Professional Engineers
Ontario

Providing Reports on Mineral Projects

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PROVIDING REPORTS ON MINERAL PROJECTS

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Notice: The Professional Standards Committee has a policy of reviewing guidelines every five years to determine if they are still viable and adequate. However, practice bulletins may be issued from time to time to clarify statements made herein or to add information useful to those professional engineers engaged in this area of practice. Users of this guideline who have questions, comments or suggestions for future amendments and revisions are invited to submit these to PEO using the "Guideline Amendment and Revision" form available at: https://www.peo.on.ca/index.php/about-peo/committees-and-task-forces/professional-standards-committee-and-subcommittees

ABSTRACT
The purpose of this guideline is to define best practices for practitioners who provide reports on mineral projects in consideration of the *Professional Engineers Act* (the Act).

1.

PURPOSE OF PEO GUIDELINES

Professional Engineers Ontario (PEO) produces guidelines to educate licensees and the public on best practices.

For more information on PEO's guideline and development process, including PEO's standard form for proposing revisions to guidelines, please see the *Guideline Development and Maintenance Processes* document available at: https://www.peo.on.ca/about-peo/committees-and-task-forces/professional-standards-committee-and-subcommittees.

For a complete list of PEO's guidelines, visit https://peo.on.ca/knowledge-centre/practice-advice-resources-and-guidelines/practice-guidelines.

2.

PREFACE

In November 2016, the Professional Standards Committee (PSC) formed a subcommittee of engineers experienced with providing reports on mineral projects to revise the previous Guideline for Engineers Providing Reports on Mineral Properties published in 2002. They were tasked to investigate the statutory, ethical and professional aspects of providing reports on mineral projects. The subcommittee was instructed to develop best practices for practitioners undertaking this work and prepare a guideline describing these best practices.

The subcommittee met for the first time on May 15, 2017, and submitted a completed draft of this document to the PSC for approval on May 25, 2020.

Following consultations with practitioners and other stakeholders, the final draft was approved by Council at its meeting on June 19, 2020.

3.

PURPOSE AND SCOPE OF THIS GUIDELINE

The purpose of this guideline is to define best practices for practitioners who provide reports on mineral projects in consideration of the Act. The focus of this guideline is on the statutory, ethical and professional obligations of practitioners providing reports on mineral projects with a focus on requirements from Canadian Securities Administrators.

4.

INTRODUCTION

The life cycle of a typical mining project includes exploration, discovery, assessment, property development, production and closure/post closure. Various types of engineering reports are required for each of these project development stages, which allow companies to properly assess the potential risks, quality and quantity of the mineral deposit, potential operating parameters, capital and operating costs, and potential financial returns.

The most visible type of reports are technical reports for public companies required under National Instrument 43-101, *Standards of Disclosure for Mineral Projects*, published by the Canadian Securities Administrators, which was unofficially consolidated on May 9, 2016 (referred to in this guideline as "NI 43-101").

Input for reports on mineral projects may be required from a number of engineering disciplines including, but not limited to, environmental engineers, geological engineers, geotechnical engineers, mining engineers, civil engineers, mechanical engineers, process engineers, electrical engineers and metallurgical engineers.

Reports on mineral properties and the reclamation of mining sites may also involve the participation of the following professions such as, but not limited to:

- Geoscientists;
- Biologists;
- Geochemists;
- Environmental scientists;
- Hydrologists/hydrogeologists;

- Commodity market experts; and
- Professional land surveyors.

At various development stages, the input from these various engineering disciplines can be included in public technical reports or internal reports on projects, including:

- Exploration reports;
- Exploration target disclosure;
- Mineral resource estimates;
- Metallurgical reports;
- Preliminary economic assessments;
- Mineral reserve estimates;
- Pre-feasibility studies;
- Feasibility studies;
- Project completion report;
- Operating mine reports;
- Due diligence reports; and
- Valuation reports.

This guideline provides references to applicable technical resources and PEO advisory resources to give the practitioner information that will help them to prepare the internal reports or public technical reports to the acceptable standards of professional engineering.

This guideline also discusses expectations for the practitioner regarding independence, competency, objectivity, qualifications, confidentiality, conflict of interest and jurisdiction to aid the practitioner in their reporting duties, and ensure focus on the PEO Code of Ethics directive that the practitioner shall regard duty to the public welfare as paramount.

5.

PREPARATION OF PUBLIC OR PRIVATE COMPANY REPORTS

5.1 Introduction

Under the rules presented in National Instrument 43-101, Standards of Disclosure for Mineral Projects, published by the Canadian Securities Administrators (referred to in this guideline as "NI 43-101"), technical reports prepared by a qualified person (as defined by NI 43-101) are required to be filed with Canada's provincial securities commissions under a range of circumstances for both public and private purposes. The day-to-day continuous disclosure requirements of the Canadian Securities Administrators may not necessarily require technical report disclosure unless a material change in scientific and technical information has occurred or a technical report trigger has been activated.

Practitioners may be engaged in providing internal reports on mineral projects, not for public disclosure, typically including technical assessment, due diligence and audit reports. The issues discussed in this guideline apply equally to such internal reports and to public disclosure.

5.2 Report Purpose and Content

For public reporting, the basic requirement of a technical report is to provide a summary of scientific and technical information regarding a property or a project for an exploration or mining company that is required to disclose information material to its project(s) or is required to do so by the securities commission for their reporting jurisdiction and/or as required by TSX/TMX disclosure regulations. The technical report is not intended to be a detailed scientific and technical account of every facet of the project and should ideally be kept to a reasonable file size for the purpose of filing on SEDAR (System for Electronic Document Analysis and Retrieval).

Any of the types of technical reports discussed in this guideline may be written as private company or public company technical reports. Many private companies eventually become public companies and it is therefore recommended that private company reports be written in the same manner as public technical reports.

5.3 Report Validity

Practitioners and clients must be aware of the shelf life of their internal reports and public technical reports and that changing technology, parameters, key assumptions and further project development will at some point cause the information to be out of date. It is the responsibility of the company (the "Issuer") to ensure that all technical disclosure reflects the current conditions of the project or operation. It is the responsibility of the practitioner to ensure that the report content is accurate and current at the date of the report issuance.

5.4 Disclosure and Compliance

The standards for all public disclosure by an Issuer of material scientific and technical information concerning all mineral properties are presented in NI 43-101, which together with its referenced documents, are the principal documents in Canada for disclosure of information on exploration and mining projects. These documents may be found on the Ontario Securities Commission (OSC) website.

In addition to the OSC requirements for disclosure, the Toronto Stock Exchange (TSX) and TMX Group regulate disclosure by exploration and mining companies. The TSX manual, Disclosure Standards for Companies Engaged in Mineral Exploration, Development & Production, sets out the requirements for TSX-listed companies. TMX Policy 3.3, Timely Disclosures, requires TMX-listed exploration and mining companies to comply with the requirements of the TMX, Appendix 3F, Mining Standards Guidelines. These documents noted above are to be considered in addition to the requirements of NI 43-101.

Generally, the requirements of the TSX and TMX Group are consistent with the requirements of NI 43-101; however, in certain areas, particularly in connection with public disclosures, they are more detailed and require an added degree of compliance and diligence. For the purposes of preparing technical reports, however, the practitioner's primary sources of guidance are NI 43-101 and the reporting format form 43-101-F1.

Regardless of its type, any technical report required to be filed with one or more of the securities commissions in any Canadian province is referred to in NI 43-101 as a technical report and must follow the form 43-101-F1 format, which can be found on the OSC website.

5.5 Technical Report Authors

All technical reports must be authored by or under the supervision of a qualified person who, unless the mining company is a "producing issuer," must be independent of the company. As per NI 43-101, "producing issuer" is a company that had gross revenues of (i) at least CDN$30 million in its most recently completed fiscal year and (ii) at least CDN$90 million during its three most recent fiscal years. Qualified persons who are not independent and prepare a technical report for a producing issuer must meet the professional and experience requirements in the same manner as an independent qualified person.

Independent qualified persons must not, among other prohibitions, have been recently employed by the company or its affiliates, own any shares or other securities of the company or its affiliates, or in any of the preceding three years prior to the technical report effective date received the majority of their income from the company. In addition, independent qualified persons should not receive company shares or other securities in advance for any of the work performed on the technical report. If shares or securities are received as payment after completion and SEDAR filing of the technical report, that qualified person may not be considered as being independent going forward on technical reports or other public disclosures.

NI 43-101 and form 43-101-F1 focus on the requirements for technical reports to be used in Canada. Since some practitioners may be required to prepare technical reports on mineral properties for regulators outside Canada, for example SEC (USA) and AIM (UK), authors are advised to check with the agency to which the technical report will be submitted to ensure it will meet all regulatory requirements.

Technical report authors may be required by their clients to review and approve technical information in many types of corporate public disclosures that are concerned with the contents of their technical reports, such as those that follow:

- Management discussion and analysis;
- Financial statements;
- Company websites;
- Annual information forms;
- Investor presentations;
- Presentations to Indigenous communities or stakeholders;
- Mineral resource and reserve initial disclosure;
- Material property acquisitions;
- Offering documents; and
- Other promotional materials.

Restrictions on authorship of non-public mineral project reports may vary according to jurisdiction. The issues discussed in this guideline apply to public disclosure that relies on reports prepared by practitioners.

5.6 Report Preparation

National Instrument 43-101 sets out the circumstances in which a written technical report must be filed with the securities commission (see section 5.1 Introduction, above). The contents of all technical reports filed with securities commissions must follow form 43-101-F1.

The Companion Policy 43-101-CP recommends that exploration and mining projects be carried out and reported in accordance with the guidelines of The Canadian Institute of Mining, Metallurgy and Petroleum (CIM). The CIM guidelines were developed by a committee of industry professionals and regulators and are neither prescriptive nor exhaustive.

While much of the information required by form 43-101-F1 to be included in a technical report is factual, the qualified person is required to perform some compulsory procedures and analysis, and express in the technical report certain opinions and conclusions that require the exercise of professional judgment on the following:

- Interpretation of significant exploration results;
- Adequacy of sampling, sample preparation, security, analytical procedures, data density and data reliability;
- Recommended program of exploration or development expenditures and a statement that the property is of sufficient merit to justify that program;
- The degree to which samples used for metallurgical testwork are representative of the various types and styles of mineralization and the mineral deposit as a whole;
- The extent to which the mineral resource and mineral reserve estimates could be materially affected by any known mining, metallurgical, environmental, permitting, legal, title, taxation, socio-economic, marketing, political or other relevant factors;
- Relevant results and interpretations of the information and analysis being reported on, including any significant risks and uncertainties that could reasonably be expected to affect the reliability or confidence in the exploration information, mineral resource or mineral reserve estimates, or projected economic outcomes. Discuss any reasonably foreseeable impacts of these risks and uncertainties to the project's potential economic viability or continued viability.
- Recommended work programs and a breakdown of costs for each phase.

6.

REPORTING ON SPECIALIZED COMMODITIES

Certain commodities require additional consideration in accordance with specific codes, guidelines and/or best practices pertaining to those commodities.

6.1. Coal Reserves

For consistency in public reporting of coal mineral resources and coal mineral reserves, it is recommended that all issuers use the mineral resource and mineral reserve categories set out in the CIM Definition Standards. A qualified person(s) should be guided by the *Estimation of Mineral Resources and Mineral Reserve Best Practices Guidelines for Coal* and by GSC Paper 88-21: A Standardized coal Resource/Reserve Reporting System for Canada. It is acceptable to use the GSC Paper 88-21 as a framework for the development and categorization of coal estimates, but the GSC 88-21 categories should be converted to the equivalent CIM Definition Standard categories for public reporting.

6.2. Industrial Minerals

When reporting mineral resource and mineral reserve estimates relating to an industrial mineral site including aggregate quarries, the qualified person(s) should be guided by the CIM document *Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines for Industrial Minerals*.

6.3. Diamonds and Gemstones

When reporting diamond exploration information and mineral resources and mineral reserves, the qualified person is expected to comply with the CIM Guidelines for the *Reporting of Diamond Exploration Results and the Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines for Rock Hosted Diamonds.*

7.

ENSURING COMPETENCY

Practitioners are required to always assess their competence in order to undertake a proposed assignment before agreeing to carry out the work. This will involve determining that their theoretical knowledge and practical experience in the relevant field are of suitable pertinence, extent and depth to enable them to provide a service that will be useful and reliable for the client or employer. This ensuring of one's own competence as a practitioner is an ethical requirement under the Act. Furthermore, there is an ethical requirement to act at times with knowledge of developments in the area of professional engineering relevant to any services that are undertaken. Therefore, continuous professional development is highly recommended as a means to ensure competency.

Note that according to section 72(2)(h), O. Reg. 941/90 under the Act, it is considered professional misconduct for practitioners to undertake work that they are not competent to perform by virtue of their training and experience. Furthermore, failure to make responsible provision for complying with applicable statutes, regulations, standards, codes, bylaws and rules in connection with work being undertaken by or under the responsibility of the practitioner is professional misconduct according to 72(2)(d).

Peer review and mentorship can be used to ensure that work is competently performed (for example, see PEO guideline on peer review, *Professional Engineers Reviewing Work Prepared by Another Professional Engineer*).

For all mineral project reports (including NI 43-101 Technical Reports), the practioners involved must have relevant competency by virtue of their knowledge and experience relevant to their portion of the report in the following areas:

- The specific commodity or commodities, their prices, current costs of extraction, potential environmental and social impact and economic viability;
- Currently acceptable methods of mining, mineral processing, tailings/waste rock disposal and environmental protection measures;
- Potential failures in mine design and project economics;
- Methods of property assessment for valuation purposes; and
- Mineral resource and mineral reserve estimation.

In the preparation of a report on a mineral property the practitioner must:

1) Practice only inside their area of competence.
2) Not take responsibility for the work of others without the practitioner being sufficiently qualified and competent.
3) Take sufficient steps to check work by others before accepting responsibility, and refer to the PEO practice guideline *Assuming Responsibility and Supervising Engineering Work*.
4) Maintain objectivity and not allow outside pressure to influence the quality and reliability of reporting.
5) Not provide a report at a level far exceeding or falling short of the required report quality level (i.e. preliminary economic assessment vs. pre-feasibility study vs. feasibility study).
6) Rely on regular peer reviews of methodologies, results and recommendations to ensure competency and currency, especially in small or single person consultancies.
7) Rely upon CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines and CIM Definition Standards for Mineral Resources and Mineral Reserves.
8) Be familiar with PEO's Professional Engineers *Reviewing Work Prepared by Another Professional Engineer* guideline, which refers to meeting and reasonableness of objectives, consideration of other options, bias, rigor and validity of assumptions and conclusions.
9) Be prepared to defend the mineral property report in an audit or review on behalf of a client.

10) Undertake the required professional development program(s) as indicated by their engineering licencing jurisdiction.
11) Take precautions when using computer software for managing and deriving engineering solutions and refer to the PEO guideline Professional Engineers Using Software-Based Engineering Tools, which explains the software, quality assurance, quality control, validation and verification.

In assessing their own position, practitioners should be aware of the essential difference between "qualification" and "competence." Dictionaries define qualification as "a quality or accomplishment that fits a person for some function, office or the like." This includes the conferring of degrees and certification by technical and professional bodies. It is a one-time, static event that cannot normally be lost or diminished by time. On the other hand, competence is a "quality of having suitable skill, knowledge, or experience for some purpose." Competence, subsequently, is a dynamic quality that relates to the present task, assignment or activity. It should be noted that incompetence can mean not only a lack of knowledge, skill or judgment, but also the suffering from a physical or mental condition that can interfere with the exercise of one's professional judgment.

Practitioners must realize that for both legal and ethical reasons, they should not undertake assignments unless they honestly and reasonably believe that they are competent to carry out the work, or that they can become competent without undue delay, risk or expense to the client or employer, or that they will engage a competent licence holder to carry out work that is beyond their area of expertise. Practitioners who proceed on any other basis are not being honest with their clients or employers and are considered to be operating in a manner of professional misconduct.

Professional responsibility refers to a practitioner's obligation to conduct themself in accordance with the technical, legal and ethical standards of the profession, including the higher duty of care associated with professional status. Whenever practitioners act in their professional engineering capacity, they must be prepared to answer for their conduct in discharging their obligations to the profession and the public. Accepting this responsibility is part of the commitment made by each individual when accepting the exclusive right to practise afforded by a licence to practise professional engineering. Good professional conduct includes practising only within one's area of competence.

A key mineral industry example where competency using computer software is a concern is the example case whereby a relatively inexperienced engineer is provided a mineral resource estimation software package by his or her employer and sent to a three to five day workshop to learn how it operates. After the workshop, the employer expects the engineer to know everything about the application of the software, whereas in reality, the engineer has just scratched the surface of the knowledge requirement to become competent. The engineer proceeds to develop a mineral resource estimate with very little if any guidance from other experienced mineral industry professionals and he or she produces an estimate that is very inaccurate since his or her approach to the task is essentially that of a "black box" with misunderstood inputs, operation and results. Unfortunately, this engineer does not understand the workings of the software and is incapable of verifying and validating their work product. To avert this situation, a significant training investment is required, and frequent interaction and review by peers is essential to acquire and maintain competency. For further information refer to the PEO practice guideline Professional Engineers Using Software-Based Engineering Tools.

8.

INDEPENDENCE AND OBJECTIVITY

Managing client and employer expectations about the type and extent of services that can be provided by a practitioner is crucial to the successful conclusion of any assignment. Practitioners should serve their clients and employers with integrity and objectivity, making every effort to carry out assigned activities in a professional manner.

Carrying out work on mineral projects, such as estimation of mineral resources or mineral reserves, or completing engineering studies regarding potential development of a mining operation, the practitioner can be subject to client or employer pressure to produce positive results, particularly when those results may have a material financial impact on the project.

A practitioner can influence the results during the course of the work through selection of various input parameters (e.g. metal prices and process recoveries) and/or estimation methods (e.g. mineral resource grade interpolation). Reasonable choices of inputs may cover a wide range requiring judgement and experience to be applied.

Whether acting explicitly as an independent (e.g. an independent qualified person under NI 43-101) or not, a practitioner is obligated to consider accepted industry practices and standards, such as:

- CIM standards and guidelines for mineral resources and reserves
  - o CIM definition standards for mineral resources and reserves
  - o CIM best practice guidelines
- CIMVal standards and guidelines for valuation of mineral properties
- AACE 47R-11 Cost Estimate Classification System—As Applied in Engineering, Procurement, and Construction for the Mining and Mineral Processing Industries
- Equator principles and International Finance Corporation (IFC) guidelines

- Relevant federal, provincial and local regulations and statutes

These references help to ensure that choices made during the course of the work are objective, reasonable, and appropriate, and that the results are defensible. Peer review, either internal or external, can provide another opinion on whether inputs and results are free from bias and technical error (see the PEO guideline on peer review Professional Engineers Reviewing Work Prepared by Another Professional Engineer).

The PEO guidelines Professional Engineering Practice and The Professional Engineer Acting as an Expert Witness contain best practices for practitioners preparing reports. Here is a summary of some of these best practices as they relate to mineral project reporting:

- It is important to ensure that a client is not misled by an overly favourable report or by a practitioner's failure to give proper emphasis to adverse considerations and project risks;

- For some projects, a client may request that a practitioner provide preliminary reports at various stages. These preliminary reports serve only one purpose: to inform a client about the progress of an investigation and provide guidance for the remaining report work;

- Before preparing a final report, a practitioner may discuss the facts and conclusions with a client to obtain appropriate guidance to ensure completeness;

- An engineer must accept final responsibility for a report and, thus, must not permit the client to exert undue influence on its final form; and

- Expressly, engineers must not alter their reports so as to distort their opinions to advocate for a client.

As an example, issues in this area contributed to the partial collapse of the Algo Centre Mall in Elliott Lake. The report of the Elliot Lake Commission of Inquiry released on October 15, 2014 (volume 1, chapter 14, recommendations: www.attorneygeneral.jus.gov.on.ca/inquiries/elliotlake/report/Vol1_E/ELI_Vol1_Ch14_E.pdf), included recommendation 1.23 pertaining to engineering reports, which dealt with improper alterations of engineering reports.

PEO's Professional Standards Committee agreed with this recommendation and noted that while it specifically mentions a structural adequacy report, the concept that alterations to reports can only be made base on sound engineering principles or changed facts applies to all engineering reports.

9.

MAINTAINING CONFIDENTIALITY

Section 77(3) of O. Reg. 941/90 covers confidentiality, making it clear that the practitioner should not divulge any information sensitive to their clients' or employers' business to third parties, unless expressly or implicitly authorized by their clients or employers or required by law to do so. Unreserved communication between practitioners, clients or employers is essential for effective delivery of professional services. Clients/employers must feel that all correspondence between themselves and practitioners are completely secure. They are entitled to assume this to be the case, without making any request as to the maintenance of confidentiality. They are also entitled to assume that the duty of confidentiality will survive the professional commission that required it.

In preparing material for technical publications or reports on mineral projects, practitioners should be particularly careful to avoid inadvertent disclosure of confidential information, and should seek approval or consent of affected parties before submitting any client-specific information for publication. A mineral industry example of such information would be terms of mineral concentrate sales agreements with smelters (typically very confidential).

For compliance with securities law, it is highly recommended for practitioners to avoid using confidential information for the benefit of themselves or third parties, or to the disadvantage of their clients or other practitioners. In the same vein, practitioners are expected to decline employment or a commission that would require disclosure of such information.

For example, an engineer works for company X, which is in the business of mineral exploration. The engineer is responsible for compiling and analyzing data regarding drilling leading to an estimation of mineral resources. The engineer, in the course of employment, gains skill and experience in analyzing data for sites within this particular geological formation. The practitioner also acquires confidential information regarding mineral resources on land worked by X. The engineer subsequently leaves the employ of company X and joins a competitor, company Y, which proceeds to buy land adjoining the property based on the engineer's knowledge of confidential information. Though the engineer can apply the specialized knowledge and skills learned at X to carry out analysis of the adjoining site, revealing the confidential information regarding mineral resources on X's land to Y is a breach of an outstanding obligation to the previous employer.

Since practitioners, in the course of their assignments, may be required to discuss aspects of projects with third parties, they should ask clients to stipulate which disclosures need to be kept confidential. It may well be worthwhile for practitioners to make this

distinction clear to their clients in certain situations. This stipulation should be included in the agreement for services or employment contract.

Confidentiality agreements are commonly used in the mineral reporting industry, typically including liability and term limits, and covering subcontractors or subconsultants in addition to the contracting organization.

10.

DOCUMENT RETENTION

Practitioners produce many documents in the course of carrying out their assignments. Practitioners producing documents for clients often find that storage of these documents is costly and may wish to dispose of them when they no longer serve a purpose to the engineering firm. Unlike certain corporate documents, there is no legal requirement under the Act stipulating how long engineering documents, including drawings and specifications, must be retained. For mineral projects, however, NI 43-101 part 6.3 stipulates document retention rules for issuers (i.e. clients or employers): An issuer must keep for seven years copies of assay and other analytical certificates, drill logs, and other information referenced in the technical report or used as a basis for the technical report.

Generally, the firm that created the documents may have internal standards for document retention. It is a best practice for practitioners to inform clients about document retention policies and confirm they are acceptable to the client. A practitioner should learn whether a client has special document requirements at the initial meeting and these requirements should be specified in the agreement. This should include obligations on the practitioner to protect, store or destroy documents related to the project.

At the conclusion of a project, a practitioner should provide a client with sufficient copies of all final documents, either in hard copy or electronic format. The number of copies and the format should be stated in the client-practitioner agreement or contract.

It is common for mineral projects to change ownership and/or management frequently, and for the new entity to be interested in obtaining copies of past work (including reports and other data) on the project. In such a case, the practitioner is obligated to obtain the permission of the original client to share the information or, in the event of an absent former owner, require proof that the new entity indeed owns the property.

11.

CONFLICT OF INTEREST

11.1. Mineral Project Reports

An important aspect for practitioners when providing reports on mineral properties is managing potential conflicts of interest. Section 72 (2) of Regulation 941/90 made under the Act defines "professional misconduct." Section 72 (2)(i) states that "failure to make prompt, voluntary and complete disclosure of an interest, direct or indirect, that might in any way be, or be construed as, prejudicial to the professional judgement of the practitioner in rendering service to the public, to an an employer or to a client" shall constitute professional misconduct.

It should be noted that disclosure of conflicting interests by the practitioner is not admitting that a lapse in judgement will happen or that the practitioner is susceptible to pressure. Informing clients and other stakeholders of circumstances that might be construed as a potential conflict of interest allows the work to proceed in an open and transparent manner and allow all parties to manage the work in a way that avoids potential conflicts.

In practical terms, the following describes some potential areas of perceived conflict of interest.

1. The practitioner or one of the study team may have previously completed work on the property or an adjacent property.
2. Working for two clients simultaneously with opposing interests.
3. The practitioner or one of the study team may have completed work on the property when employed by another company or for a previous or prospective owner.
4. The company contracting out the work may have indicated that further studies will be contracted to your firm if the results are positive on the study you are undertaking.
5. A family member of the practitioner or one of the study team may have a direct or indirect financial interest in the company that owns the property.
6. The practitioner in the course of the work may come into information considered confidential and not in the public domain and cannot act on this information to purchase shares in the client's company.

The practitioner should review PEO's *Professional Engineering Practice* guideline for a more detailed discussion on conflict of interest.

11.2. NI 43-101 Technical Reports

When engaged in writing technical reports, the practitioner should review National Instrument 43-101 Standard for Disclosure for Mineral Projects regarding the definition of qualified person and independence, specifically section 1.5:
"…a Qualified Person is independent of an issuer if there is no circumstance that, in the opinion of a reasonable person aware of all

relevant facts, could interfere with the Qualified Person's judgement regarding the preparation of the Technical Report."

The practitioner should also review sections 1.5 and 5.3 of Companion Policy 43-101CP to National Instrument 43-101 Standard for Disclosure for Mineral Projects.

12.

JURISDICTION

Practitioners providing reports on mineral properties often are required to complete reports on properties out of province and it is not unusual for practitioners to complete reports on properties in international jurisdictions.

A common question raised by practitioners is, "Does PEO have jurisdiction if the report is on a property out of province?"

Recent legal developments appear to give PEO jurisdiction in a case where a business maintains a substantial presence in Ontario, even if the work is performed out of province. PEO is of the view that the public includes not just "natural persons" but corporations and governments as well. Ontario practitioners are required to comply with the laws of other jurisdictions where they practise. Ontario practitioners remain responsible to PEO for their conduct no matter where the work takes place. There are a number of legal precedents supporting this view such as November 13, 2007, statement of allegations of the PEO vs. Serdar Kalaycioglu and decision of the Ontario Court of Appeal in R. vs. Stucky (see PEO Gazette July/August 2009). These legal precents demonstrate that both the PEO discipline process and Ontario courts can consider allegations of events occurring outside of Ontario and even Canada.

The practitioner who is not licensed by PEO and working in a jurisdiction outside Ontario is presumably governed by the jurisdiction where they hold a licence providing the jurisdiction is recognized by the Ontario Securities Commission and the jurisdiction has the ability to discipline its members. However, a practitioner who is not licensed by PEO and intends to practise professional engineering in Ontario is considered an unlicensed person and must obtain a licence from PEO.

13.

MANAGING RISKS AND UNCERTAINTY

The practitioner, as part of their duties in completing their portion of mineral project reports, need to consider risk and uncertainty in their analysis and, where possible, mitigate any potential risks to the project. Some examples of questions to consider when completing their analysis include the following:

Geology & Mineral Resources

- Is the data verification and quality control on assaying satisfactory?
- Has the mineral deposit been adequately sampled and tested to complete an accurate mineral resource estimate?
- Has the geology been correctly interpreted including structure, orientation, geometry, alteration and mineralogy?
- What controls the grade variability and continuity of the mineralization?
- Is the mineral resource estimate methodology appropriate for the type of deposit?
- Have the appropriate inputs to the mineral resource estimate cut-off grade been utilized?
- What are the main uncertainties and risks with respect to the deposit and mineral resource model?

Geotechnical

- Has the mineralization, and structure been properly interpreted?
- Has adequate geotechnical lab testing been completed on the various rock units?
- Have items such as hydrogeology or potential voids been identified?
- Have overburden properties been interpreted correctly?
- Are open pit wall slope angles or the size of underground workings suitable for the rock types, mass and structure?
- Have the underlying soil foundation conditions of potential containment structures for waste rock, tailings or water been appropriately investigated?
- Are suitable construction materials available for use in building the containment structures?
- Has provision been made for ongoing monitoring and quality control during construction and operation for the containment structures?
- Have mine closure aspects been considered for the containment structure design?
- Is there potential for release of deleterious elements to the environment from the mine or containment struc tures and have mitigation measures been incorporated into the design?
- Have adequate factors of safety been used for design parameters?

Mine Design & Mineral Reserves

- Is the mining method suitable for safe and economic recovery of the type of mineral deposit?
- Are cut-off grade inputs (metallurgical recovery, metal prices, foreign exchange rate, revenue terms, operating costs) reasonable and consistent with the chosen operating scenario?
- Have mining mineralized material recovery and dilution been properly and realistically estimated?
- Has the mineral reserve estimate been compared to previous estimates, and differences found to be reasonable/explainable?
- Are productivity factors realistic and achievable?
- Is the mining equipment type and sizing suitable?
- Have costs been estimated at an appropriate level of detail for the study being undertaken?
- Do mineral reserves have demonstrated economic viability via a cash flow model analysis?

Processing & Metallurgy

- Have samples for testing been properly selected to represent the variability and spatial distribution of the potential process plant feed and also representativity throughout the life of mine?
- Has processing plant production capacity ramp up and mineralized material feed properties been properly assessed in order that the equipment is properly selected and sized?

Environmental & Permitting

- Have adequate baseline studies been completed for flora, fauna, local stakeholders and site conditions?
- Have water sources and quality been properly identified and assessed?
- Are there any endangered flora or fauna associated with the project?
- Have all stakeholders associated with the project been identified and has the project interacted with them by communication, documentation, dispute resolution and outreach programs to identify any concerns and mitigate these concerns where possible?
- Have agreements been reached with relevant stakeholders detailing impacts, benefits and commitments through the life cycle of the project including closure and post-closure
- Have steps been taken to comply with corruption/anti-bribery/human rights/employment rights, labour laws and regulations?
- Are mine waste materials (including waste rock, tailings) disposed of in appropriately-designed storage facilities with industry accepted safety factors?
- Have there been stakeholder consultations with different groups, such as Indigenous communities?

Marketing

- Have marketing studies been completed for the commodity verifying that an economic market exists for the project's final product?
- Have all additional licensing, smelting, refining, marketing, transportation costs been included in the financial economic analysis?

Financial Analysis

- Have realistic currency exchange rate and commodity prices been used in the financial analysis?
- Have suitable allowances been made in the financial analysis for project ramp up of production and metallurgical performance?
- Have suitable sensitivity analysis been completed on the financial model?
- Are the taxation rates used in the model realistic?
- Has a tax agreement been finalized with local governments including any provision for financial accommodations for stakeholders?
- Is the discount rate used in the financial analysis representative of the jurisdiction and political risk?
- Have suitable project financing alternatives been assessed with realistic terms to assess project sensitivity?
- Has mine closure and reclamation been addressed in the financial analysis?
- Has an adequate contingency allowance been used in project capital and operating cost estimates?

14.

DEFINITIONS

"Engineers" in this guideline applies equally to professional engineers, temporary licence holders, provisional licence holders and limited licence holders as defined in the Act.

"Practitioners" refers to engineers and to firms, that hold a certificate of authorization to offer and provide engineering services to the public as defined in the Act.

"Out of province" means any jurisdiction outside of Ontario.

"Unlicensed person" means a person who does not hold a licence issued by Professional Engineers Ontario to practise professional engineering in the Province of Ontario.

Terms defined in NI 43-101: "Issuer," "Producing Issuer," "Qualified Person," "Technical Reports"

Terms defined in CIM definition standards: "Feasibility Study," "Preliminary Economic Assessment," "Pre-Feasibility Study," "Mineral Resources," "Mineral Reserves"

APPENDIX 1 – REFERENCES FOR PRACTITIONERS PROVIDING REPORTS ON MINERAL PROJECTS

Note that this list is provided for information only and should not be considered a comprehensive list. These references are informally grouped and presented in no particular order. This list in no way limits the responsibility of practitioners or the scope of this guideline. Further, the hyperlinks provided were valid only at the time of publication and may change after time.

GUIDELINES	
Geological Survey of Canada, A Standardized Coal Resource/Reserve Reporting System for Canada	https://www.onemine.org/document/abstract.cfm?docid=232792
Exploration Best Practice Guidelines	https://mrmr.cim.org/en/best-practices/
Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines	https://mrmr.cim.org/en/best-practices/
CIM Best Practice Guidelines for Mineral Processing	https://www.cmpsoc.ca/wp-content/uploads/2015/09/CIM_Best_Practice_Guidelines_for_Mineral_Processing_Rev_F.pdf
CIM Placer Deposits Guideline	https://mrmr.cim.org/media/1037/placer-deposits-estimation-guidelines.pdf
AACE 47R-11 Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Mining and Mineral Processing Industries	http://web.aacei.org/resources/publications/recommended-practices
International Council on Mining & Metals - Principles	https://www.icmm.com/

STANDARDS	
National Instrument 43-101, Standards of Disclosure for Mineral Projects	http://www.osc.gov.on.ca/en/15019.htm
Disclosure Standards for Companies Engaged in Mineral Exploration, Development & Production	https://www.tsx.com/resource/en/97
CIM Definition Standards	https://mrmr.cim.org/media/1088/cim_definition_standards_may10_2014.pdf
CIMVal Standards and Guidelines for Valuation of Mineral Properties	https://mrmr.cim.org/en/standards/valuation-guidelines-for-mineral-properties/

OFFICIAL SITES	
System for Electronic Document Analysis and Retrieval (SEDAR)	http://www.sedar.com
Report on Mount Polley Tailings Storage Facility Breach	https://www.mountpolleyreviewpanel.ca/final-report
Global Reporting Initiative	www.globalreporting.org
International Mining and Metals	www.icmm.com
Total Sustainable Mining Mining Association of Canada	www.mining.ca/towards-sustainable-mining/
IFC Environmental, Health and Safety Guidelines	https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines
The Equator Principles	https://equator-principles.com/

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