Dear Sirs

Re: Discussion Paper on Valuations in the Extractive Industries

We are responding to your invitation to comment on the above discussion paper on behalf of the Valuation practitioners of PricewaterhouseCoopers. “PricewaterhouseCoopers” refers to the network of member firms of PricewaterhouseCoopers International Limited, each of which is a separate and independent legal entity.

PricewaterhouseCoopers welcomes the opportunity to provide comments on the Discussion Paper. Following consultation with several valuation partners from firms which are members of the PricewaterhouseCoopers network of firms, this response summarises their views.

We appreciate the efforts made by the IVSC to identify the unique aspects of extractive industries and the challenges of valuing assets and business in these industries. We support the development of broad, principle based guidance, to assist valuation practitioners and users in identifying the appropriate valuation methods and key parameters that require industry expertise and proper judgment.

Whilst this letter provides a summary view of how, in our experience, valuation issues are dealt with in practice, we would like to emphasise that, given the inherent uncertainties in value drivers, the valuation of assets/companies in the extractive industries involves substantial industry experience and informed judgment from a range of specialists including mining and reserve engineers / geologists to assess resources and reserve, production volumes and costs for producing assets and assets under development or in exploration.

Each valuation in the extractive industries sector therefore requires consideration of the specific characteristics and circumstances of the subject asset. Dependent on the underlying resource being extracted, there may be exceptions to the use of the standard valuation approaches that we have outlined, but we hope you find our responses useful at a general level.
We also note that the IVSC may not solely be in the best position to provide such industry specific guidance and further engagement with relevant regulators and industry bodies (examples of which we provide in our responses to the questions) may be required to develop this type of guidance.

We would be happy to participate fully in any round-table discussions that the IVSC may decide to hold to discuss the comments received on this discussion paper, and look forward to being able to comment on the Exposure Draft for any guidance relating to this matter.

Our answers to the specific questions in the discussion paper are attached in the appendix to this letter.

If you have any questions in relation to this letter please do not hesitate to contact John Glynn, PwC Global & US Valuations Partner (+1 646 471 8420) or Romil Radia, UK Valuations Partner (+44 20 7804 7899).

Yours faithfully

PricewaterhouseCoopers LLP

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Appendix – Detailed responses to the questions in the discussion paper

**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.

Given the similarity between the value drivers and principles of the valuation methodologies employed in mining versus oil and gas, it would be reasonable to have a combined set of standards. Differences between the valuation of mining and oil and gas assets tend to reflect technical attributes rather than the principles and approach to valuation. We would therefore support a combined set of guidelines which is principles based rather than being overly prescriptive.

We note that the VALMIN code which is used in the Australian marketplace for the valuation of mining and petroleum assets for independent expert reports also covers both mining and oil and gas assets.

**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.

We typically value the overall project or business which in the case of developed projects includes reserves and resources but also the physical infrastructure put in place for production. The need to split the value between the underlying tangible assets and reserves / resources tends to arise for accounting (e.g. Purchase Price Allocations) or other specific valuation purposes. The valuations standard project should cover both the overall assessment of a mineral project (to the extent industry specific overarching principles / guidance is required) and the allocation of value ascribed to the reserves / resources versus other assets (to the extent these are industry specific).

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?

The valuation of reserves and resources typically starts with the cash flow projections for the entire business enterprise, hence we generally value the overall project which owns and develops the reserves / resources. These business cash flow projections represent in essence the sum of the parts of individual finite life assets (fields or mines) with cash flow forecasts through the expected life of the underlying reserves and resources.

If for companies with multiple projects the value of individual reserves / resources is required, the DCF approach is generally applied on a project by project basis rather than on a company wide basis.

As a valuation cross-check we do look at resources multiples (i.e. enterprise value / 2P reserves or risked resources) for comparable companies or transactions in comparable assets. However, it is important to consider and adjust for structural differences between the valuation target and
comparables, e.g. whether the businesses already have infrastructure in place or the reserves/resources are undeveloped.

**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.

The Board's preliminary views appear reasonable to us, on the assumption that the pronouncements will largely be in the form of non-mandatory guidance and principle based.

As additional material for the IVSC to consider we would recommend:
- *Petroleum Accounting - Principles, Procedures, & Issues* textbook by the Professional Development Institute ("PDI") that is published and updated on a regular basis and already addresses valuation methods, approaches and accounting for oil and gas industry; and
- The VALMIN CODE: *Code for Technical Assessment and Valuation of Mineral and Petroleum Assets and Securities for Independent Expert Reports*. This code is issued by the Australian Institute of Mining and Metallurgy (AusIM) but the VALMIN Committee comprises representatives from a number of mining, petroleum and financial representative organizations and references other industry standards such as the Society of Petroleum Engineers, JORC code, etc. Independent expert reports are generally prepared in the Australian market to advise shareholders whether or not to accept takeover offers. As they involve the valuation of securities, they are prepared by business valuers such as PwC but are usually accompanied by a technical expert's report which provides an opinion on reserves/resources and production and cost profiles for the assets which are an input into the business/project valuation.

**Question 2:**
   a) Are you familiar with the former GN14?
      
      No
   
   b) Is GN 14 used in the valuations that you provide or receive?
      
      N/A
   
   c) What elements of GN 14 do you find useful in either reporting or interpreting valuations?
      
      N/A

**Question 3**
   a) Which classification code or codes are most commonly used in your industry/sector?
      
      **Oil & Gas**
      
      - Security Exchange Commission Rule 4-10 of Regulation S-X,
- Society of Petroleum Evaluation Engineers ("SPEE"),
- Petroleum Resources Management System (PRMS),
- Canada: National Instrument 51-101 Standards for Disclosure for Oil and Gas Activities (Canada)

Mining
- Security Exchange Commission ("SEC") Industry Guide 7 - Description of Property by Issuers Engaged or to be Engaged in Significant Mining Operations
- Joint Ore Reserve Committee ("JORC")
- SAMREC (South Africa)
- Canadian Institute of Mining ("CIM") Metallurgy and Petroleum Standards on Mineral Reserves

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

All of the above codes are frequently used in practice, depending on the geographical location of the businesses and assets to be valued.

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.

From a valuation perspective, the broad classifications of 1P, 2P, 3P reserves and contingent versus prospective resources (measured, indicated, inferred resources for mining) are broadly similar and consistent when used as a basis for asset valuations in extractive industries. However, it is important to note that care has to be taken when incorporating reserve and resource estimates into a valuation as there are differences in risks and approaches between different types of commodities. For example, conventional oil and gas assets which are developed tend to be valued based on 2P reserves. Unconventional O&G and mining assets are generally developed when some but not all of the reserve base has been assessed and therefore it is appropriate to also consider the potential of additional resource conversion.

**Question 4:**

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

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.
We note that the appropriateness of valuation techniques always depends on the facts and circumstances (including the availability of observable data inputs) and our answers should be considered against that background.

- **Producing reserves**

Most commonly we apply the income approach as the primary method, and the market approach as secondary method to cross-check the results.

Given the fact that the value of a producing reserve is a function of the income they are expected to generate, we generally use an income approach to value the producing reserves.

- **Reserves undergoing development**

As for producing reserves, the income approach is typically the primary approach when sufficient information (e.g. development plans) is available; the market approach typically used as a cross-check.

Resource developments include large upfront capital costs and variable cash flows over the life of the project due to variable production volumes, quality as well as commercial factors such as price. An income approach such as DCF explicitly allows for the timing and amount of project cash flows. For projects in development, detailed forecast production and cost data is typically available which is project specific and therefore generally more appropriate than comparable data which reflects the characteristics of other projects.

- **Reserves or resources subject to exploration**

Since there is typically insufficient information available (due to uncertainty of future amount and timing of cash flows) to reliably forecast the future income capacity of resources subject to exploration, it is normally not possible to use an income approach as the primary valuation method.

Market comparables based on listed companies and transactions (appropriately adjusted for relevant factors including grade, quality, access to infrastructure, etc) are therefore commonly adopted as the primary approach for valuing exploration assets. When applying multiples (e.g. $/boe, $/tonne) to the subject assets, the views of technical experts is often important here as they are best placed to interpret the available technical data and comparability of assets. So clearly, care needs to be taken to adjust for non-comparable attributes.

Depending on information available, a replacement cost approach and/or an income approach in the form of indicative DCF with scenario analysis can serve as a cross-check to the multiples valuation range.
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.

The market approach is generally utilized to value undeveloped acreage by analyzing recent transactions in similar locations as the subject property. In the absence of detailed life of field / life of mine development plans it is often the only feasible approach for valuing exploration assets across oil & gas and mining.

We also use market approaches as a cross-check to DCF valuations across all sub-sectors of extractive industries (oil and gas, integrated LNG, unconventional oil and gas, bulk commodities (iron ore / coal), precious and base metal mining and processing, etc). As indicated in question 4 above, we note that projects and assets are rarely fully comparable and therefore the market approach results are often indicative only and may reflect a relatively wide valuation range.

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

The three most common adjustments include:

- Exploration stage
- Location (country and geography) and infrastructure in place
- Quality (grade) and reserve mix

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?

We frequently use both, depending on the availability of information and the purpose of the valuation report. For public report documents (eg independent expert reports in Australia) we would generally rely on an independent technical review of reserves / resources and production and cost profiles.

Canada for example has NI reporting standards (43:101) which require companies to have independent geological/engineering reports produced. As such, 43:101 is generally used as the basis for cash flow forecasts, with specific adjustments sometimes made by management. Forecasts are subject to our assessment of reasonableness and consider the extent of third party data.

In the absence of independent external forecasts we would normally review and rely on management’s data, cross-checked against other market data to the extent available.

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

Typically we are presented with risked, i.e. probability weighted (P90, P50, P10) and hence do not adjust production forecasts further for risk by reserve category, but we do test for reasonableness. If found unreasonable, we may go back to management and or the independent reserve engineers and ask for clarifications and/or adjustments to the production forecasts.
We would generally value conventional oil and gas projects on a 2P (P50) basis as this is the best estimate of reserves and further exploration on the field does not take place once development commences though future field performance in terms of overall recovery is still subject to some risk and uncertainty. For mining and unconventional oil and gas we would risk weight resource classifications through assumed future rates of conversion to reserves for different resource classifications.

e) 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?

We typically run the DCF analysis utilising cash flows over the full expected life of mine or field. This is to cover factors such as production declines over time, optimum mine development means higher grades or more accessible ore are exploited earlier, similarly higher cost production tends to be deferred, rehabilitation and abandonment costs can be significant and occur at end of mine life.

However, when the mine has an extremely long remaining length of life, we sometimes use the number of years in the reserve report for the explicit forecast (typically up to 20 years), and then use a remainder period for all years further out.

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?

We use a combination of sources for commodity price assumptions, generally in the near term based on market forward curves (the ‘liquid period’), if available for the subject commodity, e.g. in the US we use the NYMEX strip pricing for oil and gas. Beyond the liquid period for which forward curve data is available, prices may be escalated at inflation or reflecting specific views on the longer term pricing fundamentals for certain commodities (based on a combination of management estimates and broker consensus views).

Consieration of hedges depends on the purpose of valuation and definition of value. We typically take hedging into account if we are valuing the company but if the requirement is to value the asset, then hedging contracts put in place by the company would normally not be included (i.e. market prices being used instead), in order to derive the value of the asset in isolation.

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

Depending on price differentials already being considered in prices used by reservoir / mining engineers, we may apply adjustments for price differentials for products relative to benchmarks. These differentials are typically due to transportation costs and differences in quality and adjustments are
typically based on historical data. We would also incorporate the views of technical experts into this analysis where available,

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

Our preferred approach is to reflect currency exchange risks to the future income and operating cost projections in the cash flow analysis. Practically, we typically convert cash flows denominated in different currencies at assumed foreign exchange rates and apply a discount rate to the net cash flow which is consistent with the denomination of the project cash flows.

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 valuing resources companies (i.e. the whole business rather than individual assets), we include the value of corporate overheads. However, for valuing interests in individual upstream assets, typically only directly project related overhead costs are included.

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

We generally use a DCF methodology for valuing probable or possible reserve when reliable cash flow forecasts exist. However, as indicated earlier, for conventional oil & gas assets the DCF analysis would typically be based on 2P (proved plus possible) reserves, whereas possible reserves (P3) may not be included in the market value to be determined. By contrast for mining assets, DCF may be used to value some categories of resources (eg measured and indicated) to extent that these have not already been included in reserves.

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?

We typically use a weighted average cost of capital based on the capital asset pricing model as the starting point for estimating the discount rate.

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

Yes, we generally separate the systemic and asset specific risks.

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.

Asset specific risks will generally relate to the timing and cost of development and would be factored into cash flows through sensitivity analysis and delay factors. Other risk factors that may be considered to be reflected as adjustment to the discount rate are:

• Country risk (to the extent the asset is expected to be impacted by sovereign and political risks)
• Protections against government intervention
• Size adjustment
• Stage of the mineral resources and reserves

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

Typically we do not adjust the discount rate for movements through the life cycle, and rather adjust reserve and cash flow estimates.

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.

The cost approach (in the form of depreciated replacement cost) is not typically utilized to value reserves.

However, another type of cost approach (by reference to the most recent price of an investment) is frequently applied in practice. If an exploration asset has been recently acquired and some exploration spend has occurred which has added to an increased understanding of the underlying asset but which has not given rise to a definitive change in value, then the valuation may be based on the acquisition cost (including by reference to farm-in expenditure) and expenditure incurred since acquisition. A full or partial cost recovery factor to the historical cost may be applied, depending on the understanding of the prospects of the subject asset.

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.

As noted above, in our experience the depreciated replacement cost approach is not typically applied in the valuation of reserves.

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.

See response to 7 a)

Question 8:
a) How should the unit of valuation (unit of account) be determined in the valuation of extractive activities?

The unit of valuation is dependent upon the purpose of the valuation and existing guidance that may cover unit of account (e.g. accounting standards). For instance, the unit of valuation for tax purposes may be different and require a more detailed level than a valuation for financial reporting purposes.

b) How is double counting of the contribution of different assets avoided?
Any contributing assets (e.g. specialized plant and equipment) which, depending on the purpose of the valuation, have to be recorded separately are typically deducted from the overall DCF value at their fair value (to be determined separately using an appropriate approach, e.g. depreciated replacement cost).

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

The allocation of the economic obsolescence / impairment depends upon the purpose of valuation (financial reporting should be consistent with applicable accounting standards) and value definition assumptions (market participant or stand alone). Any implied obsolescence to mineral rights may require a reassessment of contributory asset values. If the assets are intrinsically linked to the resource then it may be appropriate to allocate any impairment proportionally. If value could be realized separately from an asset, then there may be an argument for disproportionate allocation of the impairment so the individual assets reflect fair value.

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

Cost and market approaches are generally used for tangible fixed assets and work force. For contracts and customer relationships the income approach is typically used.

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

The criteria for including entity specific adjustment should be their applicability to a third party purchaser or market participant assumption.

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

Typically we observe relatively small amounts of goodwill in acquisitions where the dominant assets acquired are the mineral reserves and resources. However, there are examples where more goodwill than indicated by the assembled workforce should be recognized, particularly if there are buyer specific synergies or where there is a specific contributor to the value (cash flows) which can be identified but not otherwise to be recognized as intangible assets e.g. government concessions not directly associated with the resource / mining rights.

Question 9:
a) How do you estimate the cost of future reinstatement or environmental protection obligations?

We typically rely on management estimates and/or discussions with specialist such as engineers and conduct a check of reasonableness based on historical data and comparison to other publicly traded companies.
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.

The discount rate used depends on the purpose of valuation. For accounting purposes, we consider the basis outlined in the relevant accounting standards. For valuations of businesses and assets for other purposes (e.g. transaction advice), we typically incorporate the reinstatement or decommissioning costs in the cash flow forecasts (as these costs are tied to the mine output in the future and the continued economic viability of the mineral rights) and consequently use the business WACC as the discount rate.

**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?

We review the engineers' reserve certifications and we generally know them by reputation or have previously worked with them. We carry out our own analysis on future production and cost profiles where historical data is available and may also review publicly available information eg other joint venture stock exchange announcements etc to corroborate data.

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 in most cases feasibility studies are available for mineral rights. As part of our valuation work we typically agree forecast cost data back to feasibility studies, development plans and cost estimates but also cross-check against industry benchmarks and publicly available data for similar projects.

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?

Not applicable as this response is provided on behalf of PwC valuation practitioners who provide valuation advice to clients.

**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.

Intangible asset other than exploration rights and licenses that could potentially be identified include: proprietary seismic, favourable/unfavourable offtake contracts, know how, patents and technology.
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.

Typically, other than workforce any residual goodwill may relate to movements in commodity prices between negotiation date and closing date, buyer-specific synergies, overpayment for reserves, and the recognition of deferred tax liabilities resulting from fair value uplifts to intangible assets acquired.

A cost approach is normally used to estimate the value of the workforce.

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.

Typically we do not allocate value to the technology unless the intellectual property is unique and has been secured.

**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.

The value per a unit of mineral rights may, all other things being equal, be significantly different depending on where the resource is located.

An important aspect of the valuation of mineral resources is the applicable fiscal and regulatory regime eg production sharing contract, mining / petroleum tax, royalties, environmental policies such as carbon tax, which are specific to each jurisdiction and in some cases to specific projects and therefore need to be explicitly reflected in cash flow forecasts and/or the discount rate.

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

The country risk (i.e. political /sovereign risk) is generally reflected in the discount rate used for the valuation of an extractive asset.