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Sixth edition

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Global Mining Resource Disclosure

David Hunter[1]

The current rules for resource disclosure in the mining industry owe their advent to the 'Poseidon Bubble' that was triggered by the discovery of a nickel deposit by exploration company Poseidon NL (Poseidon) in Western Australia in September 1969.

At the time, Poseidon shares had been trading at A$0.80 per share and peaked at A$280 per share in February 1970. This led to rapid and speculative price increases in the shares of other Australian nickel companies. Eventually, as the global price of nickel fell, the bubble popped and the share prices plummeted.

As a result, the Australian government established the Rae Committee, which, in 1974, recommended the establishment of a National Companies and Securities Commission for the regulation of securities markets in Australia.

Further, the Joint Ore Reserves Committee (JORC) was established in 1971, being sponsored by the Australian mining industry. JORC comprises representatives of the Mineral Council of Australia, the Australasian Institute of Mining and Metallurgy, the Australian Institute of Geoscientists, the Australian

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Securities Exchange, the Financial Services Institute of Australasia, and the accounting profession.

The JORC first published the JORC Code in 1989, which was the first code to set out in detail minimum reporting standards for public disclosures regarding mining properties and was the genesis for a number of similar codes in other jurisdictions that have adopted its concepts. It provides a mandatory system for classification of minerals, exploration results, mineral resources and ore reserves according to the level of confidence in the geological knowledge, and technical and economic considerations for public reporting. The JORC Code has been incorporated into the listing rules of the Australian and New Zealand stock exchanges.

Another significant and impactful scandal involved Bre-X Minerals Ltd (Bre-X), a Canadian company that reported it had discovered a significant gold deposit at Busang, East Kalimantan, Indonesia.

Bre-X was listed on the Alberta Stock Exchange in 1989 at C$0.30 a share. In October 1995, Bre-X announced it had discovered a deposit with approximately 2.7 million ounces of gold. Analysts believed the find might have 30 million ounces, and John Felderhof, a company geologist, stated it could be 45 million ounces with 'the potential of becoming one of the world's great ore bodies'. Michael de Guzman, a Philippine geologist engaged on the project, hinted at 100 million ounces. By April 1996, Bre-X had graduated its listing to the Toronto Stock Exchange (TSX) where, in May 1996, its stock price peaked at a split adjusted C$286.50 per share, translating to a total capitalisation of over C$6.0 billion.

In February 1997, the then Freeport-McMoRan Copper & Gold Inc (Freeport), a US company, negotiated an agreement respecting the property and began its due diligence evaluation. In March 1997, the project geologist, de Guzman, reportedly committed suicide by falling from a helicopter. A week later, the fraud began to unravel when Freeport announced that there were 'insignificant amounts of gold' at the Busang deposit. Unlike Poseidon, which at least had nickel, the Busang deposit had no gold other than the nearby placer gold that was used to salt the drill core samples. Following the announcement, the market capitalisation of Bre-X collapsed in a sell-off that was so frenzied the TSX had to halt trading four times.

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As a result of the Bre-X debacle, the Mining Standards Task Force was established by the TSX and the Ontario Securities Commission, which recommended sweeping changes to disclosure requirements for mining companies listed on Canadian stock exchanges. Following on from this, the Canadian Securities Administrators established National Instrument 43-101: Standards of Disclosure for Mineral Projects (NI 43-101), together with a Companion Policy and a prescribed form for mineral project technical reports (Form 43-101F1), documenting a new regulatory regime to govern disclosures regarding mineral exploration, development, and production activities by mining issuers in Canada. The requirements of NI 43-101 apply in addition to any disclosure requirements imposed by applicable securities exchange policies.

Notice was given on 3 July 1998, and NI 43-101 came into effect on 14 November 2000. NI 43-101, incorporated, as part of the law, the Canadian Institute of Mining and Metallurgy (CIM) definition standards for mineral resources and mineral reserves. Since 2000, a number of changes have been made to NI 43-101 and various regulatory notices have been issued relating to disclosure under NI 43-101. In addition, the CIM published guidelines for diamond exploration and lithium brines. Prior to NI 43-101, the Geological Survey of Canada published Paper 88-21: A Standardized Coal Resource/Reserve Reporting System for Canada, as amended (88-21). However, for disclosure of mineral resources or mineral reserves for coal, NI 43-101 requires public disclosures to use the equivalent mineral resource or mineral reserve categories set out in the CIM Definition Standards and not the categories set out in 88-21, which include a category for 'speculative' resources that is not acceptable to Canadian regulators. (See also the separate NI 43-101 section below.)

Partly as a result of the implementation of the JORC Code and NI 43-101, various exchanges, including the TSX, the TSX Venture Exchange, the Hong Kong Stock Exchange and the Australian Securities Exchange, also implemented their own mineral project disclosure rules.

Disclosure requirements around the world are becoming more standardised, at least in part due to the establishment of the Committee for Mineral Reserves International Reporting Standards (CRIRSCO). CRIRSCO is comprised of mining-focused organisations with members from across the world, many of which have derived their disclosure regimes from the CRIRSCO standard definitions (as discussed further below).

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For example, the JORC Code introduced the concept of a 'competent person' and NI 43-101 adopted a similar definition in 'qualified person'.

CRIRSCO has a number of defined terms, including 'inferred resource', 'indicated resource', 'measured resource', 'probable reserve' and 'proved reserve', which closely correspond to the CIM definitions, although there are some differences in the definition of 'inferred resource'. In addition, CRIRSCO defines a 'scoping study', a 'pre-feasibility study' and a 'feasibility study'. A scoping study is similar to a 'preliminary economic assessment' as set out NI 43-101. (Note that preliminary economic assessment is not a defined term under the CIM definitions and is a creation of NI 43-101 itself.)

In the United States, the Securities and Exchange Commission (SEC) previously had Industry Guide 7 in respect of disclosure for mining companies until 1 January 2021 when Regulation S-K (subpart 1300) became effective. The SEC announced that the new regulations were intended to modernise the disclosure requirements for mining companies to align them with industry and global regulatory practices and standards.

The provisions of Regulation S-K (subpart 1300) include the following:

- The introduction of a definition of qualified person (QP), who must meet requirements regarding academic qualifications and experience; however, independence is not required. Note that unless the QP is a member of an organisation that has the power to discipline its members, the QP would not be a QP for the purposes of NI 43 101.
- Requirements for a technical report summary, which include:
    - a price for each commodity on a reasonable basis for establishing the prospects of economic extraction when assessing mineral resources;
    - a reasonable basis for establishing that the project is economically viable when determining mineral reserves, which may be a historical or forward-looking price, as long as the QP discloses the basis; and
    - an explanation, with specific details, of the reasons for using the selected price, including the material assumptions underlying the selection.
- Permitting, but not requiring, a registrant to file a technical report summary to support its disclosure of exploration results.

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- Permitting a QP to include inferred resources in an economic analysis that is not a pre-feasibility study or a feasibility study that the QP opts to include in an initial assessment, as long as certain conditions are met.
- A definition of a mineral reserve which must allow for dilution and allowances for losses that may occur when the material is mined or extracted.
- Permitting the use of historical estimates of mineral resources or reserves in SEC filings pertaining to mergers, acquisitions, or business combinations if the registrant is unable to update the estimate prior to completion of the relevant transaction, provided that the registrant discloses the source and date of the estimate and does not treat the estimate as a current estimate (similar to the cautionary language in NI 43-101).
- Permitting multiple QPs to prepare a technical report summary if certain conditions are met.
- If a QP is employed by a third-party firm, permitting that the firm may sign the technical report summary and provide the written consent required for an expert under the Securities Act of 1933 (unlike NI 43-101, which requires the individual QP's consent, notwithstanding that the QP may be employed by a consulting firm). In such instance the potential liability pursuant to the technical report would be that of the firm, and not the individual QP.
- Providing that the disclosure by the registrant of information regarding its exploration activity and exploration results is voluntary until the information becomes material to investors.
- Permitting a registrant and its QP to disclose exploration targets, similar to 'ranges' in NI 43-101, in SEC filings if accompanied by certain specified cautionary and explanatory statements.
- In the report form, requiring that a feasibility study must include all the information contained in paragraphs 1 to 25. Initial assessments must contain all the information in paragraphs 11 to 25 and a technical report summary supporting exploration results must provide the information in paragraphs 1 to 9 and 20 to 25, the format of which closely mirrors the 43-101F1 Form.
- Definitions for the following: cut-off grade, development stage issuer, development stage property, exploration results, exploration stage issuer, exploration stage property, exploration target, feasibility study, final market study, indicated mineral resource, inferred mineral resource, initial

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assessment (preliminary economic study), measured mineral resource, mineral reserve, mineral resource, modifying factors (which include but are not restricted to mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental compliance, plans, negotiations or agreements with local individuals or groups and government factors), preliminary feasibility study, preliminary market study, probable mineral reserve, production stage issuer, production stage property, proven mineral reserve and QP.

- Requiring that the registrant must file a written consent of each QP who prepared a particular section of the technical report summary and state whether the QP is an employee of the registrant. The consent must be attached as an exhibit.
- In a feasibility study, requiring that the operating and capital cost estimates must have accuracy level of ±15 per cent and a contingency not to exceed 10 per cent. In a pre-feasibility study, the accuracy level is ±25 per cent and a contingency not to exceed 15 per cent which information must be disclosed in the report. Note that inferred resources cannot be converted into reserves. A pre-feasibility study must identify uncertainties that require further refinement in a feasibility study.
- Providing for summary disclosure tables, which include Table 2A, a summary of mineral resources at the end of fiscal year based on price, and Table 2, a summary of the mineral reserves at the end of the fiscal year based on price.

There are numerous reporting committees established by different organisations around the world, such as the Pan-European Reserves and Resources Reporting Committee (PERC).

Several of these reporting committees have published their own version of a 'Code for the public reporting of exploration results, mineral resources, and mineral reserves', including Brazil (latest version, 2022), Chile (2015), Kazakhstan (latest version, 2021), Mongolia (2014) and South Africa (latest version, 2016). There is more than one Russian code, but the only one accepted by CRIRSCO is that known as the NAEN Russian Code for the Public Reporting of Exploration Results, Mineral Resources, Mineral Reserves (October 2011).

Many of these codes have adopted the CRIRSCO definitions (discussed further below), with some changes to accommodate local activities and mining operations.

Exchanges

Stock exchanges also have their own regulatory schemes that affect the mining industry, and the listing of mining companies, including:

- The Hong Kong Stock Exchange, under Chapter 18 of its rules, adopted the CIMVal Standards and Guidelines for the Valuation of Mineral Properties adopted by the CIM in February 2003.[2]
- The Singapore Exchange in Practice Note 6.3 sets out disclosure requirements for mineral, oil and gas companies.
- The Johannesburg Stock Exchange in section 12 of its rules sets out disclosure requirements for mineral companies.
- The Australian Securities Exchange under Chapter 5 of its rules sets out requirements for additional reporting on mining, oil and gas production and exploration activities.
- The Australian Securities and Investments Commission provides a 'Perspective on Resources and Reserves Reporting', last revised in April 2013.
- The London Stock Exchange has a note regarding mining, oil and gas companies dated June 2009 under the listing requirements of AIM (a sub-market of the London Stock Exchange). The London Stock Exchange has adopted the AIM Guidance.
- The TSX in Appendix B to its Company Manual sets out disclosure standards for companies engaged in mineral exploration, development and production; and the TSX Venture Exchange (TSXV) has as appendices to its

2 On 29 November 2019, the CIM Council adopted the 2019 CIMVAL Code which supersedes the 2003 Standards. This Code for the Valuation of Mineral Properties is an update and evolution of the 2003 CIMVal Standards and Guidelines. The 2019 CIMVAL Code reflects domestic and international valuation best practice, and recognises regulatory developments. For more information, see https://mrmr.cim.org/en/standards/valuation-guidelines-for-mineral-properties.

Corporate Finance Manual Appendix 3F: Mining Standards Guidelines and Appendix 3G: Valuation Standards and Guidelines For Minerals Properties. Note that the TSX and TSXV have separate listing requirements for mining companies.

- The Financial Conduct Authority of the United Kingdom published listing Rule 6.10 regarding additional requirements for listing mining companies in January 2018.
- The European Securities and Markets Authority issued Regulation No. 2019/980 (replacing Regulation No. 809/2004) regarding prospectus directives and recommendations.

CRIRSCO

CRIRSCO was formed in 1994 under the auspices of the Council of Mining and Metallurgical Institutes (CMMI), a grouping of representatives of organisations that are responsible for contributing and developing mineral reporting codes and guidelines in Australasia (JORC), Brazil (CBRR), Canada (CIM), Chile (National Committee), Colombia (CCRR), Europe (PERC), India (NACRI), Indonesia (KOMBERS_KCMI), Kazakhstan (KAZRC), Mongolia (MPIGM), Russia (NAEN), South Africa (SAMREC), Turkey (UMREK) and the United States (SME). The combined value of mining companies listed on the stock exchanges of these countries accounts for more than 80 per cent of the listed capital of the mining industry.

The international initiative to standardise market-related reporting definitions for mineral resources and mineral reserves started at the 15th CMMI Congress at Sun City, South Africa, in 1994. The mineral definitions working group (later called CRIRSCO) was formed after a meeting at that Congress, and was made up of representatives from most of the countries listed above, with the primary objective of developing a set of international standard definitions for the reporting of mineral resources and mineral reserves.

In 1997, the original five participants reached agreement (the Denver Accord) for the definitions of the two major categories, Mineral Resources and Mineral Reserves, and their respective subcategories: Measured, Indicated and Inferred Mineral Resources, and Proved and Probable Mineral Reserves.

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In 1999, agreement was reached with the United Nations Economic Commission for Europe, which had, since 1992, been developing an International Framework Classification for Mineral Reserves and Resources (UNFC), to incorporate into the UNFC the CMMI-CRIRSCO resource and reserve definitions for those categories that were common to both systems. This agreement gave true international status to the CMMI-CRIRSCO definitions.

Following these agreements, an updated version of the JORC Code was released in Australia in 1999 (and more recently, in 2012), followed by similar codes and guidelines in South Africa, the United States, Canada, the United Kingdom, Ireland and west Europe, Chile and Peru. The JORC Code has played an important part in the development of standard definitions for the codes and guidelines.

The similarity of the various national reporting codes and guidelines has enabled CRIRSCO to develop an International Minerals Reporting Code Template of 'core code and guidelines' for jurisdictions wishing to adopt their own CRIRSCO-style reporting standard, recognising country-specific requirements such as legal and investment regulations.

Standard definitions

The following are the standard CRIRSCO definitions for inclusion in reporting standards of all CRIRSCO members subject to the agreement of the respective national reporting organisations.

The following were proposed as defined terms as of October 2012:

- Public Reports;
- Measured Resource;
- Competent Person;
- Mineral Reserve;
- Modifying Factors;
- Probable Reserve;
- Exploration Target;
- Proved Reserve;
- Exploration Results;
- Scoping Study;

- Mineral Resource;
- Pre-Feasibility Study;
- Inferred Resource;
- Feasibility Study; and
- Indicated Resource.

These definitions have been incorporated in the International Reporting Template of CRIRSCO (CRIRSCO Template) dated November 2013 and the Codes and Standards of most CRIRSCO members, and should be considered in conjunction with the CRIRSCO Template.[3] Although the CRIRSCO Template was updated in November 2019, the same standard definitions apply.

General relationship between exploration results, mineral resources and mineral reserves

The following information is drawn primarily from the CRIRSCO website (Standard Definitions as revised in October 2012).[4]

- Public Reports are reports prepared for the purpose of informing potential investors and their advisers on exploration results, mineral resources or mineral reserves for disclosure, such as annual and quarterly company reports, press releases, information memoranda, technical papers, website posts and public presentations.
- A Competent Person is a minerals industry professional with membership in an organisation with enforceable disciplinary processes, including the powers to suspend or expel a member. Alternative terms in Canada (Qualified Person) and Chile (Qualified Competent Person) are considered equivalent to Competent Person. 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 are considerations used to convert mineral resources to mineral reserves. These include, but are not restricted to, mining,

3 See https://crirsco.com/docs/CRIRSCO_standard_definitions_oct2012.pdf.

4 ibid.

processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors.

- An Exploration Target is a statement or estimate of the exploration potential of a mineral deposit in a defined geological setting where the statement or estimate, quoted as a range of tonnes and a range of grade or quality, relates to mineralisation for which there has been insufficient exploration to estimate mineral resources. This is akin to disclosure on ranges as set out in section 2.3(2) of NI 43-101.
- Exploration Results include data and information generated by mineral exploration programmes that might be of use to investors but do not form part of a declaration of Mineral Resources or Mineral Reserves.
- A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.
- An Inferred Mineral Resource is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply, but not verify, geological and grade or quality continuity. An Inferred Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.
- An Indicated Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.

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- A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation.
- A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proved Mineral Reserve or to a Probable Mineral Reserve.
- 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 or extracted and is defined by studies at pre-feasibility or feasibility level as appropriate that include application of Modifying Factors. These studies demonstrate that, at the time of reporting, extraction could reasonably be justified.
- The reference point at which Reserves are defined, usually the point when the ore is delivered to the processing plant, must be stated. It is important that, whenever the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported. This is particularly important for such elements as lithium, which may require significant processing after being mined.
- A Probable Mineral Reserve is the economically mineable part of an Indicated Mineral Resource and, in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a 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.
- A Scoping Study is an order of magnitude technical and economic study of the potential viability of Mineral Resources that includes appropriate assessments of realistically assumed Modifying Factors and any other

relevant operational factors that are necessary to demonstrate at the time of reporting that progress to a Pre-Feasibility Study can be reasonably justified. Note that this definition is not coincident with a preliminary economic assessment under NI 43-101.

- 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 that are sufficient for a Competent Person, acting reasonably, to determine whether 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.
- 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 and 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.

NI 43-101

As discussed above, the Canadian Securities Administrators have adopted Standards of Disclosure for Mineral Projects (referred to as NI 43-101), a Companion Policy to provide interpretive guidance, and a technical report form (Form 43-101F1), which must be followed when reporting results.

A technical report must include a title page, a date and signature page, and a table of contents, including figures and illustrations, such as maps, plans and sections.

The following elements are required in technical reports (note, however, that this is an edited description and is provided as an example only of what mining disclosure ultimately may resemble).

- Summary – a brief summary of important information, including property description and ownership, geology and mineralisation, status of exploration, development and operations, mineral resource and mineral reserve estimates, and the QP's conclusions and recommendations.
- Introduction – a description of the issuer for whom the technical report is prepared, terms of reference and purpose, sources of information and data, and details of the inspection carried out by a QP.
- Reliance on other experts – the QP who prepares or supervises preparation of all or part of the technical report may include a limited disclaimer of responsibility for matters concerning political, environmental or tax matters relevant to the technical report.
- Property description and location:
    - the area of the property;
    - the location of the property;
    - the type of mineral tenure and its identifying name or number;
    - the nature and extent of the issuer's title to, or interest in, property rights, access, obligations that must be met to retain the property, expiry date of claims, licences, or other property tenure rights;
    - to the extent known, the terms of any royalties, back-in rights, payments, or other agreements and encumbrances to which the property is subject;
    - to the extent known, all environmental liabilities affecting the property;
    - to the extent known, the permits that must be acquired to conduct the proposed work for the property; and
    - any other significant factors and risks that may affect access, title, or the right or the ability to perform work on the property.
- Accessibility, climate, local resources, infrastructure and physiography:
    - topography, elevation, and vegetation;
    - the means of access to the property;
    - proximity to a population centre, and the nature of transport;
    - climate and length of operating season; and

- sufficiency of surface rights for mining operations, availability and sources of power, water, mining personnel, potential tailings storage areas, potential waste disposal areas, heap leach pad areas, and potential processing plant sites.

- History:
  - prior ownership of the property and ownership changes;
  - the type, amount, quantity and general results of the exploration and development work undertaken by previous owners or operators;
  - any significant historical mineral resource and mineral reserve estimates; and
  - any production from the property.
- Geological setting and mineralisation – the regional, local and property geology, and significant mineralised zones.
- Deposit types – the mineral deposits being investigated or sought, and the geological model or concepts on the basis of which an exploration programme is planned.
- Exploration – the nature and extent of all relevant exploration work other than drilling, conducted by or on behalf of, the issuer, including:
  - the procedures and parameters relating to surveys and investigations;
  - the sampling methods and sample quality, including whether samples are representative, and any sample bias factors;
  - relevant information about the location, number, type, nature, and spacing or density of samples collected, and the size of the area covered; and
  - any significant results and interpretation of exploration information.
- Drilling:
  - the type and extent of drilling, including a summary and interpretation of all relevant results;
  - any drilling, sampling or recovery factors that could materially affect the accuracy and reliability of results; and
  - for a property other than an advanced property:
    - the location, azimuth and dip of any drill hole, and the depth of the relevant sample intervals;

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    - the relationship between the sample length and the true thickness of mineralisation;
    - the orientation of mineralisation; and
    - the results of any significantly higher-grade intervals within a lower grade intersection.

- Sample preparation, analyses, and security:
    - sample preparation methods and quality control measures employed;
    - relevant information regarding sample preparation, assaying and analytical procedures used, and the name and location of analytical or testing laboratories;
    - a summary of the nature, extent and results of the quality control procedures employed and of quality assurance actions taken or recommended; and
    - an opinion of the adequacy of the sample preparation, security, and analytical procedures.
- Data verification – the steps taken by the QP to verify the data in the technical report, including procedures, including a description of:
    - the data verification procedures applied by the QP;
    - any limitations in, or failure to conduct, such verification; and
    - the QP's opinion on the adequacy of the data.
- Mineral processing and metallurgical testing – if mineral processing or metallurgical testing analyses have been carried out, a discussion of:
    - the nature and extent of the testing and analytical procedures and a summary of the relevant results;
    - the basis for any assumptions or predictions;
    - the degree to which test samples are representative of the various types and styles of mineralisation and mineral deposit; and
    - any processing factors or deleterious elements that could have a significant effect on potential economic extraction.
- Mineral resource estimates – disclosure of mineral resources must:
    - provide sufficient discussion of key assumptions, parameters and methods used to estimate mineral resources;

- comply with all disclosure requirements for mineral resources;
- when grade for a multiple commodity mineral resource is reported equivalencies, report the individual grade of each metal or mineral and metal prices, recoveries, and other relevant conversion factors used to estimate metal or mineral equivalent grade; and
- include a general discussion on the extent to which mineral resource estimates could be materially affected by any known environmental, permitting, legal, title, taxation, socio-economic, marketing, political or other relevant factors.

Additional requirements for advanced property technical reports (referencing economic analysis)

- Mineral reserve estimates – disclosure of mineral reserves must:
  - provide sufficient discussion and detail of the key assumptions, parameters and methods used when mineral resources are converted to mineral reserves;
  - for equivalencies, report the individual grade of each metal or mineral and metal prices, recoveries, and any other relevant conversion factors used; and
  - discuss the extent to which reserve estimates could be materially affected by mining, metallurgical, infrastructure, permitting and other relevant factors.
- Mining methods – a description of the current or proposed mining methods and a summary of the relevant information used to establish the amenability or potential amenability of mineral resources or mineral reserves to proposed mining methods, including:
  - the geotechnical, hydrological, and other parameters relevant to mine or pit designs and plans;
  - the production rates, expected mine life, mining unit dimensions and dilution factors used;
  - the requirements for stripping, underground development, and backfilling; and
  - the required mining fleet and machinery.

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- Recovery methods – a discussion of the available information on test or operating results relating to the recoverability of a valuable component or commodity and the amenability of mineralisation to proposed processing methods, where relevant, including:
    - a description or flow sheet of the current or proposed process plant;
    - plant design, equipment characteristics and specifications, as applicable; and
    - the current or projected requirements for energy, water, and process materials.
- Project infrastructure – a summary of the infrastructure and logistical requirements for the project, which could include roads, rail, port facilities, dams, dumps, stockpiles, leach pads, tailings disposal, power, and pipelines, as applicable.
- Market studies and contracts:
    - a summary of reasonably available information concerning the markets for the issuer's product, including the nature and material terms of any agency relationships, commodity price projections, product valuations, market entry strategies, or product specification requirements; and
    - identification of any contracts material to the issuer that are required for property development, including mining, concentrating, smelting, refining, transport, handling, sales and hedging, and forward sales contracts or arrangements in place, under negotiations and terms and industry norms.
- Environmental studies, permitting and social or community impact – a discussion of reasonably available information relating to the project, including:
    - a summary of the results of any environmental studies and environmental issues that could materially affect the issuer's ability to extract resources or reserves;
    - the requirements and plans for waste and tailings disposal, site monitoring and water management both during operations and after closure of the mine;

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  - the project permitting requirements, the status of any permit applications and post-performance or reclamation bonds;
  - a discussion of any potential social or community-related requirements and plans; and
  - a discussion of mine closure (remediation and reclamation) requirements and costs.

- Capital and operating costs – a summary of the estimates of these costs, with major components set out in tabular form.
- Economic analysis of the project, including:

  - a clear statement of principal assumptions;
  - annual cash-flow forecasts using reserves or resources and an annual production schedule for the life of project;
  - a discussion of net present value, including the impact of taxes, internal rate of return, and payback period of capital with imputed or actual interest;
  - a summary of taxes, royalties and other government levies or interests applicable to the mineral project or production, and to revenue or income from the mineral project; and
  - sensitivity or other form of analysis using variants in commodity price, grade, capital and operating costs, or other significant parameters and impact of results.

Additional requirements for technical reports

- Adjacent properties – a report may include relevant information concerning an adjacent property, provided:

  - the information has been publicly disclosed;
  - the source of the information is identified;
  - the technical report states that its QP has been unable to verify information and that information is not necessarily indicative of mineralisation on the property that is the subject of report;
  - the report clearly distinguishes between information about an adjacent property and information about the property that is the subject of the report; and

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    - any historical estimates of mineral resources or mineral reserves are disclosed in accordance with paragraph 2.4(a) of NI 43-101.

- Other relevant data and information – any additional information or explanations necessary to make the technical report understandable and not misleading.
- Interpretation and conclusions:
    - summary of relevant results and interpretations of the information and analysis being reported on;
    - discussion of any significant risks and uncertainties that could reasonably be expected to affect reliability or confidence in exploration information, resource, or reserve estimates, or projected economic outcomes;
    - discussion of any reasonably foreseeable effects of the risks and uncertainties relating to a project's potential economic viability or continued viability; and
    - a report concerning exploration information must include the conclusions reached by the QP.

- Recommendations – particulars of recommended work programmes and a breakdown of the costs for each phase. If successive phases of work are recommended, each phase must culminate in a decision point, and must not apply to more than two phases of work, and whether advancing to a subsequent phase is contingent on positive results in a previous phase.
- References – a detailed list of all references cited in the technical report.

On 14 April 2022, the Canadian Securities Administrators published Consultation Paper 43-401 (Consultation Paper), initiating a comment period to reassess NI 43-101 in response to significant changes in the mining industry since the last revisions came into force on 30 June 2011. The Consultation Paper sought stakeholder feedback on the efficacy of key provisions of NI 43-101, potential priority areas for revision, and the possibility of regulatory changes to address previous stakeholder concerns such as the clarity, sufficiency, and suitability of disclosure requirements – including data verification, exploration information, and environmental, social, and indigenous matters. It also considered modernising requirements, such as permitting remote technologies for site inspections and exploring alignment with disclosure standards in

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other influential mining jurisdictions and international norms. The consultation period (as extended) closed on 13 September 2022, and further updates are anticipated.

Conclusion

The world of mining disclosure is gradually converging because of the efforts of organisations such as CRIRSCO, JORC, SAMREC, CIM and the application of regulators such as the Canadian Securities Administrators and stock and securities exchanges such as AIM, Toronto, Hong Kong, Australia and emerging exchanges in South America and Asia.

In time, one expects that disclosure will be common and yet still allow for local rules and regulations unique to each jurisdiction.

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For nearly three decades, David has practised securities, corporate and natural resources law. He has acted for a broad range of public and private companies, as well as institutional venture capital investors and local governments. David handles a wide range of commercial agreements for natural resource companies, including share and asset purchase agreements, joint venture agreements, royalty agreements, shareholders' agreements, management and consulting agreements, option agreements, investment agreements, and bulk commodity supply and transportation agreements. In addition, he regularly advises clients on BC mineral title maintenance, tenure disputes, permitting and reclamation obligations.

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