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Standards Review Board
International Valuation Standards Council
London
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RE: File Reference IVSC Agenda Consultation 2017
Response to Chapter 5, Extractive Industries, Questions for Respondents

The following are the responses from the Valuation Standards Committee of the Society for Mining, Metallurgy, and Exploration, Inc. (SME), to the questions posed in the Extractive Industries chapter of the *IVSC Invitation to Comment*, issued 15 May 2017. SME is a USA-based mining industry professional society, with more than 15,000 members across 100 countries. The responses provided here are from the seven-member SME Valuation Standards Committee, not the SME body.

Question 5.1: Should IVSC produce combined standards and guidance for Extractive Industries or produce separate pronouncements for mining and for oil and gas? If you believe the latter, please indicate the reasons why you consider separate guidance is appropriate.

We strongly recommend maintaining the philosophy of IVS International Valuation Guidance Note 14 (GN 14), *Valuation of Properties in the Extractive Industries* (published 2005 and 2007). That philosophy of combined valuation standards and guidance for the mining and petroleum sectors, has been carried forward into the *International Mineral Valuation Template (IMVAL Template)* and our *SME Valuation Standards*.

IVS standards and guidance for the extractive industries should emphasise the appropriate application of the existing IVSs (Framework, General Standards, Asset Standards) to valuations in the extractive industries. At the same time, recognition must be provided that differences exist between the two sectors, between global regions, and between government agencies and public financial regulatory bodies, in the classification systems applied to the mineralisation. While these differences should be recognised, together with jurisdictional controls on the reporting of mineralisation from these classification systems and the application of mineralisation categories within valuations, these issues do not justify separate pronouncements for the mining and petroleum sectors.

The IVSC's Extractive Industries Expert Group (a.k.a. Task Force) strived to convey and maintain this philosophy throughout its 2001-2008 tenure. This effort began with its 35-page submission in June 2001 to the IASB, then continued with the development of GN 14, first published in 2005. The philosophy was also conveyed through the Expert Group's collaborative and advisory role with the IASB's Extractive Activities Project Team. It similarly conveyed this in interactions behind the

scenes and in active participation in 2004-2006 United Nations' meetings with mining and petroleum industry leaders, including while providing influential support to then IASB Chairman, Sir David Tweedie's request of 13 December 2005 to the mining industry's CRIRSCO committee and the petroleum industry's SPE reserves committee, for "convergence of the minerals and oil & gas industry-based definitions of reserves and resources."

In our submission of 21 October 2012, responding to the IVSC Discussion Paper, *Valuations in the Extractive Industries*, we provided an extensive technical argument supporting this same perspective, in responding to the DP Question 1.1. We will not repeat the technical argument here, but instead, attach that submission.

As a supplemental statement pertaining to extractive industries valuation guidance, we took interest in Footnote 2, page 7, of this Agenda Consultation, which states: "... guidance notes will not be issued by the IVSC. Rather, the IVSC will coordinate such efforts through the Advisory Forum Working Group for Guidance Notes to be issued by respective VPOs." We request that for guidance notes of potential relevance to valuations within the extractive industries, the VPOs include minerals industry valuation professional organisations, such as our SME committee, the IMVAL committee, and the International Institute of Minerals Appraisers.

Question 5.2: Should the standards focus just on the valuation of reserves and resources or should it extend to other assets employed in the industry and to entire businesses in the sector? Please provide reasons for your answer.

We recommend that the primary focus of extractive industry specific standards and guidance should be for the market valuation of the real property interest in a subject mineral property's minerals estate, including mineral reserves, resources, additional mineralisation and exploration potential, and mineral stockpiles on the property. For this, the limit of the mineral property valuation should usually be at the point of shipment of mineral product in its first saleable form. Other assets employed by a company, such as those for further mineral upgrading or beneficiation, can be valued as industrial real estate, plant and equipment. Emphasis should be placed on the requirements for valid estimation of market value versus investment value. Exploration properties can be particularly challenging to value, so appropriate methods and inputs for this application should be addressed.

We commonly observe inappropriate and confused use of business valuation methods for the market valuation of real property mineral interests, by mineral industry valuers around the world. In addition to providing direction to IVS 200 and 210, a standard should emphasise a clear distinction between the valuation of a mineral property, particularly a producing property, as a business versus as real property. A starting point for the confusion is that globally, most acquisitions of the operator's interest in a mineral property, whether it be a rock quarry or a mineral exploration tenement, involves acquiring the property holding company, often being a single asset company.

At least minimal guidance should be provided in the standards regarding the handling of the contributions of important assets to the value of the minerals estate, such as plant and equipment,

surface facilities, water rights, and access rights, while avoiding double counting. The market value of a mineral property might drop precipitously if such assets became unavailable to it.

Complex project financing, royalty arrangements, and product advanced sales contracts can have long term impacts on the real property value of an operator's interest in a minerals estate, as well as the value of the business holding that interest. At least minimal guidance should be provided on these matters for the inter-relationship of the various IVS asset standards (IVS 200, 210, 400, 500).

Question 5.3: Which classification code or codes are most commonly used in your industry/sector? Which code do you normally use or rely on? Are you aware of differences across your industry/sector on the classification codes used? If so please indicate whether these differences cause problems in undertaking or understanding valuations.

In our submission of 21 October 2012, responding to the IVSC Discussion Paper, *Valuations in the Extractive Industries*, we provided more than a page length of responses to essentially the same set of questions in three parts of the DP Question 3. Nothing has changed enough within the industry and its standards to warrant re-writing our response. Therefore, we direct you to those responses in our attached 2012 submission.

However, we do note that we did not include mention that one of our SME committee members commonly relies on the Petroleum Resources Management System (PRMS) during his petroleum valuation work in North America.

In the context of Question 5.3, we wish to remove confusion that is conveyed in the following statement from Alternative B of Potential Standards Alternatives, on page 43 of the Invitation to Comment:

The Board further notes that there already [are] a number of organisations providing standards in this area such as the International Mineral Valuation Committee (IMVAL), the Committee for Mineral Reserves International Reporting Standards (CRIRSCO) and VALMIN and furthermore there is the United Nations Framework Classification (UNFC), which is a numerical classification system, independent of language, that is designed for use in both the minerals and petroleum sectors.

The IMVAL committee has published the *International Mineral Valuation Template (IMVAL Template)*, which provides a principles-based template of mineral (including petroleum) real property valuation standards and guidelines, for adoption as minimal requirements for national standards. That is, **the IMVAL Template is entirely devoted to provision of mineral (including petroleum) real property valuation standards and guidelines.**

The CRIRSCO committee was similarly formed to maintain and publish the CRIRSCO *International Reporting Template* for classification of exploration results, mineral resources and mineral reserves within the mining sector, for public reporting purposes. The main western world public reporting classification standards for mineral resources and reserves are closely aligned with this –

Australasia's JORC; Canada's CIM; Southern Africa's SAMREC; and USA's SME. (However, the USA SEC's Industry Guide 7 is not closely aligned). **Neither the CRIRSCO Template, nor these national standards and codes, contain valuation guidance.**

The *United Nations Framework Classification (UNFC)* similarly provides a classification system for both mineral and petroleum exploration results, resources, and reserves. **The UNFC contains no valuation guidance.**

The VALMIN Code, developed by the Australasian VALMIN Committee, is the *Australasian Code for Public Reporting of Technical Assessments and Valuations of Mineral Assets*. Its primary role is to provide a rules for the conduct and reporting of technical assessments of mineral properties to the Australian stock exchanges, appropriately applying the classification system of the Australasian JORC Code for mineral resources and reserves. This is the same role as in Canada for the Canadian stock exchange regulators' *National Instrument 43-101 (NI 43-101)*. **A minor portion of The VALMIN Code is devoted to provision of minimal guidance for valuation of mineral properties** (as opposed to technical assessment "evaluation").

Question 5.4: When valuing with a discounted cashflow do you use internal production forecasts developed by the entity's own geological and engineering specialists, external forecasts, or a combination of both and you adjust the production forecasts for risk by reserve category?

The operating entity's internal forecast schedule for property development and/or production, if available, may be used as a base, but due diligence review and critique by the independent Valuer is appropriate, particularly for Market Valuations. Equally important is consideration of what changes the likely buyer would make to how the property is explored, developed, and/or produced, including change of cutoff grade for the resource estimate. Such consideration is particularly important in a seller's market. Differences should be disclosed and explained in the Valuation Report.

For income approach cashflow modelling, risk and uncertainty factors may best be included as various kinds of probability factors, including scenario weightings, rather than as increases in discount rate. This includes resource uncertainties. Major mining and petroleum companies learned at least 30 years ago to use alternatives to high discount rates for modelling the effects of risks and uncertainties on value, particularly for calculating their bid offers in a seller's market, for development properties which may require many years of lead time before production, while having potential production life spans measured in decades.

For market valuation, product price forecasts used will usually be external, if available, unless the production is under long term contract pricing.

Despite these statements, the methods used for value estimation by market participants can vary substantially between mineral property market niches. It can be enlightening to find out the methods

and motivations of the market participants. For example, price per unit of in situ mineral resource in the ground is often considered to the exclusion of the income approach.

Question 5.5: Please indicate what methods you use or are familiar with that fall under the Cost Approach and that are used in valuing assets in the Extractive Industries. Please indicate in your experience how the cost of an equivalent asset is determined and please indicate the three most common adjustments that are made in your experience to reflect physical, functional or economic obsolescence, and what metrics are used to determine these adjustments?

Cost approach methods are often used for mineral property valuations at the exploration and early deposit definition stages, prior to delineation of defined mineral resources. The depreciated replacement cost method can be used for valuation of on-site surface installations at all development and operating stages. The value determined for such an asset will usually be included in, or at least included with, a mineral estate's market value. An example would be an ore concentration mill, which is dedicated to a specific mineral deposit because of geographical isolation. While not strictly additive, the contributing value of that facility may be estimated by the depreciated replacement cost method, reflecting physical, functional, and/or economic obsolescence.

Other cost approach methods are commonly used in the mining sector for estimation of the market value of exploration and early deposit definition stage properties, where sales data for tracts with similar prospectiveness is often lacking. The *Multiples of Exploration Expenditure* method is commonly used in Australia, while in Canada a somewhat similar *Appraised Value Method* and variants of the Kilburn *Geoscience Matrix* method are often applied. For these methods, physical, functional, and economic obsolescence are rarely a consideration, since application of such adjustments to geological data and interpretation would be unusual. The methods are based on factors such as: the sunk exploration expenditure and scale of geological knowledge enhancement derived; the cost and probability of discovering a mineral property of similar geological prospectiveness; and/or the amount of future exploration expenditures justified by the geological knowledge. Though these methods conspicuously suffer from little market input to their value estimates, without relevant market transaction data, alternative valuation methods are unavailable.

Component property contributions to the value of a large mineral property tract may be calculated by a component cost calculation method similar to the *rural cost method*. This may be used to extract the unit value of, for example, water rights or unexplored timber land from transactions, to use in calculating the component's value, which is then combined with the value of the mineral resource portion of the tract estimated by the market or income approach.

Question 5.6: Please identify any intangible assets that are normally separately identified and valued:

- (i) In transactions between entities in the Extractive Industries, and;
- (ii) When accounting for the acquisition of a business in the Extractive Industries.

The identification of “intangible assets” is generally considered by mineral property valuers as pertaining to the accounting for, or valuation of, extractive industry businesses. Such identification is usually considered to be not relevant to the assignment of valuers of real property mineral assets and outside their professional competence. It is unusual in our experience to identify an intangible asset or interest directly tied to a minerals estate. This is because we usually treat items that could be considered intangible assets to be real property components of the mineral property. For example, a permit or license to extract minerals is valued as an enhancement to the value of the minerals estate. Also, a production royalty interest is considered to be a real property interest in the minerals estate, often representing the market rent received by a lessor land owner.

On rare occasions, the geological data set has become separated from the owner or operator of a mineral property, dramatically reducing the value of the owner’s or operator’s holding. Though an accountant could treat the separated data set as an intangible asset, the mineral property valuer would more likely treat it as a real property value factor, akin to the treatment of a suspension of the extraction permit.

We conclude that this question might be better answered by mineral business valuers experienced with appropriate application of IVS 210. Despite this, as we stated above in 5.2, we also encourage the provision in an extractive industries standard of at least minimal guidance on the appropriate role of IVS 210 for valuations in this sector. It is important for valuers to understand the boundaries, applications, and protocols of practice specialisations.

Question 5.7: In your experience what, if any, value is attributed to components of goodwill, eg, an assembled skilled workforce, in corporate transactions in the Extractive Industries. Please briefly indicate any valuation techniques used to establish the value of goodwill in such circumstances.

The identification of “goodwill,” as we understand it from an accounting standpoint, again pertains to the accounting for, and valuation of, businesses in the extractive industries. Such identification is usually outside the competency of a valuer of real property mineral assets. It would be a strange circumstance to have goodwill identified in a valuation of real property mineral assets. But, for a real property market valuation of an operating mine property, it is typical to assume that the skilled workforce will remain during a transaction and continue operating the mine under the new owner, thereby maintaining the value of the property.

Question 5.8: Please provide any examples of which you are aware of significant differences between the value of otherwise similar resources arising solely from different Governmental policies. Please indicate how “country risk” factors are reflected in the way in which you price or value extractive assets.

Country, political, or social risk, almost invariably comprise one of the adjustments to transaction prices per mineral unit, when adjusting across regional or state boundaries to the subject mineral property, employing an indirect sales comparison method in the market approach. The adjustments

may be derived from survey data, insurance and finance company information, and comparative transaction analysis.

An example of mineral property value differences due to governmental policies, is the following:

Nevada's state and regional governments are recognised internationally as employing favourable policies for mining. Nevada is one of the major gold producing jurisdictions of the world, with plentiful gold mines throughout its metallic mineralised regions. In the Fraser Institute's *Annual Survey of Mining Companies 2016*, Nevada ranked fourth best of 104 jurisdictions globally in the Investment Attractiveness Index. During the past decade, the operator's (lessee) interest in gold properties has sold for as much as \$260 per ounce of gold contained in situ within proven and probable mineral reserves.

California, which adjoins Nevada's west and southwest borders, includes the Sierra Nevada Mountain range. This range was the destination of the famous mid-nineteenth century California gold rush. Well defined vein gold deposits remain unmined throughout the 500 mile length mountain range. However, government policies have resulted in California being recognised as considerably less attractive for all mining investment than Nevada. California is ranked by the Fraser Institute as "the least attractive policy jurisdiction in the US." For gold mining in particular, the difficulty of permitting a substantial gold mining and processing operation has resulted in California being totally out of consideration for exploration and investment by most of North America's respected mining companies. This has occurred despite there being no specific regulation that prevents the application of modern mining and gold ore processing methods. Total annual gold production from California is only equivalent to that from a single modest size gold mine in Nevada. Owners of what would be attractive gold properties if they were in Nevada, are unable to get any reputable mining companies to examine their properties, let alone pay money to buy or lease them.

This example demonstrates that across border adjustments to transactions in the market approach and similarly, modifications to factors applied in the income approach for this change of jurisdiction, would need to be much larger than indicated by commercial interest rate differences and insurance company risk surveys conducted in the two states.



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London
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Re: Response to Questions in IVSC Discussion Paper, *Valuations in the Extractive Industries*

The following are the responses of the Valuation Standards Committee of the Society for Mining, Metallurgy, and Exploration, Inc. (SME) to the questions posed in the IVSC Discussion Paper, *Valuations in the Extractive Industries*. SME is a USA-based mining industry professional society, with more than 14,000 members across 85 countries. Please understand that the responses provided here are those of the seven-member SME Valuation Standards Committee, not the SME body.

Question 1.1:

Should IVSC produce combined standards and guidance for Extractive Industries or produce separate pronouncements for mining and for oil and gas? If you believe the latter please indicate the reasons why you consider separate guidance is appropriate.

The most significant differences between the two sectors are: (1) the method for determination of the level of confidence for estimates of categories of resources and reserves in the most respected classification systems; (2) mines and quarries typically attain reasonably constant or increasing annual production rates, whereas annual production from individual oil and gas wells typically declines on an exponential decay curve; and (3) petroleum and its refined products are generally transported to market or port by pipeline, whereas mined product is normally transported to market by truck or rail.

These differences are due to extraction of solids versus fluids. However, the majority of our committee members consider that these differences are inadequate to justify separation of the two sectors for valuation guidance. We recommend that IVSC combine the two sectors for development of its standards and technical information guidance.

The following similarities for valuation inputs outweigh the differences: types of geological and geographical settings; property interests, leasing, and royalty factors; access and water rights; risk factors; social and economic issues; regulatory and political issues; financing and taxation structures; multi-year to more than decade long time-lines from exploration through project development; and a vast range in scale of project capital investment required.

Furthermore, there is no conspicuous dividing line between the producing properties and operations of the two sectors. Uranium, evaporites, and copper are mined by both shovel and by in-situ recovery using solutions, the latter involving fluid dynamics dependent on the nature of the minerals and the location in the ground. Oil sands and oil shale are examples of oil being mined by shovel. Natural gas (methane) can be extracted from coal seams that are being mined nearby for coal. The large front-end investments facing offshore natural gas extraction with its need for liquefaction is of similar financial risk level to what hard-rock mining companies must endure during development. Geothermal energy production, another portion of the extractive industries, applies the technology of hot water or steam production in similar fashion ways to those employed for natural gas recovery.

The application of valuation methods within the two sectors by valuation professionals is similar at the general practice level, with sales comparison, cost methods, and particularly discounted cash flow commonly being employed.

Question 1.2:

a) Should the project focus just on the valuation of reserves and resources or should it extend to other assets employed in the industry and to entire businesses in the sector? Please provide reasons for your answer.

The project should focus on the valuation of interests held in mineral and petroleum exploration properties, and resource and reserve properties, as they relate to land and the interests held in the minerals and surface estates of land. Realistic market valuation of exploration properties can be important, yet quite challenging, and must not be ignored.

The valuation of plant and equipment, intangible assets, and businesses within the extractive industries should also be addressed. However, since the influences on these valuations are essentially a subset of the influences on the valuation of minerals estate interests, they can be addressed secondarily.

For valuations in the extractive industries, it is convention that all assets employed at a reserve property are valued as one with the in situ mineralization and stockpiles or storage tanks. For example, in the case of hard rock mining, it is convention that the mineral reserve plus the mine (extraction workings and equipment) are one asset for valuation up to the point of first sale to the market. That can be a concentrate to be sold after the mill to a smelter, or it can be ore prior to toll milling in a mining camp. The mine and mill would have little value were it not for the in situ mineralization, while the mineralization would not be extractable without the mine and mill.

b) How often do you assess or use (if it is readily ascertainable) the value of an extractive business as a starting point for the valuation of reserves and resources?

Differing perspectives were received from our committee in response to this question. Despite this, there was a common thread of agreement.

One perspective is that the value of extractive businesses should never be used as a starting point for valuation of a mineral or petroleum reserve or resource property.

Another perspective is that owners and operators of mineral properties often carry their interests in a particular mineral property in a holding company devoted to that property, together with associated assets such as permits and water rights. Therefore, for the sales comparison approach (market approach) the starting point of transaction analysis is frequently a transaction of a corporate entity holding company. Since the subject property is often similarly held, little or no adjustment to the holding company value may be needed.

Committee members agree that stock market valuations of corporations that are a single mineral property asset company, or which derive their stock market valuation dominantly from one property, can be useful for sales comparison transaction analysis. Accounting for liabilities and assets of the corporation that are not part of the comparison property allows extraction of the entity value of the mineral property assets from the stock market capitalization of the corporation. Analysis of the stock price trends for companies in the same mineral sector as the subject can also provide useful data, such as *beta* for discount rate build-up for use in the income approach.

Our committee did not reach agreement on whether it is valid to use the stock market value extraction method for valuation of the subject property if it is held in a single asset listed company. A perspective presented is that this method should not be the primary method for market valuation of mineral property assets as there can be a significant disconnect between stock market valuations and direct acquisitions of mineral property assets. However, the method may provide useful secondary information about the value of the subject property.

Question 1.3:

Do you agree with the Board's preliminary view as to the type of pronouncements that IVSC should be making in relation to valuations in the Extractive Industries? If not please explain what alternative or additional material you believe would be useful.

Our committee agrees with the preliminary view expressed in para 1.3.5:

It is the preliminary view of the Board that a standard might be needed to confirm how the principles in the other IVSs should be applied in order to prevent misapplication of those principles and maximise the protection to those who rely on valuations in the sector. However, it considers that the major part of its output will be in the form of a TIP providing non-mandatory guidance.

However, our committee's opinion is not that a standard for the extractive industries might be needed, but is needed. The standard must state that the principles in the other IVS standards also apply to the extractive industries and should specify how they apply.

Question 2:

a) Are you familiar with the former GN14?

The level of experience with GN 14 amongst our committee members ranges from not at all familiar to extensive experience with it.

b) Is GN 14 used in the valuations that you provide or receive?

GN 14 has been used more commonly in valuations provided by our committee members than received by them. With USPAP prevailing as the USA's national valuation standard, our application of GN 14 has mainly been for valuation reports with intended use outside the USA.

Our committee members note that USPAP does not specifically address mineral valuation. Therefore some have sought ways to integrate other minerals valuation standards into their valuations under USPAP. This has resulted in references to GN 14 guidance being included in some of their USPAP minerals valuations.

c) What elements of GN 14 do you find useful in either reporting or interpreting valuations?

GN 14 as a whole has been found useful as a comprehensive standard integrated with the IVSs. The following elements are particularly useful:

The references in GN 14 to other standards in the IVSs provide useful direction for integration of the specific extractive industries guidance with guidance in other IVS standards;

The definitions are helpful and useful for quoting;

The explanation of how to apply aspects of the valuation framework, such as Highest and Best use, within the extractive industries;

Question 3

a) Which classification code or codes are most commonly used in your industry / sector?

Classification standards or codes related to the CRIRSCO-based classification system (CRIRSCO Template), especially JORC, CIM, SME, and SAIMM, are mainly used in the minerals industry of the western world, or where the mineral property is controlled by a western world company. They are applied primarily to mineral properties held by companies reporting to the western world stock exchanges, or where there is an expectation or hope for a transaction involving a listed public company. As a result, mineral deposits with significant economic interest for the major metallic and precious metal minerals, coal, and uranium, are usually classified in accordance with the CRIRSCO Template. However, for industrial mineral and construction stone quarry properties, which in the great majority of cases are not held by publically listed companies, even in the western world, the owners and operators often have little or no knowledge or interest in any resource classification system.

The United Nations Framework Classification (UNFC) is a numerical classification system, independent of language, that is designed for use in both the minerals and petroleum sectors. It provides a much wider ranging classification system, encompassing mineral deposits from producing reserves to those that fall well outside the five resource and reserve boxes of the CRIRSCO Template. It provides classifications designed for use in both socialist and capitalist economies.

The UNFC has gained some penetration worldwide for use by academics and government agencies for classifying mineral deposits in national resource inventories. Its most frequent use is in eastern Europe and in China.

b) Which code do you normally use or rely on?

When working on mineral properties within the USA, our committee members generally use either the SME or CIM classifications, though many advanced stage and operating industrial mineral and construction stone properties are unclassified. Outside the USA, members often rely on technical reports that apply the JORC classification. Most of the mineral property transaction data we receive from outside the USA is in the JORC or CIM classifications. For transaction data from China, central Asia, and the ex-Soviet countries, it has often been in the UNFC or Russian classifications.

c) Are you aware of differences across your / industry sector on the classification codes used? If so please indicate whether these differences cause problems in undertaking or understanding valuations.

Within the USA, we sometimes must deal with transaction data or a subject property constrained by the US SEC's restrictive Industry Guide 7 classification. Industry Guide 7 and its effective application allowed by SEC regulators is quite constraining relative to the CRIRSCO-based classifications. We find the differences between the various CRIRSCO-based classifications to be insignificant for valuation undertakings.

Impositions of regulations by stock exchange regulators, for reporting within the classification systems, can result in significant differences in reporting requirements between exchanges. This can cause biases in transaction data and valuations. An example is the Canadian NI 43-101 regulatory definition of *historic data* and its prohibition of the use of historic data for higher than an Inferred Resource classification. Another is the Canadian TSX-V's discouragement of the inclusion of mineral resources with mineral reserves in cash flow modeling for the DCF method of valuation (Appendix 3G, para. 4(a)).

Our members sometimes find ways to successfully work around these biases. One member, when he fails to successfully by-pass the biases, inserts in his report a paragraph comparable to USPAP's *Jurisdictional Exception Rule*.

Question 4:

a) Please identify the valuation methods that you most commonly use or encounter for valuing:

• Producing reserves

The primary method we use and encounter for valuation of mineral property interests with producing reserves is the NPV/DCF Method of the Income Approach. Our observation is that this is the preferred valuation method of minerals valuers for operating mineral properties. Considerable variation occurs between practitioners, including our committee members, in the bases of cash flow calculation, the main differences being inclusion or exclusion of inflation;

before or after income tax cash flows; and the methods of projecting inputs such as production rates, operating costs, and product selling prices.

The supporting valuation method we generally use is either a direct or indirect sales comparison method, even if only for a reality check.¹ The secondary valuation method we generally encounter is a direct sales comparison method or a market approach method based on stock market transactions.

- **Reserves undergoing development**

Similar to producing reserves, but with some modification.

In this case for the DCF method, our members consider it necessary to insert a risk factor into the cash flow table to model the probability of the mining operation successfully achieving the producing stage and capturing adequate market share for its production. One member also argues that the DCF result must still be factored for the lingering mechanical construction, financing and timing risks.

The emphasis placed on the valuation derived from the sales comparison method will increase.

- **Reserves or resources subject to exploration**

Use for undeveloped tracts containing defined Mineral Reserves: Our committee members use Market Approach sales comparison methods together with the Income Approach DCF method.

Use for undeveloped tracts containing defined Mineral Resources subject to additional exploration: The committee members primarily use a sales comparison method. This may be supported by a Cost Approach method, such as Historic Cost adjustment, or for one of our committee members, the Rural Cost Method of land mix adjustment. An Income Approach method is often applied based on an imputed or actual lessor's royalty, overriding royalty, option or farm-in terms, for valuation of partial interests.

Encounter for both property stages: The DCF method is the primary method seen utilized. For undeveloped tracts containing defined Mineral Resources, we frequently see a direct sales

¹ By "indirect sales comparison method" we mean a method in which the transacted properties are adjusted to the subject property on a per unit basis of contained mineral commodity, by application of a substantial array of adjustments. The per unit basis of contained mineral commodity to which the adjustments are applied could be for example, Troy ounce of gold, or tonne of coal, or short ton of lump hematite. Adjustments applied to the transacted properties may compensate for a wide variety of differences with the subject property, such as: geological, mining, and metallurgical parameters; geographic and property access differences; regional infrastructure; cost and/or revenue differentials; social, regulatory, and political factors; and the property interest involved. Though application of a "direct sales comparison method" to a mineral property might use a similar per unit basis, only a few adjustments if any are applied, these typically being modest in their scale, thereby in most cases conveying a misleading impression of direct comparability of the transacted properties to the subject property. Ellis 2011 provides a number of case studies of application of indirect sales comparison: Ellis, Trevor R., 2011, "Sales Comparison Valuation of Development and Operating Stage Mineral Properties", *Mining Engineering*, Vol. 63, No. 4, April 2011, pages 89-104, a peer reviewed technical paper.

comparison method applied, often in addition to the DCF method. For early resource and exploration properties, various Cost Approach methods are often used, including Multiples of Exploration Expenditures, the Appraised Value Method, and the Geoscience Matrix Method.

If you are a valuation provider, please indicate why you prefer these methods. If you are a valuation user, please indicate if you are confident in the result obtained by these methods.

As valuation providers, we like the NPV/DCF method for advanced stage and operating properties because the cash flow models can be constructed much quicker and easier than seeking out relevant transactions then analyzing them. Most professionals associated with the mining industry, including accounting firm auditors, feel they understand the cash flow models and associated NPV analysis. They often trust a valuation by the DCF method more than by a sales comparison method.

However, some of our members do prefer a sales comparison method, such as the indirect Market Transaction Valuation Method, at all property stages except possibly the producing stage. This is because we find the inherent market measurement involved in transaction analysis and sales comparison can provide accurate and reliable market-based results when adequate care and diligence is applied.

For resource and exploration properties, we find the NPV/DCF method to be inaccurate unless extreme care is employed in deriving market-based inputs. The NPV/DCF method is often misused and abused by inexperienced valuers of resource and exploration properties.

Question 5:

b) If you have experience of using the market approach to value assets, please indicate the sectors and asset types where this is used.

Some of our committee members apply market approach methods (indirect and direct sales comparison methods) across all mineral commodity sectors for all mineral property exploration and development stages. One member also has extensive experience in application of the market approach to petroleum properties.

c) Please identify the three most important factors for which you frequently need to adjust price data when applying this approach.

By price data, we assume asset transaction price, with our focus being mineral property transactions.

Changes and differences in net commodity prices and in capital and operating costs.

Resource quantity, quality, and estimation confidence.

Resource location, with all that encumbers, such as: geography, distance to the commodity product market, property access, social and regulatory matters, political and country risk.

Question 6.1:

a) Production forecast – do you use internal production forecasts developed by the entity's own geological and engineering specialists, external forecasts, or a combination of both?

For an Investment Valuation, we will rely moderately on the entity's internal production forecast.

For a Market Valuation, we will rely mainly on external market information that we will compile and analyze. Whether the mineral property market is a buyer's or seller's market will help determine the weighting we give to an internal production forecast.

b) Do you adjust the production forecasts for risk by reserve category?

Our committee members generally do not differentiate between Proven and Probable Mineral Reserve categories, because little difference is evident in the mineral property markets and stock markets.

We do differentiate between the Mineral Reserve categories and the various Mineral Resource categories. A common method used to adjust for category risk in the cash flow model is inclusion probability factors on production modeled for the resource categories.

c) Do you make an explicit cash flow forecast through the term of expected production, even though it might be a very long period of time, or do you use a "remainder period" for long lived reserves? If you use a remainder period, typically over what period is your explicit forecast?

Our members are flexible on this matter, doing whichever makes the most sense based on the configuration of the deposit being mined, the tenement terms, the social and regulatory environment, and the commodity market. However, most would consider it unusual to model more than 40 years of production.

d) Do you use an internal management estimate for future pricing, eg the NYMEX, investment bank analysts' estimates, industry sources, or a combination thereof to estimate future prices? If using the NYMEX strip pricing, what are the typical assumptions you make for prices beyond the NYMEX strip (e.g., flat, inflationary growth, etc.) Do you consider the impact of any hedging of future prices that might be in place in estimating the future revenue stream?

For an Investment Valuation, our members will likely use their client's internal management estimate for future pricing.

For a Market Valuation, we will probably use a combination of future pricing sources, including NYMEX, if valuing a mineral resource property containing one of the few mineral commodities for which those are available. Our members vary in whether they do their cash flow modeling in constant (real) currency terms or escalated (inflated) terms. Most though find it beneficial to assume real prices stay flat beyond any forecast real price change.

For DCF methods, whether or not a valuer develops the cash flow model using constant or escalated terms, the outcome is that the income streams from distant future years are typically heavily discounted. Therefore, the effect of highly escalated future prices will be somewhat negated.

Some members frequently find that there are no price specific forecasts available for the mineral commodities involved in the mineral properties that are the subject of our valuations. This is typically the case for sand, crushed stone and other construction material products. It is also the case for many industrial minerals. Therefore, our own interpretations of the commodity market drivers and the perceptions of the likely buyer of the property are necessary.

If a hedge transaction is in place which would remain an obligation for the likely buyer, our members take that into account, just as if a coal sales contract were in place that would transfer as an obligation to the likely buyer of a coal mine

e) Do you apply differentials to the future price estimates? If so, what is your source for estimated differentials?

Our members consider such exercises of commodity price accuracy and refinement almost always futile and unwarranted given the multitude of larger potential variances involved in estimations of Market Value for mineral properties. The same is true for determination of Investment Value, except in circumstances involving specialized needs for sensitivity analysis.

f) Do you reflect currency exchange risks to future income and operating cost projections in the cash flow or in the discount rate?

For an Investment Valuation, we will if it is pertinent to our client.

For a Market Valuation, most of our members usually develop their valuation analyses and value estimates in constant US dollars, thereby removing most needs for inclusion of currency exchange risk.

g) Do you include corporate overheads when estimating the value of mining, oil and gas reserves, or just the selling, general and administrative costs associated with operating and producing the reserves?

For a Market Valuation of a mineral property, most of our committee members do not include corporate overheads. Philosophically, these should not be considered relevant in the negotiation of a market transaction for a mineral property. For an Investment Valuation, it may be appropriate to include corporate overheads for the purpose the client has for the valuation.

h) How often do you use the DCF method to value probable or possible reserves?

For Market Valuation of a mineral property containing Probable Reserves, our members almost always use the DCF method. This method is generally supplemented by the sales comparison approach, particularly if the property is non-producing.

Possible mineral reserves do not exist in the CRIRSCO-based classifications and the US SEC's Industry Guide 7 classification. If we receive a "possible reserve" estimate for our subject property or a transacted property, we usually downgrade that classification to Inferred Resource or maybe only a "mineralized material" estimate. Our members will likely include this Inferred Resource in their cash flow modeling if this resource is included in an existing mine plan, or is a portion of the resource base associated with an operating mine, provided that the regulatory rules that may govern the valuation allow inclusion of Inferred Resource in the DCF cash flow model. (See 6(b) regarding adjustment for resource category risk.)

Question 6.2:

a) What methods do you use or are familiar with for determining the discount rate used for valuations of reserves and resources?

For Investment Valuations, we use our client's specified investment rate of return requirement. If this is not available, most use a weighted average cost of capital.

For Market Valuations, most members typically use a built-up discount rate based on a stock market derived beta from the same commodity sector as our subject property. Others use a weighted average cost of capital derived for that sector. We then adjust these for property and project specific risk.

One of our members attempts to measure the prevailing discount rate in the market place for transactions of the type of mineral property asset he is valuing. His preferred method for measuring the prevailing discount rate is extraction of internal rates of return from transactions of mineral properties with similar characteristics to the subject property. This requires taking care to design the cash flow model for a transaction so that the assumptions being used correlate correctly with those of the cash flow model for the subject.

b) Do you separately consider and evaluate market (systemic) risk and asset specific risk?

Generally our members find that this level of detail seems unwarranted, given the scale of other uncertainties. They are aware of asset specific risk and its combined effect with systemic risk. The practice of one member's consulting firm is to separately consider these risks.

At least two of our members remove much of the project risk from the discount rate by applying probability factors to the main risk points for the project being modeled. Probability factors are estimated for success and failure at risk points such as mine and processing plant startup and product market entry.

c) Please indicate the factors that you normally consider and reflect in the discount rate and any source you use to determine the appropriate rate adjustment.

Our committee members have not been adequately polled on this matter.

d) Do you use multiple discount rates to reflect the changing risk profile as an extractive process moves through its life cycle?

Some members have occasionally done this for Investment Valuations and for comparison of multiple potential acquisition/sale scenarios.

For Market Valuations, the committee members who are knowledgeable of the factors involved in the changing risk profile prefer to account for those risk changes by application of point risk probabilities.

Question 7:

a) Please indicate what methods you use or are familiar with that fall under the Cost Approach and that are used in valuing assets in the Extractive Industries.

Cost Approach methods sometimes used by our members for market valuation of the minerals estate in mineral properties are:

- The Geoscience Matrix Method
- The Rural Cost Method of land mix adjustment
- Multiples of Exploration Expenditures
- Appraised Value Method
- Historic Cost adjustment

These methods for valuing the minerals estate have been addressed in a number of professional papers presented in the mineral valuation sessions at our SME annual conferences. A comprehensive paper was presented by Ellis in 2011.²

For buildings and plant and equipment, our members rarely find need for formal application of the Depreciated Replacement Cost Method. Such a level of detail is usually overwhelmed by the scale of value and uncertainties inherent in the mineral deposit.

b) If you use or are familiar with the Cost Approach, please indicate in your experience how the cost of an equivalent asset is determined.

For mineral properties we rarely find equivalent assets. Therefore this question seems inappropriate for mineral property valuation.

For plant and equipment valuation, we may use manuals and computer databases, inquire with equipment brokers, or retain an equipment appraiser.

c) If you use or are familiar with the Cost Approach, please indicate the three most common adjustments that are made in your experience to reflect physical, functional or economic obsolescence, and what metrics are used to determine these adjustments.

This question implies use of the Depreciated Replacement Cost (DRC) Method, which has negligible application to the valuation of components of land. Due to the large scale of

² Ellis, Trevor R., 2011, "A Review of the Many Cost Approach Methods for Minerals Valuation", *SME Transactions 2011*, Vol. 330, pages 557-562, a peer reviewed technical paper.

uncertainties in our valuations of the minerals estate, formal application of the DRC method to buildings, plant and equipment can rarely be justified. The presence of the buildings, plant and equipment is inherently incorporated in the valuation of the mineral property through its stage of development classification. Separate assessment of their values would only add a supplemental note to the valuation report for the mineral property, except possibly for liquidation situations involving lender and lessor claims on residual assets.

Question 8:

This question deals with philosophical aspects of asset component value accounting for financial reporting. Most of our committee consider their education and experience inadequate to provide responses to these various question parts. Therefore, the limited input we received on these question parts from polling our committee cannot be provided as fairly representing the opinions of our committee.

If such asset component valuation matters are relevant to a mineral valuation assignment, a mineral valuer lacking a high level accounting education should be provided relevant instructions from the client's representative. The valuer should then include the instructions in the scope of work description in the valuation report.

Question 9:

a) How do you estimate the cost of future reinstatement or environmental protection obligations?

Environmental and other disclosure costs are included in mineral industry mineral reserve estimates as part of the economic analysis demonstrating that mineral reserves exist. As with other pricing and cost values current costs for future environmental remediation are used except when there is a contractual basis for the changes used. The use of current prices and costs eliminates the uncertainties involved in estimating future changes, particularly for final closure remediation work which may not be done for many years in the future.

Typically, future reinstatement or environmental protection obligations are already estimated by the mining engineer during the Feasibility/Pre-Feasibility studies, or by some type of financial assurance established by the operator, in compliance with regulations.

Use of a sales comparison method captures much of the environmental obligations through incorporating them in the units of value being adjusted from similar property types.

Several methods for estimating the future cost of reclamation have been observed in the industry, primarily the following:

- Reclamation costs are estimated on a current basis for the end of the project, and brought back into current operating costs on a cost per ton basis.
- Reclamation costs are estimated on a future basis, with some type of investment (such as a sinking fund) established to fund reclamation upon project completion.

- Reclamation costs are estimated on a current or future basis, utilizing some type of guideline (cost per acre) published by a State Regulatory Agency.

b) Do you discount the future cost of reinstatement obligations using a risk free rate or another rate? If another rate please identify and provide rationale for this approach.

Our members provided answers from two perspectives for this question.

The first is: Yes, just as future income is discounted, future cost of reinstatement obligations (if assumed occurring at the end of a project) may be discounted also. The discount rate is usually kept the same as the discount rate used to value the reserves, typically derived using either the Buildup Method or the Weighted Average Cost of Capital, particularly for large corporations. The Buildup Method consists of determining and adding the following risk components: real risk-free rate of return + public company risk premium + industry risk + site-specific risk for individual properties.

The second is that a philosophical argument can be made that environmental protection and remediation obligations remaining after cessation of profitable mining operations should be discounted at a safe rate. Consideration of this argument in turn raises other questions:

What is the intended use of the valuation? This maybe to represent the Fair Value of a long term liability in the corporate accounts for financial reporting.

Who are the main users that will be relying on this value?

Should the measure of value be IFRS Fair Value, Market Value, an isolated component value, an investment value, or a value akin to insurance liability value?

Is there an offsetting asset in the accounts such as a sinking fund, a reclamation bond, or a specified investment, with capital and revenue generation assigned to service the liability, which is earning a higher or lower rate of return than the safe rate?

Substantially overvaluing or undervaluing a relatively large on-going liability could cause significant harm. Before attempting to answer the main question, it seems necessary to investigate these questions raised in response. A “one size fits all” rule may not be a fair and appropriate answer.

Question 10:

a) If you provide valuations of mineral assets, what investigations do you undertake to established the reasonableness or otherwise of estimates of the extent of reserves or resources provided by geologists?

Authors of valuation reports typically include a caveat covering the assumption that the mineral reserves and resource estimates provided by outside sources are correct. Regardless, discussion with the geologists, as well as independent “reasonableness” checks and volumetric modeling is usually also performed to check if the provided estimates are reasonable and physically possible.

Dependent on the scale of the valuation assignment, the reasonableness check may be part of a review of the property by an independent mineral valuer or a substantial team of experts.

Mineral Resource and Mineral Reserve estimate technical report filings with the major western world stock exchanges, usually are required to abide by the CRIRSCO-based classifications and the associated Qualified or Competent Person requirements for the signer of the report. This is not true for USA stock exchange filings under Industry Guide 7 requirements. Whether or not the Qualified or Competent Person requirement applies to a technical report containing Mineral Resource or Mineral Reserve estimate that the valuer is to rely on, the valuer should take the time to review the qualifications of the person responsible for that report to assure that the education and experience appear adequate and appropriate for the type of deposit and estimate.

b) If you provide valuations of mineral assets, are you routinely provided with estimates from engineers of the cost and feasibility of extraction? What enquiries do you make to satisfy yourself as to the reasonableness of these estimates?

The relevant experiences of those responding to this question vary considerably. One affirmed that he is routinely provided with such estimates. Some of the “reasonableness” comes from his past experience with similar projects. The other check is performed by comparing against established cost models and methods employed for estimating mining costs.

The other committee member stated it is almost unknown for him to receive such an estimate that is up-to-date and appropriate for use as the basis of a current Market Valuation. He or a subcontract mining engineer often revamp the estimates to match currently prevailing circumstances, particularly if it is a seller’s market for the type of mineral property. In a seller’s market, this sometimes involves matching the size and style of mining operation to that which a likely buyer will employ.

c) If you are a recipient or other user of valuations of assets in the Extractive Industries, are you satisfied that the valuations properly reflect any uncertainties in the current estimates of either the extent of the reserves or the costs of recovery? What information would you expect to see in a valuation report that would improve your understanding of the sensitivity of the reported value to uncertainties in the identified reserve or the costs of recovery?

Our respondents again differ substantially in their answers. The first states that uncertainties in the current reserves estimates or the costs of recovery do not always seem to be apparent in valuations. Typically, stochastic modeling, risk based adjustment or sensitivity analyses better allocate for the uncertainties in the reserves or the mining costs.

The other respondent states that this question is not applicable to a report providing an opinion of Market Value.

Question 11

a) Please identify any intangible assets that are normally separately identified and valued; i. In transactions between entities in the Extractive Industries and

Our committee members consider it inappropriate to separate these assets from the market value of the mineral property, except in rare circumstances of legal necessity. It was agreed that *overriding mineral royalties* may be separately valued.

ii. When accounting for the acquisition of a business in the Extractive Industries.

Skilled workforce, non-compete agreements, acquired software, customer base, sales contracts, customer related intangibles and permits. Also again, *overriding mineral royalties*.

b) In your experience what, if any, value is attributed to components of goodwill, e.g. an assembled skilled workforce, in corporate transactions in the Extractive Industries. Please briefly indicate any valuation techniques used to establish the value of goodwill in such circumstances.

One opinion states: Goodwill usually is addressed when performing a business valuation, such as determining Going Concern Value of a Mining Operation. Techniques to establish the value of Goodwill may include asset allocations, where the hard assets such as plant & equipment less depreciation, real estate, minerals, Cash & Securities and other assets may be balanced against the Going Concern Value to determine the residual goodwill. Other methods of determining goodwill may include performing valuation of intangibles (if significant) and other values to balance out and estimate Goodwill.

The other opinion is that goodwill generally derives from an error in the asset value allocation or an inappropriate allocation of asset value has required a balance to be assigned to goodwill.

c) When considering the valuation of previously uneconomic reserves that can now be recovered using advanced technology, e.g. shale gas, deep water drilling, do you attribute an element of the overall value to the intellectual property involved? If so please explain briefly the method used to estimate this.

No. Particularly for Market Valuations, a change in value due to application of a technology should be applied to the value of the mineral or petroleum reserve property

The addition of previously uneconomic mineral or petroleum resources typically adds value to the property interest held. However unless the advanced technology has been proven and in use for many years, then some type of adjustment (adjust discount rate, adjust reserves) is typically made to address the possible risk of the advanced technology not performing satisfactorily. New technologies are continually under development and testing. The extraction of estimated mineral reserves using new technologies should be evaluated considering the risk that the proposed new technology will perform as planned. This results in a risk-adjusted valuation that fully describes the risks involved and their potential impact on the valuation of the resource.

Question 12

a) Please provide any examples of which you are aware of significant differences between the value of otherwise similar resources arising solely from different Governmental policies.

Significant differences between the value of otherwise similar resources as a result of Governmental policies occurs in the United States at a Federal and State Level. Federal regulations regarding condemnation (taking) of mineral properties contain provisions that may alter the value if compared to fair market value. State taxation regulations are imposed in certain States that also modify the way that a valuation is conducted, and thus may result in different values if compared to Fair Market Value.

These governmental impacts are addressed in both the overall project risk discussion of a mineral resource and mineral reserve estimation and valuation and specifically in the site-specific risk for individual properties part of the discount rate determination discussed in the answer to question 9(b).

Provision of specific examples could prove inappropriate for this committee.

b) Please indicate how “country risk” factors are reflected in the way in which you price or value extractive assets.

From an Income Approach perspective, one respondent stated: “Country risk” or site-specific risk for individual properties is used in the determination of the discount rate for mineral resource and mineral reserve estimation and valuation studies. “Country risk” estimates are published annually by various consulting groups such as Behre Dolbear & Company.

From a Market Approach perspective, another respondent wrote: Information about political and other country risks, such as expropriation and civil risk, is available from a number of publications. For the Market Approach, sales comparison adjustments of mineral property values for country risk from high risk countries such as Venezuela, Sudan, and Zimbabwe, to low risk countries such as Botswana, Chile, and Finland, can be a number of multiples of value. The appropriate scale of country risk adjustment can only be obtained through observation and analysis of transactions. Double counting of factors incorporated in country risk must be carefully avoided in other adjustment factors.



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