include feasibility studies, have been carried out and include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction is reasonably justified.

The choice of the appropriate category of Mineral Reserve is determined primarily by the classification of the corresponding Mineral Resource and must be made by the Competent Person.

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

THE COMPETENT PERSON

Definitions and guidelines lose their effectiveness unless responsibility for following them is assigned to a specific individual or group of individuals who satisfy technical and ethical requirements and can be subjected to disciplinary actions. Hence the internationally recognized need to define a Competent/Qualified Person.

A **'Competent Person'** is a person who is a member of a professional society for earth scientists or mineral engineers, or has other appropriate qualifications. The Competent Person must have a minimum of five years experience which is relevant to the style of mineralization and type of deposit under consideration and to the activity which that person is undertaking. If the Competent Person is 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 analysis of Mineral Reserves.

The professional society to which the Competent Person belongs must admit members primarily on the basis of academic qualifications and experience, must require compliance with specified professional and ethical standards, and must have disciplinary powers, including the power to suspend or expel a member.

Persons being called upon to sign as Competent Persons should be clearly satisfied in their own minds that they could face their peers and demonstrate competence in the commodity, type of deposit and situation under consideration. If doubt exists, the person should either seek concurring opinions from colleagues or should decline to sign as a Competent Person. Estimation of Mineral Resources may be an individual effort while estimation of Mineral Reserves is commonly a team effort involving a number of technical disciplines. The Competent Person (or Persons) who signs a report is responsible and accountable for the whole of the report. Where there is a clear division of responsibilities, each Competent Person must accept responsibility for his or her particular contribution. The Competent Person accepting overall responsibility for a report that has been prepared in whole or in part by others must be satisfied that the work of the other contributors is acceptable to the Competent Person.

Requirements concerning the Competent Person differ from country to country. The Australian and New Zealand Stock Exchanges require that public releases are based on information compiled by a Competent Person as defined by the JORC Code or a "recognized mining professional" as historically defined in the ASX listing rules. (However this ASX requirement is undergoing a more beneficial amendment, refer later in this paper under ROPO Provisions). The Johannesburg Stock Exchange requires public releases to be based on the work of a Competent Person as defined by the SAMREC Code. The Canadian NI 43-101 defines, and specifies the role of, the Qualified Person. In the UK, rules inherent in the IMMM Reporting Code most likely will be accepted by the regulatory agencies including those relating to the Competent Person. The US SEC does not specifically require that a Competent Person prepare a report.

The increased legal responsibilities of the Competent Person will have consequences which will need careful assessment. These responsibilities are likely to vary significantly between countries. In some jurisdictions, a Competent Person could be sued personally if there are indications that fraudulent public statements were made. The risk of legal action should significantly decrease the likelihood of fraudulent or misleading statements.

CURRENT STATUS

A comparison of national codes and guidelines illustrates the progress already made and steps to be taken before international standards are developed and uniformly recognized.

Australia

All Australian and New Zealand companies, and all international companies listed in Australia or New Zealand, must report according to the Australasian Code for Reporting of Mineral Resources and Ore Reserves (the JORC Code). The code is also recognized as a world standard by most international financial institutions and large consulting companies. In addition to including the JORC Code as part of its listing rules, the Australian Stock Exchange (ASX) has historically included the "recognized mining professional" rule, but this is in the process of changing under the ROPO agreements. The ROPO rules will permit ASX-listed companies reporting on mineral deposits to report to the ASX when the ROPO requirements are met. However such reporting must comply with JORC Code standards.

The JORC Code forms the basis of all national codes accepted by the member countries of CRIRSCO. Over the years, the JORC Code has been improved by taking into account codes and guidelines developed by other countries, whose codes were themselves based on earlier versions of the JORC Code. For example in the 2003 revision of the JORC Code, significant sections from the Reporting Code of IMMM, IGI, GSL and EFG have been included. This “leap-frog” improvement process has been particularly effective and should be maintained even after international standards are accepted.

South Africa

As of March 2000, the entire mineral industry of South Africa, as well as the South African regulatory agencies, adopted the South African Code for Reporting of Mineral Resources and Mineral Reserves (the SAMREC Code). The SAMREC Code must be followed by all companies reporting information in South Africa or listed on the Johannesburg Stock Exchange (JSE). This Code includes the CMMI/CRIRSCO international definitions of Mineral Resources and Mineral Reserves and their sub-categories. Compliance with SAMREC's Table 1 "check-list" is mandatory.

As with all other national codes, country-specific requirements are included, such as conditions for qualification as a Competent Person in South Africa. A system of panel review is operating during the initial implementation period, similar to the mechanism used in Australia following the introduction of the JORC Code in 1989.

United States

The Society for Mining, Metallurgy and Exploration (SME) Guide for Reporting Exploration Information, Mineral Resources and Mineral Reserves is accepted but is not

mandatory in the US mining industry. The SME Guide closely follows the JORC Code and other international codes, but is not fully compatible with the requirements of the US SEC as expressed in Industry Guide 7. Reaching compatibility between international standards and US SEC rules remains a critical objective

The SME Guide specifies that reports must be prepared by, or under the direction of, a Competent Person. It is likely that international standards will require that Competent Persons are members of a self-regulating professional organization with disciplinary powers. This is already the case in Australia, South Africa and Canada, and is awaiting formal UK Listing Authority approval in UK. SME does not have disciplinary power over its members so other organizational structures are being considered to fill this gap.

The objective of further dialogue between SME and SEC is to develop a more inclusive concept of what makes a reserve, to identify the similarities as well as differences in points between regulators and mining industry representatives, between US and other countries, and more importantly to define what needs to be done to effectively reach international agreements which are meaningful in the US as well as in other countries which are of significance to the mining industry.

Canada

The Reserves Committee of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) published in 2000 a revised code based on the international CMMI definitions. The Canadian industry will use the term Qualified Person instead of Competent Person. NI 43-101, “Standards of Disclosure for Mineral Projects”, issued by the Canadian Securities Administrators (CSA), came into effect in February 2001 and includes the CIM definitions and standards. The Canadian regulatory agencies recommended that CIM and the Canadian mining industry actively contribute to the development of international standards that would be considered for acceptance by the CSA.

The CIM Standards Committee on Reserves Definitions has been dealing with various groups trying to establish the usage of a common set of definitions, the CIM Standards, for all mineral commodities. In addition the work of the CIM Best Practices Committee is continuing.

United Kingdom

In June 2001, a group comprising the UK Institution of Mining and Metallurgy (IMM) now the Institute of Materials, Minerals and Mining (IMMM), the European Federation of Geologists (EFG), the Institute of Geologists of Ireland (IGI) and the Geological Society of London (GSL) promulgated their joint Reporting Code, which followed the 1999 JORC Code with improvements based on the more recent SAMREC Code. The new Code also included changes concerning specific reference to commodities other than metalliferous minerals, Rules of Conduct to be followed by the Competent Person, and Generic Terms and Equivalents.

The UK Listing Authority (UKLA) has been involved in a wider review of the LSE listing rules which is likely to be completed by October 2003. The bottom line for Chapter 19 of the LSE listing rules (Yellow Book) dealing with minerals is that most likely the UKLA will accept the changes inherent in the new IMMM Reporting Code, will agree to endorse it, the new reporting guidelines will be accepted while the inclusion of Inferred Mineral Resources will be allowed but these must not be aggregated with Measured and Indicated Mineral Resources.

IMMM is now recognised under the ASX ROPO protocols and the Canadian CSA list for reporting under NI 43-101.

Ireland

In Ireland both the Department of Communications, Marine and Natural Resources (Republic) and the Department of Enterprise, Trade and Investment (Northern Ireland) now require that all reports submitted in respect of mining leases must be signed off as a Competent Person and conform to the Reporting Code. The Institute of Geologists of Ireland is now recognised as a ROPO by the ASX and is also included on the CSA list for reporting under NI 43-101.

Europe

The EFG is now recognised by both CSA and by the ASX ROPO protocols. Contact is being maintained with UN-ECE. It is a policy of EFG to promote the Competent Person concept and not just in respect of reporting within the natural resources sector.

United Nations Economic Commission for Europe (UN-ECE)

It is recognized that the financial resources required to develop mineral deposits are likely to come from countries represented by CRIRSCO, and that these countries are moving toward a single standard whose recognition would benefit all member countries of the United Nations. The UN-ECE participating nations have adopted the CMMI/CRIRSCO definitions, with minor modifications. The UN-ECE Framework Classification takes into account requirements of the private and state-controlled mining industries, as well as government needs for mineral inventory classifications. For these reasons the CMMI definitions satisfy only part of the UNFC requirements. To satisfy the needs of countries with a variety of centralized and decentralized economic backgrounds, the UN-ECE included definitions for Reconnaissance Mineral Resource, Prefeasibility Mineral Resource and Feasibility Mineral Resource which are not used by CRIRSCO.

NEXT STEPS TOWARD INTERNATIONALIZATION

International definitions of Mineral Resources and Reserves have been accepted by the mining industry and most regulatory agencies. Compatible reporting guidelines have also

been accepted by the member countries of CRIRSCO. The requirement that Mineral Resources and Reserves are estimated by a Competent Person is widely recognized.

However a number of steps still need to be taken before the objective of an International Code is reached. To continue in its leading role, CRIRSCO is in the process of preparing an International Template, and to submit it to its member countries for review: The Template will include:

- International guidelines for reporting Mineral Resources and Mineral Reserves.
- International definition of the Competent Person.
- International rules of conduct for the Competent Person.
- Reciprocal conditions or conditions that must be satisfied for a Competent Person to be recognized across national boundaries.

It is expected that, as the international code/guidelines come into use, experience will dictate the need for modifications. CRIRSCO will coordinate requests for changes or improvements, and decide which changes should become part of the guidelines.

It is also recognized that country-specific requirements, such as those imposed by national regulatory agencies, are likely to remain and would be additional to the international guidelines. It would be unrealistic to expect that every clause in the International Template would be agreeable to all, so completely word-identical codes although desirable are unlikely. In that sense, at least initially, the International Template should be regarded as influential and advisory but not mandatory.

Differences in the regulatory and legal environment of each country will present significance challenges to national acceptance of international guidelines and to recognition of the Competent Person across national boundaries. With the notable exception of the US, the regulatory agencies of the member countries of CRIRSCO have either included or are considering the inclusion of the CMMI/CRIRSCO definitions and guidelines in their reporting rules. Preliminary exchanges of position between SME and the US regulatory agencies have highlighted differences which need to be resolved. Hopefully, following the SME Conference at Reston, Virginia, 1-3 October 2003, the various parties in USA will be able to move closer to compatible agreement.

International recognition of the Competent Person is likely to require a minimum level of relevant experience as well as membership in a professional organization which has a code of ethics, disciplinary powers over its members, and the willingness to exercise these powers. The legal responsibilities of such a professional organization, as well as those of the Competent Person, are likely to vary between countries. These differences must be taken into account when developing reciprocity conditions. Already considerable progress has been made by the established ROPO agreements.

An umbrella organization, which may be an extension of CRIRSCO, will probably be needed to specify the conditions that national organizations must satisfy if their members

are to be recognized as Competent Persons outside their national boundaries. The same umbrella organization will need to review national organizations requesting international recognition, and should have the power to discipline member organizations which no longer satisfy the conditions for reciprocity.

RECOGNISED OVERSEAS PROFESSIONAL ORGANISATIONS (ROPO) AGREEMENT and PROVISIONS

During 2002, JORC, its parent bodies and the Australian Stock Exchange (ASX) agreed to extend the Competent Person provisions of the JORC Code and ASX listing rules by introducing a system which identifies "recognised overseas professional organisations" (ROPOs) to which Competent Persons may belong for the purpose of preparing documentation underpinning reports on Exploration Results, Mineral Resources and Ore Reserves for submission to the ASX under the JORC Code. The system involved the ASX promulgating the list of overseas bodies, acting on advice from JORC working in cooperation with its parent bodies. The development recognises the rapid globalisation of reporting standards in recent years and has its genesis in a similar arrangement introduced in Canada in 2001.

A ROPO Taskforce developed a list of agreed criteria that ROPOs would need to satisfy to be recognised, the most important of which is an ability to discipline its members. Prospective ROPOs were identified and contacted and initially some eleven responded expressing interest in being recognised. Others have subsequently been included on the ASX list. All satisfied the Taskforce's criteria, and recommendations were duly made to the ASX and accepted by it. In early May 2003, ASX promulgated the ROPO list. It is envisaged that further applications will be received as the system becomes more widely publicised. JORC views the ROPO system as a major advance in the development of genuine international reciprocal recognition of Competent/Qualified Persons, and hence in the establishment of high quality national and international reporting standards for the minerals industry.

THE INTERNATIONAL TEMPLATE

The International Template is envisaged as a CRIRSCO initiative to promulgate a "core" code and to give guidance to individual countries which are contemplating introducing and utilising an international standard reporting code. The International Template would by necessity exclude matters and provisions which could be included by individual countries in recognition of their country specific practices and their legal and regulatory situation and requirements. In addition to matters which could be seen, by general agreement as "core" provisions in the existing codes, some of the matters that are likely to be addressed in the International Template are mentioned below. Many of these are from the Reporting Code of IMMM, IGI, GSL and EFG and are also included in the 2003 JORC Code revision.

Mineral Reserve Studies

There is a variation in the level and detail of studies required for the reporting of a Mineral Reserve between a number of the operating codes.

The International Template may include suggested clauses or guidelines which state the extent and details which feasibility or other studies should apply in order to demonstrate economic viability, in the conversion of mineral resources to reserves.

Involvement of Competent Person in Reporting of Exploration Results

Some Codes (the Reporting Code and the SAMREC Code) require the Competent Person who prepared the documentation on Exploration Results on which a Public Report is based, to be named. The proposed 2003 JORC Code has similar provisions. In Canada, National Instrument NI 43-101 and the CIM Standards require the involvement and naming of a Qualified Person, equivalent to a Competent Person.

The International Template may include a provision that the role of the Competent Person includes Public Reports of Exploration Results, along with Mineral Resources and Mineral Reserves, in the type of reports required to "be based on and fairly reflect the information and supporting documentation prepared by the Competent Person".

The term Exploration Results may include in the definition that Exploration Results includes data and information generated by exploration programs that may be of use to investors. The clause may also state that Exploration Results may or may not be part of a formal reporting of Mineral Resources or Mineral Reserves, and additional guidance may be included on when it is appropriate to report Exploration Results.

As a consequence of the possible requirement to name the Competent Person when reporting Exploration Results, the definition of a Competent Person may be amended slightly to cover this extension, by making reference to the Competent Person who prepares documentation on Exploration Results having relevant experience in exploration.

ROPOs

With the globalisation of the mining industry, and the worldwide adoption of reporting standards based on the JORC Code a requirement to extend reciprocal recognition needs to be made. During 2003, the ASX promulgated a list of Recognised Overseas Professional Organisations (ROPOs) to which Competent Persons may belong for the purpose of preparing reports on Exploration Results, Mineral Resources and Mineral Reserves for submission to the ASX. The ROPO process applies in respect of reports prepared under the JORC Code.

Many mining professional organisations have satisfied the following qualification criteria agreed between JORC, its parent organisations and the ASX:

- is a self-regulatory organisation covering professionals in the mining and/or exploration industry;
- admits members primarily on the basis of their academic qualifications and experience;
- requires compliance with the professional standards of competence and ethics established by the organisation; and
- has disciplinary powers, including the power to suspend or expel a member.

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It is proposed to build on this ROPO provision in the Template.

Reporting of Exploration Targets

In order for companies to clearly communicate the potential value of projects to investors and their advisers, there may be a need for company boards to be able to discuss their exploration targets and possible outcomes of exploration programs

The reporting of exploration targets which permits the reporting of exploration target size and type with strict conditions may be necessary and possibly should include the following requirements:

- the information must be expressed so that it cannot be misrepresented or misconstrued as an estimate of Mineral Resources or Mineral Reserves;
- the terms Resources or Reserves must not be used in this context; and
- any statement referring to potential quantity and grade of the target must be expressed as ranges and must include (1) a detailed explanation of the basis for the statement, and (2) a proximate statement that the potential quantity and grade is conceptual in nature, that there has been insufficient exploration to define a Mineral Resource on the property and that it is uncertain if further exploration will result in discovery of a Mineral Resource on the property.

The cautionary statements above, sometimes referred to as a "health warning" is similar to one contained in the Canadian NI 43-101 and the IMMM code, and emphasises to investors and their advisers that such statements should not be confused with Mineral Resources or Mineral Reserves. This will clarify the manner in which company boards communicate matters other than specific Exploration Results, Mineral Resources and Mineral Reserves to the public.

Coal and Diamonds

Because they may have differing specific reporting requirements it may be necessary for the International Template to have additional reporting requirements for diamonds and coal. In future other specific minerals may be included.

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Guidelines for Reporting of Industrial Minerals

It would appear to be necessary to include an explanatory section containing a single clause and guideline on Industrial Minerals to be included in the International Template. For example, the guidelines may refer to the importance of matters not normally considered quite so material for other commodities, such as deleterious minerals or physical properties, likely product specifications, proximity to markets and general product marketability.

Confidence levels

Increasingly it is common practice during mining project studies to attempt to quantify the confidence levels that are applicable to the resources or reserves being considered as the basis for the study. These confidence levels in the view of many should not be based solely on geostatistical or mathematical evaluations but must also consider confidence in the geological interpretations on which the estimates are based. An International Template guideline may be necessary which encourages, but does not require, the discussion of relative accuracy and confidence in resource/reserve estimates. It may not specify the manner in which that is done, leaving the selection of an appropriate method to the judgement of the Competent Person.

Generic Terms and Equivalents

Following the Reporting Code example, the International Template should include a table of Generic Terms and Equivalents for example, mining/quarrying, tonnage/volume, and recovery/yield.

Rules of Conduct

The Reporting Code has included a section covering Rules of Conduct for the Competent Person. Countries may vary in the applicability of these provisions, but it would very useful to include similar Rules of Conduct in the International Template.

CONCLUSIONS

Much progress has been made in advancing towards a genuine International Reporting Code and developing procedures to ensure compliance. But more remains to be done before an internationally recognized International Code becomes a reality. The need for international standards is recognized by the world mining industry. These standards will

improve the quality of communication both within and outside the industry. The standards will also impose a higher level of self-discipline and self-regulation on the industry, which should not be considered a hindrance but rather as a means toward improvement of the public image of the industry.

It is worth noting that the International Accounting Standards Board, based in London, has acknowledged the importance of JORC and other codes in its "Issues Paper on the Extractive Industries" released several years ago. Among its tentative conclusions is one that states: "While the primary financial report should be based on historical costs and not on reserve values, information about reserve quantities and values and changes in them should be disclosed as supplemental information". This demonstrates that the successful operation of JORC and CMMI in establishing, in effect, world-recognized standards for reporting of mineral resources and reserves has had ramifications far beyond its initial objectives,

The JORC Code played a leading role in the development of international standards. The CMMI Group, now CRIRSCO, succeeded in developing internationally recognized definitions. The full development of an International Reporting Code is moving forward at an accelerated pace. The success of this code will require a concerted education effort. The benefits which will result from its adoption must be demonstrated not only to the mining industry, but to all other stakeholders, investors, regulatory agencies and organizations which directly or indirectly influence the viability of the industry. The CMMI Congress during 27-28 May 2002 in Cairns, Queensland, Australia provided a natural focal point and chronological target towards the objective of progressing the International Code and related matters. The SME Conference in Reston, Virginia during 1-3 October 2003 should add more momentum.

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