Ernst & Young response to IVSC Extractive Industries Discussion Paper

Thank you for the opportunity to comment on the Discussion Paper relating to the “Valuations in the Extractive Industries.” This response is on behalf of global Ernst & Young organisation which as well as providing accounting, audit and tax services, includes professionals who provide valuations of businesses, property, plant & equipment, financial instruments and intangible assets.

Ernst & Young is supportive of the IVS aim to identify concepts and principles that are applicable to all types of valuation in order to improve consistency, transparency and therefore confidence in the valuation process. As requested our attached responses address each specific question within the paper.

Should you have any questions please contact me on +1 404 817 5474.

Yours faithfully,

Robert J. Stall
Principal – Americas Director
Capital Equipment Valuation
Valuation and Business Modelling

Attachment
Copy to: [Name]
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Ernst & Young Mining response to IVSC

1 PROJECT SCOPE

1.1 Extractive Industries.

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.

Separate pronouncements for mining and oil and gas as the two are different industries with different methodologies for valuing the tangible and identified intangible assets.

1.2 Assets to be included

Question 1.2:
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.

We believe the project should focus on reserves/resources and other assets employed in the sector. Depending on the nature of the “other assets” their values can be substantial. Furthermore the project focus should be broad enough to cover the specific assets and/or projects to be valued. If too narrow, ie, including only reserves and resources it may not be clear if exploration assets (without an identified resource) or inventory which is beyond resources is also included. The project focus should also be sufficiently narrow to exclude comment on assets and liabilities which are not unique to the extractive industries.

The value of the “other assets” is often required for both financial reporting and tax purposes. We often see practitioners using questionable methods (i.e., cost approach using historical records that either reflect prior purchase accounting adjustments or are grossly inaccurate) to value these types of assets. Clearer guidance regarding the use of appropriate valuation methods and assumptions would provide more clarity to valuation practitioners.

a) 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?

A business valuation can be the starting point for valuing assets as part of financial reporting and tax valuation services, however, it is not always necessary depending on the purpose of the valuation and the premise of value.
1.3 Output required from IVSC:

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.

We generally believe that it is useful for the Board to issue standards, pronouncements, and guidance that relate to valuing entities and their underlying assets that operate in extractive industries. However, we believe that the standards and guidance should be broad enough to allow the practitioner latitude to make judgmental decisions based on the actual facts and circumstance associated with a particular entity, its reserves/resources, or "other assets".

2 GN14

2.1 Former GN14

Question 2:

a) Are you familiar with the former GN14?

Our experience is that GN14 is only relevant for hard rock extractive.

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

No explicit reference, but in nature the guidance is observed.

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

Elements found useful:

- Definitions of reserves and resources (3.5-3.6)
- Classification of projects by development stage and relevant definitions (5.1.9.-5.1.13)
- Statement on reconciliation between sum of the parts and business valuations (5.3.4)
3 Reserves and Resources

3.1 Mineral Classification Codes.

Question 3:

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

Classification codes vary by geography. For example, the classification between reserves and resources, probable and inferred as outlined below:
A portion of our global practice use the CRIRSCO mineral reserve and resources code as it has been integrated into the CIMVal, JORC, SAMREC codes as defined in the following graphic:

Within the Australasian mining and metals sector they give reference to the code for the Technical Assessment and Valuation of Mineral and Petroleum Assets and Securities for Independent Expert Reports (“The VALMIN Code”). The Valmin Code has been prepared by the VALMIN Committee, a joint committee of The Australasian Institute of Mining and Metallurgy (The AusIMM), the Australian Institute of Geoscientists (AIG) and the Mineral Industry Consultants Association (MICA), with the participation of the Australian Securities and Investment Commission (ASIC), the Australian Stock Exchange Limited (ASX), the Minerals Council of Australia (MCA), the Petroleum Exploration Society of Australia (PESA), the Securities Institute of Australia (SIA) and representatives from the Australian finance sector.

Within the Valmin Code, Mineral Resources and Ore Reserves are defined in the current version of the Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves (“JORC Code”).

The differences across the industry/geography could cause issues, especially depending on the purpose of the valuation. The guidance should clearly instruct the valuer to be familiar with the various asset classifications prior to performing a valuation in the extractive minerals sector. (competence disclosure).

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

See responses above.

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.

A uniform classification across the industry would be beneficial in determining the risk and value of the asset. However, in the absence of this global standard (likely not to happen due to local tax and regulatory issues) it would be beneficial to have a comprehensive comparison grid with full explanations of the cut offs for each classification in each set of codes.
4 Valuation Methods General

Question 4:

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

- Producing reserves
- Reserves undergoing development
- Reserves or resources subject to exploration

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.

The valuation methods we commonly use are summarized below:

- Producing reserves: DCF method under the income approach. This method is also applied to producing resources subject to a resource/reserve conversion factor;
- Reserves undergoing development: DCF method under the income approach provided availability of detailed life of mine forecasts and sufficient confidence in achieving milestones to production; and
- Reserves or resources subject to exploration: Resource multiples (i.e. EV/Resources or reserves or EV/contained metal) under the Market approach.

Market approach is generally preferred if limited forecast information is available and reflects general market participants’ view on the market value of the assets.

EY generally uses the income approach where there is sufficient information available to estimate future cash flows generated by a commodity related investment.

Our framework relies on the Discounted Cash Flow ("DCF") method to adjust cash flow for risk and timing and the cash flows represent the project specific factors such as grade, location, access to infrastructure, etc.

We use two types of DCF models the first follows a standard DCF adjustment where net cash flow is adjusted for risk and time through a discounting process that relies on an aggregate discount rate. In certain instances, based on the facts and circumstances, a Certainty Equivalent ("CeQ DCF") approach is applied, where a risk-adjusted net cash flow is calculated by applying a targeted risk adjustment to particular cash flow component (e.g. a pure copper risk adjustment applied to a copper based revenue stream). This risk-adjusted net cash flow is then adjusted for the time value of money and possibly a residual risk adjustment for uncertainties not explicitly accounted in the cash flow model. Note that the CeQ DCF approach is also used to value financial derivatives and has its own terminology (e.g. risk neutral valuation) in this context. We may then augment our cash flow model by modelling metal price and other uncertainties with a numerical technique (e.g. lattice techniques or simulation) to correct for biases created in a cash flow estimate by contingent cash flow structures the result of risk management, management flexibility, financing and taxation considerations.

We note that the CeQ DCF approach was not discussed in the Exposure Draft of the IVSC Technical Information Paper titled “The Discounted Cash Flow (DCF) Method – Real Property and Business Valuations” even though this method is a recognized DCF method for fair value estimates under accounting guidelines and well supported in valuation and finance theory literature. CeQ DCF is one of the approaches described in IFRS 13. We would highlight that the structure of the CeQ DCF approach is comparable to derivative valuation methods used to value many financial assets and is used for select types of real assets such as natural resource projects.

EY generally uses a cost and/or a market approach for early-stage exploration properties and for later stage development projects and operating properties.
EY generally uses a cost approach for very early-stage exploration properties when there is little information on property geology beyond an indication that a minerals occurrence exists. We have found that all of these methods provide valuation results that are supportable when applied with professionalism and discipline. We generally do not use a particular method in isolation and generally confirm the results from one approach with the results from a second approach.

5 Valuation Methods Market Approach

Question 5:

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

Typically with business enterprise level valuations, water rights and air rights, inactive/idled reserves, if appropriate.

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

Please see below 5 adjustments that are commonly considered and made to the market approach when data is available.

   i. Quality (e.g., coal—sulfur and ash content; low, mid or high volatility grade; BTU content, etc.)
   ii. timing (expected production run rate)
   iii. region/location transportation differentials if valuing FOB mine or seaborne
   iv. extractive method (deep mine vs. surface mine vs. long-wall, etc.); and
   v. grade of mineral/type

6 Valuation Methods Discounted Cash Flow

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?

Primarily rely on internal production forecasts developed by the entity’s geological and engineering specialists. In cases where data is not available from management reliance has been placed on expectations of external forecasts and commercial diligence analyses.

EY may use the internal production forecast of an entity, external forecasts or a combination of both. Our valuation reports note the source of the production forecasts so that report readers are aware of the basis for the production forecast.

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

We work with our clients to understand the characteristics of the subject reserves and whether the production forecast are inclusive of volumetric risk adjustments which helps us understand the risks in the underlying cashflows for our valuation analysis.

Depending on the circumstances, production forecasts may be adjusted using a probability weight based on the amount of information attached to a particular resource and the conversion factor appropriate for the classification of the resource.

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?

EY generally uses an explicit long-term cash flow forecast but the “remainder period” approach may be utilized depending on facts and circumstances. Depending on the circumstances, “remainder period” cash flows during that period may not be specifically disclosed in our reports.

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?

EY uses a combination of sources to estimate forecast future commodities prices including management forecasts, spot prices, consensus forecasts from investment banks and forecasts derived from forward curves as the circumstances dictate. The choice of forecast reflects suitable analysis of the context and available data combined with professional valuation judgment to obtain what is considered the best forecast in the circumstances.

EY recognizes that in appropriate circumstances a commodity price forecast may be derived from its forward price curve. Ultimately, we consider the facts and circumstances of the valuation problem before deciding on the information that will be used to support a price forecast.

The value impact of a hedging program may be considered if there is a program in place. Further, cash flow models may be adjusted to reflect the value impact of commodity derivatives that may be embedded in project financing or risk management programs. One of the considerations in that regard is the purpose of the valuation and whether there is a need to separate the value of the mineral interest and the value of the hedge position.

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

We rely on management and/or third party technical specialists for any differentials to the benchmark price to account for commodity quality, impurities, etc.

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

We have utilized both approaches to account for currency exchange risks: Currency exchange risks may be recognized in the discount rate if a conventional DCF model is used. In the cases where the facts and circumstances have led to the use of a CeQ DCF model, the currency exchange rate risks can be captured through either the currency forward curve or consensus forecasts.

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?

Selling costs and G&A associated with the particular reserves and resources are recognized when valuing a particular mining property. Corporate overheads may or may not be recognized depending on
the purpose for which the valuation is prepared (valuation of mining properties as opposed to valuation of corporate shares) and the facts and circumstances that guide market participant views.

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

The Discounted Cash Flow Method ("DCF") is typically used almost exclusively (where possible) to value probable reserves.
We have seen a combination of methods to value possible reserves which include a DCF, option pricing method and market approach.

**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?**

EY use a Weighted Average Cost of Capital to determine an appropriate discount rate for a project and may also use a project specific discount rate when building a conventional DCF model. The discount rate is estimated within a Capital Asset Pricing Model ("CAPM") framework.
As market value is based on market participant approaches and views, where market participants have generally adopted particular discount rates for given types of mining properties, EY considers those rates or may use those rates as a "base rate" and adjust for particular risks of other characteristics.

A CeQ DCF approach does not make use of an aggregate discount rate though an implied aggregate discount rate can be derived. The CeQ approach uses targeted risk-adjustments for select cash flow components. These adjustments are done within the CAPM framework. Market related uncertainties such as metal and energy prices may be risk-adjusted with the CAPM while project-specific uncertainties may be modelled directly with no risk-adjustment. A residual risk adjustment may be necessary to adjust previously risk-adjusted cash flows for risk not explicitly recognized in the model before a final adjustment for the time value of money.

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

Risk adjustments and discount rates are selected considering both systemic risk and asset specific risk. Systemic risk is reflected through CAPM ‘beta’ analysis and the Equity Risk Premium estimate. Asset specific risk adjustments are chosen after considering publicly available information or the professional judgement of specialists.
Systematic risk in metal price is often a significant and separate consideration.

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.**

Time value of money – Risk-free government bond yields.
Systemic risk premium for equity or commodities – CAPM framework, computed Betas or market Betas from market information service, econometric analysis of market data such as historic spot prices or forward curves for the analysis of commodity price risk.
Debt yields – Corporate bond yields based on proxy credit rating
Size premium – Morningstar
Country risk premia – analyst reports on relative country risk, relative government bond yields, review of political risk insurance data, political risk commentaries, market participant views.
Investment or project specific – adjustment for project stage or type of investment that is based on specialist opinion and market information.
Residual risk (CeQ DCF approach) – a discount rate adjustment for uncertainties and risks not explicitly reflected in the CeQ model.

Technical and development risk – consideration of discounts applied by analysts in relation to comparable projects, engineering reports that identify the complexity of the mineral processing and mining processes.

Capital cost risk – consideration of contingency factors included in cost estimates, cost over-run experience in comparable projects, and the relation of capital cost to project value.

Permitting risk – review of regulatory regime and project progress; consideration of approval experience of other projects; and consideration of jurisdiction and property specific community relations, aboriginal relations and “social license to operate” information.

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

In certain circumstances the use of multiple discount rates may be used in the valuation. For example, higher discount rates may be applied to reflect uncertainties not related to time (such as applying higher discount rates to more geologically uncertain resources). We note that a by-product of using the CeQ DCF method is that effective aggregate discount rate implied by this analysis can change with the variation of cash flow uncertainty as a result of a changes in operating leverage and other project characteristics.

7 Valuation Methods Cost Approach

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.

There are two methods that we typically employ under the Cost Approach when valuing assets, specifically tangible assets: (1) the indirect (or trending) method and (2) the direct (or detail) method. Under the indirect method of the Cost Approach, inflationary indices are applied to historical costs to estimate a current reproduction cost new. Under the direct method of the Cost Approach, current reproduction or replacement costs new are estimated through direct quotations from vendors, engineering estimates, current authorizations for expenditures (AFE) or capital budgets, etc. From this point, there is no difference in the application of appraisal depreciation (physical, functional and economic).

We also recognize that both of these methods have limitations in certain situations. However, we primarily rely on a direct method whenever feasible. Limitations of the indirect method include the following:

► Inflationary indices are not always indicative of true price fluctuations, especially when attempting to apply to costs in international locations.
► Indices are generally based on average values, and specific assets within a category might show different price movement.
► Care should be taken when applying trend indices to assets older than 15 years, as indices do not typically reflect technological advances, and trended reproduction costs new should be compared with results from other methods.
► Indices should only be applied to true historical costs. Any costs that have been adjusted for purchase accounting, or other accounting adjustments, or assets that were purchased new, should not be trended.
► Care should be taken to understand what is included in the costs that are being trended to ensure that there are no extraordinary costs that are being included.

Limitations of the indirect method include the following:

► Not always feasible and can be time consuming and not cost efficient.
Estimated costs do not typically include all costs associated with an asset, such as freight, installation, engineering, etc.

Costs for most of these types of assets are very project specific.

Difficult to replicate the engineering and produce and accurate estimate.

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

See response to 7(a). Our preferred reliance would be on a direct method, relying on recent invoices, AFEs or capital budgets, engineering studies, or direct vendor quotes.

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.

Physical deterioration: We apply physical deterioration based on “Iowa”-type survivor curves. These deterioration rates have been derived to measure the economic utility of an asset in relation to its economic life, and consider allowances to accruing costs of routine maintenance and general upkeep of the assets. The Iowa curve method is based on studies and research conducted by Iowa State University. This method uses an age-life concept which measures the physical loss in value attributed to a reduction in the quality of a given type of asset remaining in service or use over a given period of time. The period of time is measured from the point at which the unit is first placed into use until it is removed from service. In addition, as a consequence of wear and tear, an asset is increasingly more costly to operate over time, and accruing maintenance costs result in a decrease in the overall utility of a given asset. This decreased utility is quantified through a service factor adjustment. The service factor represents the estimated percentage of original utility remaining at the end of an asset’s life.

Functional obsolescence (FO): We measure FO in many different ways, and usually rely on discussions with Company or site inspections to determine if there is any functional obsolescence. However, there are 2 types of FO that we consistently see: (1) excess capital cost and (2) excess operating costs. Excess capital costs are typically measured based on the difference between replacement cost new and reproduction cost new, where the replacement cost new for an asset would cost less than the reproduction cost new for that same asset. Excess operating costs typically occur when an asset has an operating cost that is in excess, when compared to benchmark studies or other producing assets, and that excess cost is not rectified, or planned to be rectified.

Economic obsolescence (EO): We measure EO in several different ways as well, and usually rely on either an application of an inutility penalty, results from the Market Approach, or the value of the business (or operating unit) as a whole to determine the magnitude of EO.

8 Treatment of Contributing or Complementary Assets

Question 8:

a) How should the unit of valuation (unit of account) be determined in the valuation of extractive activities?

The unit of account is typically determined by the client with input from the audit firm. The unit of account may be very different for tax purposes vis-à-vis financial reporting. The nature of the valuation should dictate the unit of account.

b) How is double counting of the contribution of different assets avoided? Typically a life of mine model is utilized and all contributing assets at fair value/fair market value are back out of
the aggregate cash flows generated by the life of mine model at time period 0.

To avoid double counting the contributions of contributing assets, one must remove their effects from an income statement when estimating a stand-alone contributory asset charge. This can include the elimination of i) a royalty expense, ii) depreciation, iii) capital expenditures, iv) R&D expense, etc. Doing so will ensure that inclusion of a stand-alone contributory asset charge will not produce a double counting for the use of a contributory asset.

c) How should economic obsolescence or impairment, if present, be allocated extractive activities?

Generally, economic obsolescence in an extractive industry relates to the reserve/resource, not the tangible equipment or financial assets necessary to facilitate the production of the reserve/resource. In that regard, the adjustment for economic obsolescence to a reserve/resource body is implicitly embodied in the valuation of this asset class to the point where its value approaches an economic limit (i.e., the present value of the cash flows is zero). However, as reserve/resource approaches its economic limit the value of its contributing tangible assets will begin to fall in value as well. At that point, adjustments for economic obsolescence would then be applied to the tangible supporting assets. However, the value of the tangible assets would not be taken below i) their alternative use value, or ii) their liquidation value.

The specific facts and circumstances of each valuation may lead to different conclusions, however, it is typically applied to the mining/oil and gas assets first and then to the property plant and equipment.

d) How should economic obsolescence or impairment, if present, be allocated proportionally to all contributory assets of the mineral asset?

This is a facts and circumstances question and therefore the approach may differ from one situation to another depending on the purpose and premise of value. Generally, one must first determine whether or not economic obsolescence should be fact applied to the contributing assets. We would generally assume that the reserves/resource bear the brunt of the economic obsolescence adjustment. In a worst case scenario, the value of the reserve/resource body would be zero. At that point the contributing assets may have no operational value and one must determine their i) alternative use value, or ii) liquidation value.

e) What methods do you use or are familiar with to attribute value to specific contributory assets?

The choice of valuation method is dependent upon the type of asset. For financial assets, Income or Market approaches are used. For tangible assets, the Cost and Market approaches are used. For intangible assets, the Income Approach is used most often, with the Cost Approach occasionally being used (ex., software, assembled workforce, etc.)

f) Are entity specific inputs appropriate when valuing contributory assets in extractive activities? What checks can be made on the reasonableness of entity specific inputs?

For the most part, we would agree that the use of entity specific inputs are appropriate when valuing contributor assets. An exception would be when valuing this asset class for financial reporting and the guidance precludes the use of entity specific inputs that could not be realized by other "market participants".
Checks would include comparison with historical operating or performance metrics (e.g. Resource to reserve conversion ratio, quality discounts, metal recovery rates, cost of exploration, operating costs, capital expenditure per unit of production), validation in the marketplace, 3rd party research, etc. Benchmarking can be used to cross check some inputs.

g) **Should components of goodwill other than value of assembled workforce be recognised?**

Generally, we see no advantage to recognizing the other components of goodwill. Those components can include i.) immediate use of the assets, and ii.) in place policy and procedures. While these components of goodwill clearly are valuable, they are difficult to value individually. Goodwill is usually valued indirectly through the use of a residual method (i.e., enterprise value less working capital less value of tangible assets less value of identifiable intangible assets).

Recognition of other elements of goodwill may assist management in impairment testing and post-acquisition integration. Service contracts with the acquirer can be recognized.

### 9 Asset retirement obligations

**Question 9:**

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

We do not. As valuation professionals, we rely on valuation estimates that are provided by our clients. These estimates are either generated internally or by a 3rd party environmental engineering consultant.

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.**

We will assist in estimating the appropriate discount rate (as prescribed by the accounting or tax regulations) to apply to the future cost estimates to arrive at the present value of the asset retirement obligation.

### 10 Reliance on specialists

**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?**

Where we undertake investigations to corroborate volumetric estimates that are provided to us we would typically discuss forecasts with management, interview 3rd party specialists to discuss the assumptions used to prepare the estimates, and conduct benchmarking and numerical analysis. We would not, however, alter the estimate as a result of this work.

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?**
Yes. We would typically review historical costs and ensure these are in line with the future estimates. If the mine is new, we might compare the mining complex with other mines that the company owns. Lastly, we could benchmark the estimated costs vs. that of other companies.

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?

Often, we review the valuations prepared by 3rd party specialist on behalf of our audit client. As such, we receive a wide range of evidence regarding reserve volumes and the cost of their recovery. Approximately 50.0% of the time the source of this support is a report prepared by an external engineer. The remaining 50.0% of the time this support is prepared by our client’s internal engineering group. Generally, we are satisfied that evidence provided by both of these sources reasonably reflects the extent of the reserves and the cost of their recover.

d) 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?

Disclosures on the assumptions supporting mineable inventory (discussion of previous exploration success achieved in the area, additional exploration required, inclusion of previously uneconomic areas or exploration potential), technical assumptions based on the type of resources mined; rationale for Contingencies, Infrastructure access and timings risks, assumptions related to use of plant (useful life, maintenance requirements, site visit details).

11 Intangibles and Goodwill

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

Permits, mining leases, favorable or unfavorable contracts, water rights, air rights, port entitlements and workforce.

b) 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.

Depending on the region, there may be significant value to workforce in a transaction. Goodwill is typically identified as the residual of the purchase price from the acquired assets and liabilities assumed.

c) When considering the valuation of previously uneconomic reserves that can now be recovered using advanced technology, eg 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.

We have not encountered this in the mining industry.
12 Government regulation

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.

Governmental policies related to the tax regimes and the requirement to process materials to certain levels of finished/WIP status within the country before export can have a significant impact on the profitability of the mining operation in any given country. There are a number of local country nationalism issues that need to be assessed by a mining company as they enter or expand in certain countries Ernst & Young annually publishes a Top Ten Mining risks paper that is available on our web site at EY.Com.

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

Country risk factors are typically included in the WACC for the business and are eventually a component in the discount rate for the extractive assets. Also, an after-tax local cost of debt is incorporated into the derivation of the international WACC. Care has to be exercised so as to not double count risk in cash flows and again in discount rate.
Ernst & Young Oil and Gas response to IVSC

1 PROJECT SCOPE

1.1 Extractive Industries

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Question 1.2:

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We believe the project should focus on reserves/resources and other assets employed in the sector. Depending on the nature of the “other assets” their values can be substantial.

Furthermore the project focus should be broad enough to cover the specific assets and/or projects to be valued. If too narrow, ie, including only reserves and resources it may not be clear if exploration assets (without an identified resource) or inventory which is beyond resources is also included. The project focus should also be sufficiently narrow to exclude comment on assets and liabilities which are not unique to the extractive industries.

The value of the “other assets” is often required for both financial reporting and tax purposes. We often see practitioners using questionable methods (i.e., cost approach using historical records that either reflect prior purchase accounting adjustments or are grossly inaccurate) to value these types of assets. Clearer guidance regarding the use of appropriate valuation methods and assumptions would provide more clarity to valuation practitioners.

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?

We seldom use the business value (or enterprise value) as a starting point for the valuation of reserves and resources. The value of the business is determined, to a large degree, based on the forward forecast relating to extractive operations. So, we use valuation methods and techniques to value the reserves/resources directly. Quite often the value of the reserves/resources approximates the value of the enterprise, particularly if both proven and non-proven reserve classes are being valued. Only for the larger enterprises that have some element of goodwill/going concern value (i.e., large engineering staff, proven track record of exploration and development success, significant prospects, insightful technology and knowhow, etc.) would we expect the enterprise value and the value of the reserves to be different.

A business valuation can be the starting point for valuing assets as part of financial reporting and tax valuation services, however, it is not always necessary depending on the purpose of the valuation and the premise of value.

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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.

We generally believe that it is useful for the Board to issue standards, pronouncements, and guidance that relate to valuing entities and their underlying assets that operate in extractive industries. However, we believe that the standards and guidance should be broad enough to allow the practitioner latitude to make judgmental decisions based on the actual facts and circumstance associated with a particular entity, its reserves/resources, or “other assets”.

2 GN14
2.1 Former GN14

Question 2:

a) Are you familiar with the former GN14?

Our experience is that GN14 is only relevant for hard rock extractive.

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

No.

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

At this time, nothing we have seen in GN 14 would be useful in reporting or interpreting valuations.

3 Reserves and Resources
3.1 Mineral Classification Codes.

Question 3:

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

Completed in 2007, the Society of Petroleum Engineer’s Petroleum Resource Management System (PEPRMS) provides updated definitions and the related classification system for petroleum reserves and resources that reflect advances in technology, the international expansion and the increasing role of unconventional resources in the industry. These classification codes are used by valuation practitioners involved in oil and gas industry.

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

The reserve classification codes we encounter/use include the following:

- **Discovered**
  - Reserves
    - Proven
    - Probable
    - Possible
  - Contingent Resources
- **Undiscovered**

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.
Generally, we are unaware of differences in reserve classification across the oil and gas industry.

4 Valuation Methods General

Question 4:

a) Please identify the valuation methods that you most commonly use or encounter for valuing:
   • Producing reserves
   • Reserves undergoing development
   • Reserves or resources subject to exploration

   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.

For producing reserves and reserves undergoing development, the most common valuation methodology we use and encounter in practice is a form of the Income Approach, the discounted cash flow (DCF) method. We also use a Market Approach which is based on using valuation metrics derived from transactions for similar assets. For reserves or resources subject to exploration, we use and encounter several valuation methodologies, including the DCF method, two forms of the Market Approach, and the Cost Approach.

As a valuation provider, we believe that a DCF method is generally the most appropriate method to value producing reserves and reserves under development in most circumstances. The application of a DCF method allows the valuation consultant to utilize inputs and assumptions that are specific to the asset being valued, such as a resource production forecast, net realized price forecast, operating expenses, development expenses, tax regimes, etc.

We believe that the use of a Market Approach based on transactions for similar assets is appropriate as a valuation indication in situations when sufficient information is available about the nature of the transaction. For proven reserves, the valuation metrics obtained from the market transaction data include i.) $/BOE¹, and ii.) $/BOE of daily production. For unproved reserves, the valuation metrics obtained from market transaction data include i.) $/acre, and ii.) $/BOE of unproved reserves. However, our experience suggests that it is challenging to rely solely on a value indication using the Market Approach due to insufficient transaction visibility and information.

With regard to exploration assets the issue with adopting an Expected Monetary Value (“EMV”) approach is that there is a tendency to overvalue the asset compared to what a willing buyer would be prepared to pay. This is reflected in the fact that E&P Independents with a substantial portfolio of exploration assets typically trade at a discount to Net Asset Value. In general, performing a valuation of exploration assets is challenging and the best indicator of value would be a recent transaction, typically a farm-in, of the asset or a similar nearby asset assuming the information is available in the public domain.

5 Valuation Methods Market Approach

Question 5:

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

As indicated previously, we believe that the use of a Market Approach based on transactions for similar assets is appropriate as a valuation indication in situations when sufficient information is available. However, our experience suggests that it is often challenging to observe sufficient reliable information regarding a particular transaction, and to rely solely on a value indication using the Market Approach.

¹ BOE = barrel oil equivalent
The Market Approach, specifically the similar transactions method, can be utilized in the valuation of oil and gas reserves in certain circumstances. Note, the Market Approach is generally considered as a corroborative measure relative to the valuation results derived under an Income Approach.

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

The application of the similar transactions method involves consideration of location (e.g., play, basin, etc.), classification of oil and gas reserves (e.g., offshore vs. onshore, conventional vs. unconventional, developed vs. undeveloped, etc.), and transaction timing (i.e., transaction data that is near or under similar economic / industry conditions as the valuation date).

These factors are generally considered when comparing asset attributes from similar transactions to the same assets to be valued pursuant to the Income Approach. Given the Market Approach is typically utilized as a corroborative measure; direct adjustments to the similar transaction data are not generally made.

6 Valuation Methods Discounted Cash Flow

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?

Primarily rely on internal production forecasts developed by the entity’s geological and engineering specialists. In cases where data is not available from management reliance has been placed on expectations of external forecasts and commercial diligence analyses.

EY may use the internal production forecast of an entity, external forecasts or a combination of both. Our valuation reports note the source of the production forecasts so that report readers are aware of the basis for the production forecast.

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

We work with our clients to understand the characteristics of the subject reserves and whether the production forecast are inclusive of volumetric risk adjustments which helps us understand the risks in the underlying cashflows for our valuation analysis.

Depending on the circumstances, production forecasts may be adjusted using a probability weight based on the amount of information attached to a particular resource and the conversion factor appropriate for the classification of the resource.

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?

EY generally uses an explicit long-term cash flow forecast but the “remainder period” approach may be utilized depending on facts and circumstances. Depending on the circumstances, “remainder period” cash flows during that period may not be specifically disclosed in our reports.

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?

Depending on the purpose of the valuation engagement (e.g., IFRS or US GAAP, or income tax purposes), we will utilize our client’s internal price estimates or external, observable price forecasts, such as NYMEX, Sproule, McDaniel, EIA, brokers and other industry sources. We typically apply an annual inflation factor to derive price forecasts for the period beyond the discrete forecast period.

The value impact of a hedging program may be considered if there is a program in place. Further, cash flow models may be adjusted to reflect the value impact of commodity derivatives that may be embedded in project financing or risk management programs. One of the considerations in that regard is the purpose of the valuation and whether there is a need to separate the value of the mineral interest and the value of the hedge position.

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

Yes, we apply price differentials to account for transportation, commodity quality, and other factors to calculate a net realized price. We develop these differentials, often jointly with our clients, by comparing historical realized prices to the marker commodity price in place. These differentials are often expressed as a percentage of the marker commodity price. The typical benchmark crudes include West Texas Intermediate, Brent, etc. The most common benchmark price indicators for natural gas include Henry Hub/NYMEX and National Balancing Point (“NBP”) futures.

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

We have utilized both approaches to account for currency exchange risks:

Currency exchange risks may be recognized in the discount rate if a conventional DCF model is used. In the cases where the facts and circumstances have led to the use of a CeQ DCF model, the currency exchange rate risks can be captured through either the currency forward curve or consensus forecasts.

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?

Typically, we consider only the field level expenses associated with producing and operating the reserves in arriving at their value. Corporate overhead is often treated as a stand-alone liability in arriving at the value of an enterprise that is in the business of exploring and producing oil and gas reserves.

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

We utilize the DCF method to value probable and possible reserves whenever possible. Typically our valuation analysis is based on proven and probable reserves which typically represent the best basis to establish market value.

However, our clients often do not produce forward forecasts for the development of possible reserves which makes the use of the DCF method moot.

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?

EY use a Weighted Average Cost of Capital to determine an appropriate discount rate for a project and may also use a project specific discount rate when building a conventional DCF model. The discount rate is estimated within a Capital Asset Pricing Model ("CAPM") framework.

As market value is based on market participant approaches and views, where market participants have generally adopted particular discount rates for given types of oil and gas properties, EY considers those rates or may use those rates as a “base rate” and adjust for particular risks of other characteristics.

A CeQ DCF approach does not make use of an aggregate discount rate though an implied aggregate discount rate can be derived. The CeQ approach uses targeted risk-adjustments for select cash flow components. These adjustments are done within the CAPM framework. Market related uncertainties such as metal and energy prices may be risk-adjusted with the CAPM while project-specific uncertainties may be modelled directly with no risk-adjustment. A residual risk adjustment may be necessary to adjust previously risk-adjusted cash flows for risk not explicitly recognized in the model before a final adjustment for the time value of money.

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

Risk adjustments and discount rates are selected considering both systemic risk and asset specific risk. Systemic risk is reflected through CAPM ‘beta’ analysis and the Equity Risk Premium estimate. Asset specific risk adjustments are chosen after considering publicly available information or the professional judgement of specialists.

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.

Time value of money – Risk-free government bond yields.

Systemic risk premium for equity or commodities – CAPM framework, computed Betas or market Betas from market information service, econometric analysis of market data such as historic spot prices or forward curves for the analysis of commodity price risk.

Debt yields – Corporate bond yields based on proxy credit rating

Size premium – Morningstar

Country risk premia – analyst reports on relative country risk, relative government bond yields, review of political risk insurance data, political risk commentaries, market participant views.

Investment or project specific – adjustment for project stage or type of investment that is based on specialist opinion and market information.

Residual risk (CeQ DCF approach) – a discount rate adjustment for uncertainties and risks not explicitly reflected in the CeQ model.

Technical and development risk – consideration of discounts applied by analysts in relation to comparable projects, engineering reports that identify the complexity of processing.

Capital cost risk – consideration of contingency factors included in cost estimates, cost over-run experience in comparable projects, and the relation of capital cost to project value.

d) Do you use multiple discount rates to reflect the changing risk profile as an extractive process moves through its life cycle?
In certain circumstances the use of multiple discount rates may be used in the valuation. For example, higher discount rates may be applied to reflect uncertainties not related to time (such as applying higher discount rates to more geologically uncertain resources). We note that a by-product of using the CeQ DCF method is that effective aggregate discount rate implied by this analysis can change with the variation of cash flow uncertainty as a result of a changes in operating leverage and other project characteristics.

7 Valuation Methods Cost Approach

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.

There are two methods that we typically employ under the Cost Approach when valuing assets, specifically tangible assets: (1) the indirect (or trending) method and (2) the direct (or detail) method. Under the indirect method of the Cost Approach, inflationary indices are applied to historical costs to estimate a current reproduction cost new. Under the direct method of the Cost Approach, current reproduction or replacement costs new are estimated through direct quotations from vendors, engineering estimates, current authorizations for expenditures (AFE) or capital budgets, etc. From this point, there is no difference in the application of appraisal depreciation (physical, functional and economic).

We also recognize that both of these methods have limitations in certain situations. However, we primarily rely on a direct method whenever feasible. Limitations of the indirect method include the following:

- Inflationary indices are not always indicative of true price fluctuations, especially when attempting to apply to costs in international locations.
- Indices are generally based on average values, and specific assets within a category might show different price movement.
- Care should be taken when applying trend indices to assets older than 15 years, as indices do not typically reflect technological advances, and trended reproduction costs new should be compared with results from other methods.
- Indices should only be applied to true historical costs. Any costs that have been adjusted for purchase accounting, or other accounting adjustments, or assets that were purchased new, should not be trended.
- Care should be taken to understand what is included in the costs that are being trended to ensure that there are no extraordinary costs that are being included.

Limitations of the indirect method include the following:

- Not always feasible and can be time consuming and not cost efficient
- Estimated costs do not typically include all costs associated with an asset, such as freight, installation, engineering, etc.
- Costs for most of these types of assets are very project specific.
- Difficult to replicate the engineering and produce and accurate estimate.

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.
See response to 7(a). Our preferred reliance would be on a direct method, relying on recent invoices, AFEs or capital budgets, engineering studies, or direct vendor quotes.

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.

**Physical deterioration**: We apply physical deterioration based on “Iowa”-type survivor curves. These deterioration rates have been derived to measure the economic utility of an asset in relation to its economic life, and consider allowances to accruing costs of routine maintenance and general upkeep of the assets. The Iowa curve method is based on studies and research conducted by Iowa State University. This method uses an age-life concept which measures the physical loss in value attributed to a reduction in the quality of a given type of asset remaining in service or use over a given period of time. The period of time is measured from the point at which the unit is first placed into use until it is removed from service. In addition, as a consequence of wear and tear, an asset is increasingly more costly to operate over time, and accruing maintenance costs result in a decrease in the overall utility of a given asset. This decreased utility is quantified through a service factor adjustment. The service factor represents the estimated percentage of original utility remaining at the end of an asset's life.

**Functional obsolescence (FO)**: We measure FO in many different ways, and usually rely on discussions with Company or site inspections to determine if there is any functional obsolescence. However, there are 2 types of FO that we consistently see: (1) excess capital cost and (2) excess operating costs. Excess capital costs are typically measured based on the difference between replacement cost new and reproduction cost new, where the replacement cost new for an asset would cost less than the reproduction cost new for that same asset. Excess operating costs typically occur when an asset has an operating cost that is in excess, when compared to benchmark studies or other producing assets, and that excess cost is not rectified, or planned to be rectified.

**Economic obsolescence (EO)**: We measure EO is several different ways as well, and usually rely on either an application of an inutility penalty, results from the Market Approach, or the value of the business (or operating unit) as a whole to determine the magnitude of EO.

### 8 Treatment of Contributing or Complementary Assets

**Question 8:**

a) **How should the unit of valuation (unit of account) be determined in the valuation of extractive activities?**

   *The unit of account is typically determined by the client with input from the audit firm.* The unit of account may be very different for tax purposes vis-à-vis financial reporting. The nature of the valuation should dictate the unit of account.

b) **How is double counting of the contribution of different assets avoided?**

To avoid double counting the contributions of contributing assets, one must remove their effects from an income statement when estimating a stand-alone contributory asset charge. This can include the elimination of i.) a royalty expense, ii.) depreciation, iii.) capital expenditures, iv.) R&D expense, etc. Doing so will ensure that inclusion of a stand-alone contributory asset charge will not produce a double counting for the use of a contributory asset.

c) **How should economic obsolescence or impairment, if present, be allocated extractive activities?**
Generally, economic obsolescence in an extractive industry relates to the reserve/resource, not the tangible equipment or financial assets necessary to facilitate the production of the reserve/resource. In that regard, the adjustment for economic obsolescence to a reserve/resource body is implicitly embodied in the valuation of this asset class to the point where its value approaches an economic limit (i.e., the present value of the cash flows is zero). However, as reserve/resource approaches its economic limit the value of its contributing tangible assets will begin to fall in value as well. At that point, adjustments for economic obsolescence would then be applied to the tangible supporting assets. However, the value of the tangible assets would not be taken below i.) their alternative use value, or ii.) their liquidation value.

The specific facts and circumstances of each valuation may lead to different conclusions, however, it is typically applied to the mining/oil and gas assets first and then to the property plant and equipment.

d) How should economic obsolescence or impairment, if present, be allocated proportionally to all contributory assets of the mineral asset?

This is a facts and circumstances question and therefore the approach may differ from one situation to another depending on the purpose and premise of value.

Generally, one must determine whether or not economic obsolescence should in fact be applied to the contributing assets. We would generally assume that the reserves/resource bear the brunt of the economic obsolescence adjustment. In a worst case scenario, the value of the reserve/resource body would be zero. At that point the contributing assets may have no operational value and one must determine their i.) alternative use value, or ii.) liquidation value.

e) What methods do you use or are familiar with to attribute value to specific contributory assets?

The choice of valuation method is dependent upon the type of asset. For financial assets, Income or Market approaches are used. For tangible assets, the Cost and Market approaches are used. For intangible assets, the Income Approach is used most often, with the Cost Approach occasionally being used (ex., software, assembled workforce, etc.)

f) Are entity specific inputs appropriate when valuing contributory assets in extractive activities?

What checks can be made on the reasonableness of entity specific inputs?

For the most part, we would agree that the use of entity specific inputs are appropriate when valuing contributor assets. An exception would be when valuing this asset class for financial reporting and the guidance precludes the use of entity specific inputs that could not be realized by other “market participants”.

Checks would include comparison with historical operating or performance metrics (e.g. Resource to reserve conversion ratio, quality discounts, metal recovery rates, cost of exploration, operating costs, capital expenditure per unit of production), validation in the marketplace, 3rd party research, etc. Benchmarking can be used to cross check some inputs.

g) Should components of goodwill other than value of assembled workforce be recognised?

Generally, we see no advantage to recognizing the other components of goodwill. Those components can include i.) immediate use of the assets, and ii.) in place policy and procedures. While these components of goodwill clearly are valuable, they are difficult to value individually. Goodwill is usually valued indirectly through the use of a residual method (i.e., enterprise value less working capital less value of tangible assets less value of identifiable intangible assets).

Recognition of other elements of goodwill may assist management in impairment testing and post-acquisition integration. Service contracts with the acquirer can be recognized.
9 Asset retirement obligations

Question 9:

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

We do not. As valuation professionals, we rely on valuation estimates that are provided by our clients. These estimates are either generated internally or by a 3rd party environmental engineering consultant.

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.

We will assist in estimating the appropriate discount rate (as prescribed by the accounting or tax regulations) to apply to the future cost estimates to arrive at the present value of the asset retirement obligation.

10 Reliance on specialists

Question 10:

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

Where we undertake investigations to corroborate volumetric estimates that are provided to us we would typically discuss forecasts with management, interview 3rd party specialists to discuss the assumptions used to prepare the estimates, and conduct benchmarking and numerical analysis. We would not, however, alter the estimate as a result of this work.

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?

As per 10a. In addition we would perform high level cross checks on a capex and opex per barrel basis to establish if there are any obvious errors.

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?

Often, we review the valuations prepared by 3rd party specialist on behalf of our audit client. As such, we receive a wide range of evidence regarding reserve volumes and the cost of their recovery. Approximately 50.0% of the time the source of this support is a report prepared by an external reservoir engineer. The remaining 50.0% of the time this support is prepared by our client's internal reservoir engineering group. Generally, we are satisfied that evidence provided by both of these sources reasonably reflects the extent of the reserves and the cost of their recover. However, we do spend more time analyzing recovery costs, as there is 3rd party market data available for recover costs on $/BOE basis. Additionally, we must make sure we understand whether the cost recovery forecast has been prepared on a real or nominal basis. We often will see cost recovery forecast prepared on a static basis, usually for standardized measure oil and gas reporting for financial reporting purposes. Blindly using this type of forecast in a nominal dollar denominated valuation can produce a number of errors.
d) 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?

We would expect to see reserve estimates, and how they vary over time considering:
- Extensions & discoveries
- Revisions & improved recovery
- Purchases & sales
- Production

We would expect to see historical finding costs per barrel, and how they have varied over time.

We would expect to see how the value varies over time through sensitivity tables that would include variations in the following variables:
- Annual production rates
- Price deck
- Differentials
- Lifting costs on a $/BOE basis
- Finding costs on a $/BOE basis
- Discount rate

11 Intangibles and Goodwill

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

Given the commodity nature of the oil and gas industry, we seldom see any intangible assets in purchase accounting. Occasionally we will see a favorable processing/transportation contract or proprietary seismic data, but it is rare.

b) 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 amount of goodwill reflected in transactions in the oil and gas industry is generally low relative to other industries. Given the commoditized nature of the industry, market participants are traditionally unwilling to pay a significant premium to market prices for the underlying commodities, unless significant synergies are expected between multiple potential buyers. Components of goodwill typically include an assembled workforce, immediate use of the acquired assets (assemblage), as well as know-how related to management’s ability to successfully identify recoverable resources in the future.

c) When considering the valuation of previously uneconomic reserves that can now be recovered using advanced technology, eg 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.

In the valuation of these types of previously uneconomic resources, we typically do not attribute any value to the technology that is required to support their production. Obviously the cost of using these technologies is included in the operating expense profile. These technologies can be valued using traditional valuation methods (Income or Cost Approaches) on a stand-alone basis, but it is not necessary to include them in the valuation of a particular reserve body.

12 Government regulation

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.

Due to the fact that there are a number of factors that affect value, including geography, markets, etc., it is difficult to isolate differences that are solely due to Governmental policies. However, if there is one place where we see variation around the world it is in the area of taxes. Variations in tax rates imposed by the local tax regime can result in situations where the “government take” is significant in one country versus another. The magnitude of the “government take” can result in two otherwise similar projects being economic in one country and uneconomic in another.

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

Country risk factors are typically included in the WACC for the business and are eventually a component in the discount rate for the extractive assets. Also, an after-tax local cost of debt is incorporated into the derivation of the international WACC. Care has to be exercised so as to not double count risk in cash flows and again in discount rate.

There are several elements that are specific to oil and gas reserves:

First, producers of oil reserves, regardless of the country they are operating in, generally receive payment in U.S. dollars. This has the effect of eliminating foreign exchange risk and is due to the fact that oil is truly a global commodity. This is not always true with natural gas, particularly if it is consumed within the region from which it is produced. Natural gas markets are much less fluid, have geographic and logistical limitations, and often lack infrastructure for its production.

Second, we certainly embrace the concept of “country risk” and use the appropriate data sources to index our U.S. (or other major country) based cost of debt and equity capital to the level of risk in a particular country. However, we have notice that companies that explore and produce oil and gas have an extremely high risk tolerance. As such, we often noticed that valuation discount rates used in the industry tend to be at the lower end of an acceptable range, often aligned with returns expected for low risk profile countries like the U.S., Canada, U.K., Australia, etc. And this risk can vary depending on whether the production is onshore v. offshore or is consumed locally v. shipped elsewhere.

So, while one must consider country specific risk, one must also consider the industry's appetite for risk and our client's expectations regarding risk/reward.