Global Arbitration Review

The Guide to Mining Arbitrations

Editors
Jason Fry QC and Louis-Alexis Bret

Second Edition

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Publisher's Note

Global Arbitration Review is delighted to publish *The Guide to Mining Arbitrations*.

For those unfamiliar with GAR, we are the online home for international arbitration specialists, telling them all they need to know about everything that matters. Most know us for our daily news and analysis service. But we also provide more in-depth content: books and reviews, conferences and handy workflow tools, to name just a few. Visit us at www.globalarbitrationreview.com to find out more.

Being at the centre of the international arbitration community, we often become aware of fertile ground for new books – important topics yet to be covered. Recently, mining disputes emerged as one such gap.

One might blithely assume mining is little different from energy (for which we have *The Guide to Energy Arbitrations*). But as our editors Jason Fry and Louis-Alexis Bret explain in their excellent Introduction, miners face different risks. Unlike a lot of oil and gas exploration, mining projects are on-land and visible, meaning they depend on the blessing of their neighbours, and are more likely to become politicised. It is also much easier to value an early-stage oil and gas asset than a mine, which has implications for both damages and how stakeholders behave. And different substantive principles apply. The *lex mineralia* is not the *lex petrolia* and owes more to rulings from Australia and Canada than Texas.

But above all, the era of hydrocarbons is waning, while that of minerals and metals is in the ascendant. Copper, cobalt, lithium, silicon and zinc are at the heart of our evolution towards a cleaner planet. Without them and a growing array of other rare minerals – no batteries, circuit boards or solar panels, and one day, who knows, no future. But that, in itself, brings tensions to the endeavour.

For all these reasons, we thought it was high time we covered mining disputes in the esteemed GAR Guides series. The book you are reading – *The Guide to Mining Arbitrations* (second edition) – is the result. It is a practical, know-how text, organised in three parts:

- Part I identifies issues most salient in mining arbitrations, which tend to be driven by the unique nature of mining and metals as a business;
- Part II introduces select substantive principles that frequently arise; and
- Part III introduces some regional perspectives on mining arbitration.

We are delighted to have worked with so many leading firms and individuals to produce *The Guide to Mining Arbitrations*. If you find it useful, you may also like the other books in the GAR Guides series. They cover energy, construction, M&A, and challenge and enforcement of awards in the same practical way. We also have books on advocacy in

international arbitration and the assessment of damages, and a citation manual (*Universal Citation in International Arbitration*), and will soon be releasing books on investment treaty arbitration and evidence.

My thanks to the editors for their vision and energy in pursuing this project and to my Law Business Research colleagues in production for achieving such a polished work.

David Samuels
London
May 2021

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Valuation of Non-Producing Mineral Properties

Damien Nyer and Xuefeng Wu[1]

Introduction

This chapter considers issues and challenges faced by counsel, experts and arbitrators in valuing non-producing mineral projects, including exploration, pre-development and development properties, whether to determine compensation for expropriation or for other purposes.

A central issue explored in this chapter is whether, considering the specifics of the mining industry, an investor in a non-producing mineral project that fails for reasons attributable to the host state may claim compensation beyond its sunk costs, including for the producing potential of the project and associated future profits. Non-producing mineral projects, by definition, do not have the record of operations and profits that is sometimes required to support the use of such approaches. The specific nature of the mining business and, in particular, the existence of an established market for mineral products may obviate some of the main objections to the consideration of future profits in the valuation of non-producing mineral projects. The reported cases show a broad range of approaches and outcomes in this respect. If a common thread emerges, it is the increasing sophistication of arbitral tribunals in assessing the facts and, in particular, the varying stages of development of mineral projects, as they relate to issues of valuation.

This chapter is divided into three parts. The first part is a brief overview of the typical development sequence of a mining project and the prevailing mineral classification standards. The second part discusses the valuation framework and methods commonly used in the mining industry depending on different stages of project development. The third part surveys the growing body of investment arbitration cases addressing the valuation of non-producing mineral properties.

1 Damien Nyer is a partner and Xuefeng Wu is an associate at White & Case LLP.

The mineral development sequence

Arbitral decisions addressing the valuation of mining properties (producing and non-producing) reflect an increasingly sophisticated understanding of the industry. To assist the reader, this part provides an overview of the development stages of mining projects, the twin concepts of mineral resources and reserves, and the main studies and reports used in the industry to value mineral projects.

Mining development stages

Mining involves exploring for, discovering and extracting non-renewable raw materials of economic value from the earth and may also include further processing of the raw materials into a more easily marketable form.

The construction of extraction facilities and the eventual operation of a mine (namely, the development and production stages) are only the last stages of a mineral project. Before them, the central goal of all activities on a mineral project is to establish whether there is a viable case for committing capital towards the development of the project.

The pre-development stage, which itself often involves the commitment of substantial resources over extended periods of time, broadly consists of two phases: (1) exploration, and (2) planning or permitting. During the exploration phase, drilling, sampling and geological mapping activities may be conducted to investigate and assess the mineral deposit potential of the property. Based on the exploration results, progressive studies may be conducted to investigate whether the mineralisation identified during exploration may be exploited economically and, if a justifiable plan to commence development exists, to formulate a detailed construction and operation plan, balancing all technical, economical, financing, social and environmental factors. Governmental and other approvals as well as development funding are then expected to be procured before a final investment decision is made and the project moves into the development phase.

Resources and reserves

The value of a mineral project depends on its mineral deposits. Given the non-renewable, finite nature of mineral deposits, it is critical for the participants in a mineral project to understand the mineral inventory of the project. In fact, a large part of pre-development activities is devoted to gaining and refining that understanding so as to assess investment options.

Over the years, the major mining jurisdictions have developed, with the support of industry participants, standards for estimating and presenting the mineral inventory of projects to the investing public and other market participants and conducting associated studies.[2] A prominent example (given the importance of Canada and its capital markets to the mining industry) is the definitional standards prepared by the Canadian Institute of Mining,

2 Apart from the Canadian standards discussed further below, other commonly used international standards include the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC); www.jorc.org/; the SME Guide for Reporting Exploration Results, Mineral Resources and Mineral Reserves (the 2014 SME Guide) in use in the United States; www.crirsco.com/docs/2014_sme_guide_%20june_10_2014_appendix_a_update_march_2016.pdf, and the South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves (the SAMREC Code) in use in South Africa; www.samcode.co.za/samcode-ssc/samrec.

Metallurgy and Petroleum (the CIM Definition Standards). These standards have also been incorporated into the mandatory technical reporting framework for mining companies listed on the Toronto stock exchange (TSX), a framework known as NI 43-101 Standards of Disclosures for Mineral Projects (the NI 43-101 Disclosure Standards).[3] These standards are increasingly referenced in arbitration proceedings, with a tribunal describing them as 'uniform standards' for the mining industry.[4]

Two key concepts reflected in the CIM Definition Standards (and relevant to the valuation of mineral properties) are 'mineral resources' and 'mineral reserves'. Under the CIM Definition Standards, a 'mineral resource' is 'a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction'.[5] A mineral resource can be 'inferred', 'indicated' or 'measured', reflecting the ascending level of confidence in its existence.[6]

Under the CIM Definition Standards, a 'mineral reserve' represents the estimated tonnage and grade (mineral concentration in the ore) of 'the economically mineable part of a Measured and/or Indicated Mineral Resource'.[7] The notion of mineral reserve thus includes a determination of both the technical and economic feasibility of exploiting a mineral resource. Mineral resources may be converted into mineral reserves only when one is satisfied that 'extraction could reasonably be justified' after applying various 'modifying factors', which include mining, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental aspects of the development in question.[8] A mineral reserve may be 'probable' or 'proven', in an ascending level of confidence.

The nature of the resources and reserves of a non-producing mineral project is key to its valuation because it directly impacts the level of confidence in the potential of the project to be operated economically. A project with proven reserves has achieved the highest level of confidence in this respect.

Technical and economic studies and reports

The technical and economic reports and studies that may be required to support the existence of mineral resources and reserves before the large-scale development and operation stages of a mining project are largely standardised. Under the CIM Definition Standards and NI 43-101 Disclosure Standards, the three main such reports are known as the 'preliminary economic assessment' (PEA), the 'pre-feasibility study' and the 'feasibility study'.

3 The NI 43-101 Disclosure Standards incorporate by reference the relevant definitions from the CIM Definition Standards (Sections 1.2, 1.3, 1.4). The NI 43-101 Disclosure Standards also allow reporting under foreign standards if such foreign code defines mineral resources and mineral reserves in a manner consistent with the CIM Definition Standards (Section 1.1 – 'acceptable foreign code').

4 See *Quiborax*, Award, 16 September 2015, paras. 393–94.

5 Definition – Mineral Resource, CIM Definition Standards (2014).

6 The CIM Definition Standards and the NI 43-101 Disclosure Standards require that a 'Qualified Person' estimate and certify mineral resources and reserves. The Qualified Person needs to meet certain educational and other professional requirements. See NI 43-101 Disclosure Standards (2011); Definition – Qualified Person, CIM Definition Standards (2014).

7 Definition – Mineral Reserve, CIM Definition Standards (2014).

8 Definition – Modifying Factors, CIM Definition Standards (2014).

A PEA is often commissioned in the earlier stages of a project to analyse the 'potential viability of mineral resources'.[9] The NI 43-101 Disclosure Standards provide that the results of a PEA may include or be based on inferred mineral resources (the lowest level of confidence), but cautionary statements must be made in this respect.[10]

A pre-feasibility study is a comprehensive study 'on the technical and economic viability of a mining project' that has advanced to a prescribed level. Under the CIM Definition Standards, the completion of a pre-feasibility study is the minimum required for the conversion of mineral resources into mineral reserves.[11]

A feasibility study requires more detailed assessment of the selected development option to demonstrate that 'extraction is reasonably justified'. A feasibility study therefore denotes a higher confidence level, and its results may 'reasonably serve as the basis for a final decision by a proponent or financial institution to proceed with, or finance, the development of the project'.[12]

Mining valuation approaches

This part describes the valuation methods commonly used in international investment arbitration (cost-, market- and income-based approaches) in the specific context of the mining industry.

Valuation methods

Three main valuation methods[13] are commonly used to value investments in international arbitration practice.

- The 'income-based approach', which seeks to determine the value of an asset by reference to the present value of the future revenues of the asset in question, primarily through the discounted cash flow (DCF) method. A recent study indicates that the DCF method is the most frequently presented damages quantification method in international investment arbitrations.[14]
- The 'market-based approach', which assesses value by reference to transactions or traded companies that are comparable to the property in question.
- The 'cost-based approach', which focuses on the 'actual investment' or historical ('sunk') costs.

9 1.1 Definitions – Preliminary Economic Assessment, NI 43-101 Disclosure Standards (2011). A preliminary economic assessment may be used interchangeably with a scoping study.

10 2.3 (3), NI 43-101 Disclosure Standards (2011). See also S1.0, CIMVAL Valuation Guidance (2003) for the definition of Preliminary Assessment.

11 Definition – Pre-Feasibility Study, CIM Definition Standards (2014).

12 Definitions, CIM Definition Standards (2014). The studies are sometimes called 'bankable feasibility study' or 'definitive feasibility study'.

13 See Mark Kantor, *Valuation for Arbitration: Compensation Standards, Valuation Methods and Expert Evidence* (Kluwer Law International 2008), Chapter 2, pages 8–17.

14 See PricewaterhouseCoopers, 'Dispute Perspectives, Discounting DCF?' (showing that the DCF method was proposed as the primary damages quantification methodology in 59 out of the 95 cases reviewed, and accepted by the tribunals 37 times); www.pwc.co.uk/tax/assets/dispute-perspectives-discounting-dcf.pdf.

These three methods are likewise used by market participants in the mining industry to value mineral properties, with some variations.

For example, a variation on the market-based approach is the market capitalisation approach.[15] For public companies (and especially companies holding a single mineral property), it is sometimes possible to derive property value by analysing their market capitalisation movements during the relevant time period. The approach rests on the assumption that, in a well-developed stock market, stock price will reflect the present value of the underlying assets of the company.

A further variation on the market-based approach is the price to net asset value (P/NAV) method. The method involves a determination of a P/NAV multiple for comparable companies, calculated by dividing their market capitalisation by their net asset value (generally, the net present value of expected future cash flows, minus debt plus cash). The value of the project at issue is then arrived at by multiplying the project's own net asset value by the P/NAV multiple.

Variations on the cost-based approach are also used in the industry to value mineral properties. One such variation is the 'appraised value' method.[16] The method assumes that 'the amount of exploration expenditure justified on a property is related to its value' and that value may be quantified as 'meaningful past exploration expenditures plus warranted future cost'.[17] The 'multiple of exploration expenditure' method is a variation of the appraised value method, assigning a premium or discount to the expenditure through the use of a subjective multiplier.[18] There is ongoing debate in the industry on the application of these variations, in particular, with respect to the use of 'warranted future exploration expenditure' in the valuation.[19]

CIMVAL Code

In 2003, the Special Committee of the Canadian Institute of Mining, Metallurgy and Petroleum on Valuation of Mineral Properties (CIMVAL) issued the Standards and Guidelines for Valuation of Mineral Properties, which was updated in November 2019 by

15 Table 2, CIMVAL Valuation Guidance (2003).

16 ibid.

17 William E Roscoe, Valuation of Mineral Properties Using the Cost Approach; https://store.cim.org/en/valuation-of-mineral-exploration-properties-using-the-cost-approach.

18 Ian S Thompson, A Critique of Valuation Methods for Exploration Properties and Undeveloped Mineral Resources; https://store.cim.org/en/a-critique-of-valuation-methods-for-exploration-properties-and-undeveloped-mineral-resources.

19 André J van der Merwe, 'Applying the Cost Approach to Valuation of Exploration Stage Mineral Assets'; www.samcode.co.za/codes/category/32-submissions?download=189:applying-the-cost-approach-to-valuation-of-exploration-stage-mineral-assets, pages 4–5. ('The validity of including future exploration expenditure is an on-going debate.'). For example, the TSX Venture Exchange generally does not accept the inclusion of future expenditure when applying the appraised value method to value properties without mineral reserves. Appendix 3G, Valuation Standards and Guidelines for Mineral Properties, TSX Venture Exchange Disclosure Obligations for Mining Companies; www.tsx.com/resource/en/531.

the CIMVAL Code for the Valuation of Mineral Properties (the CIMVAL Code).[20] The CIMVAL Code observes that mineral property valuation may be conducted for various purposes, including for determining the 'expropriation compensation'.[21]

Incorporating relevant definitions under the CIMVAL Definition Standards (e.g., mineral resources, mineral reserves, feasibility study and pre-feasibility study), the CIMVAL Code groups mineral properties into four broad categories based on different development stages.

- Exploration properties: mineral properties that do not contain mineral reserves or mineral resources and for which economic viability has not been demonstrated.
- Mineral resource properties: mineral properties that contain mineral resources or estimates of quantity and grade of mineralisation that are reconciled with the CIM Definition Standards.
- Development properties: mineral properties that contain mineral reserves or mineral resources, or both, and for which economic viability has been demonstrated by a feasibility study or pre-feasibility study, including a mineral property that has a current positive feasibility study or pre-feasibility study but that is not yet in production.
- Production properties: mineral properties that contain an operating mine, with or without a processing plant, which is fully commissioned and in production.

The CIMVAL Code also provides the views of the CIMVAL Special Committee on the valuation approaches most appropriate for mineral properties at different stages of development in the following table.[22]

Valuation approaches for different types of mineral properties

Valuation approach	*Exploration properties*	*Mineral resource properties*	*Development properties*	*Production properties*
Income	No	In some cases	Yes	Yes
Market	Yes	Yes	Yes	Yes
Cost	Yes	In some cases	No	No

It is important to note that the CIMVAL Code represents only one possible approach to the valuation of mineral properties (and is not part of the standards adopted by the Canadian market regulators). As discussed below, some arbitral tribunals have found the analytical framework of the CIMVAL Code helpful, while others have not. The CIMVAL Code itself cautions that there might not be 'clear-cut' boundaries between the four categories of 'exploration properties', 'mineral resources properties', 'development properties' and 'production properties', and that any classification may 'change over time'.[23]

20 Special Committee of the Canadian Institute of Mining, Metallurgy and Petroleum on Valuation of Mineral Properties (CIMVAL) Code for the Valuation of Mineral Properties (2019) (the CIMVAL Code); https://mrmr.cim.org/media/1135/cimval-code-november2019.pdf.

21 1.5, CIMVAL Code (2019).

22 id., 3.3.3.

23 ibid.

Survey of valuation cases

In recent years, several arbitral tribunals have considered the valuation of non-producing mineral projects. Although tribunals in the reported cases have tended to use cost-based approaches (sunk costs) for earlier-stage projects, they have also shown willingness to entertain other approaches for more advanced projects, including projects that had reached the development stage at the time of the host state's wrongful acts. For analytical and presentation purposes, it is convenient to consider these decisions through the prism of the three broad categories of non-producing properties outlined in the CIMVAL Code, namely, exploration properties, mineral resources properties and development properties.

Exploration properties

In *Copper Mesa v. Ecuador*,[24] the claimant held copper exploration concessions in Ecuador and had started exploration activities. Confrontations with local communities ensued. In 2006, the Ecuadorian authorities rejected the claimant's environmental impact study for its key Junín concession based on the lack of consultation with affected local communities and subsequently terminated the concession (without compensation) on the basis of a newly enacted law requiring the conduct of local referendums before the award of mining concessions.

The tribunal found Ecuador liable under the Ecuador–Canada bilateral investment treaty with respect to the termination of the concessions. At the quantum stage, the claimant did not proffer an income-based valuation.[25] Instead, the claimant sought market-based compensation of US$69.7 million, based on a weighted average of the results of the comparable transaction method and the market capitalisation method. As an alternative, the claimant sought compensation for its sunk costs (US$26.5 million, pre-interest) spent developing the concessions as evidenced by its audited financial statements.[26]

The *Copper Mesa* tribunal found that the project 'remained in an early exploratory stage' with neither 'actual mining activities' nor a 'track record as an actual mining business' and that its chances of moving beyond the exploration stage were 'slender' at the time of the taking.[27] In these circumstances, the tribunal held that the cost-approach was 'the most reliable, objective and fair method' to 'restore the claimant to the status quo ante',[28] and that the other proposed valuation methods were 'uncertain, subjective and dependent upon contingencies, which [could not] fairly be assessed by the Tribunal' and subject to significant influence by 'wholly extraneous factors'.[29] The tribunal awarded a total pre-interest amount of approximately US$19.4 million, based on the expenditure figures at relevant time in the audited financial statements of the claimant but after certain deductions to reflect the claimant's contributory negligence.[30]

24 *Copper Mesa Mining Corporation v. Republic of Ecuador*, PCA No. 2012-2, Award, 15 March 2016.
25 id., para. 7.3.
26 id., paras. 7.4–7.6.
27 id., para. 7.24.
28 id., paras. 7.27, 7.29.
29 id., para. 7.24.
30 id., paras. 7.28–7.32.

Mineral resources properties

In *South American Silver v. Bolivia*,[31] the claimant had acquired concessions for the Malku Khota silver project in Bolivia. Following periods of confrontation with local communities, Bolivia revoked the concessions in June 2012. At the time of the revocation, a PEA had been conducted and the existence of mineral resources (inferred, indicated and measured) had been established such that the project arguably qualified as a 'mineral resource property' under the CIMVAL Code.[32] The claimant filed for international arbitration under the Bolivia–UK bilateral investment treaty, seeking US$385.7 million in damages.

Having found (by majority) Bolivia liable for revoking the concessions without compensation,[33] the tribunal turned to the question of the quantum of compensation. The claimant sought damages based on the market and income (DCF) approaches, while the respondent argued that the project remained at 'an early stage without any mining activity' and that only the cost-based valuation method should be used.[34] The tribunal held that the project remained at an 'incipient stage', with significant remaining exploration work and no pre-feasibility study.[35] According to the tribunal, '[se]rious uncertainties' surrounded the scope of the identified mineral resources, the proposed metallurgical process and the marketability of its production, which, the tribunal found, made it difficult to value the project 'with any degree of precision and objectivity'.[36]

The tribunal therefore awarded reimbursement of exploration expenditures (sunk costs) of US$18.7 million plus interest.[37] In doing so, the tribunal refused to allocate a portion of general and administrative cost of the claimant's parent (which operated multiple projects) on the basis that the claimant had failed to prove the 'proportional relationship' between those allocated cost and the value of the project.[38]

In *Stans Energy Corp v. Kyrgyz Republic (II)*,[39] Kyrgyzstan had revoked the mining licence for a rare earth project held by a local subsidiary of Stans Energy Corp, a TSX-listed company. The project was undergoing advanced technical and economic assessment at the time and had declared mineral resources, but had not yet obtained a pre-feasibility or feasibility study and had no stated mineral reserves.[40] The claimant sought US$128 million based on Stans Energy Corp's market capitalisation prior to the expropriation. Kyrgyzstan, for its part, argued that the DCF method was 'the only reliable way' to quantify the loss and that it yielded a negative result.[41]

31 *South American Silver Limited v. Bolivia*, PCA No. 2013-15.

32 *South American Silver Limited*, Award, 22 November 2018, paras. 724, 767(d), 810.

33 id., para. 938(b).

34 id., para. 778.

35 id., para. 857.

36 ibid.

37 id., paras. 866–76.

38 id., para. 869.

39 *Stans Energy Corp. and Kutisay Mining LLC v. Kyrgyz Republic (II)*, PCA Case No. 2015-32.

40 id., para. 241.

41 id., para. 690.

The *Stans* tribunal rejected both approaches. Finding that the development was still at an early stage and 'far away from being an ongoing concern' and that therefore 'a projection of future cash flows would be too speculative',[42] the tribunal decided to award compensation based on sunk costs.[43] The tribunal considered that approximating the loss through proven expenditures was consistent with prior cases (including *Copper Mesa*).[44] The tribunal ultimately awarded approximately US$15 million (before interest), after examining evidence on the claimant's investment expenditures, including audited financial statements, reports submitted to Kyrgyzstan regulators and other internal records.[45]

Development properties

The reported cases concerning more mature projects (including, in particular, projects whose economic viability has been demonstrated by feasibility studies) show a broader variety of valuation approaches.

Income-based valuation

Gold Reserve v. Venezuela[46] is the first known example in which the claimant received compensation for a non-producing mining project based on a DCF valuation. The case involved an unlawful failure by the Venezuelan authorities to issue project permits and revocation of the exploitation concessions for the Brisas gold and copper project before operation had commenced, in violation of Venezuela's obligations under the Canada–Venezuela bilateral investment treaty. By the time of the wrongful acts, the claimant had commissioned several feasibility studies, received certain approval for its environmental and social assessment work, and advanced various other aspects of the project.[47]

At the quantum stage, both sides submitted DCF valuations (among other valuation approaches), with the claimant claiming in excess of US$1.3 billion and the respondent contending that the project had negative value at the time of the taking. The tribunal, citing the CIMVAL Code as support, agreed that the DCF approach was suitable in the circumstances, noting that the approach is preferred over other methods 'where sufficient data is available'.[48] The tribunal found that the DCF method could be used reliably given 'the commodity nature of the product' (i.e., gold) and 'the detailed mining cashflow analysis previously performed' for the project.[49] The tribunal also noted that the claimant's DCF analysis predicting a profitable investment was consistent with valuation results using the comparable method and contemporaneous independent valuations by three investment banks.[50] The tribunal concluded that the respondent's negative valuation was 'highly unlikely' and irreconcilable with (1) the in-depth analysis contained in a detailed feasibility

42 id., paras. 759–60.
43 id., para. 761.
44 id., paras. 774–83.
45 id., paras. 799–824.
46 *Gold Reserve Inc v. Bolivarian Republic of Venezuela*, ICSID Case No. ARB(AF)/09/1.
47 *Gold Reserve*, Award, 22 September 2014, paras. 10–22.
48 id., para. 830.
49 ibid.
50 id., para. 833.

study and impacts studies previously performed and (2) the fact that the claimant continued investing in the development of the property.[51] The tribunal awarded approximately US$710 million to the claimant based on adjustments to the DCF valuation (including, primarily, the tribunal's exclusion from the scope of the concession of a parcel as to which the tribunal concluded that the claimant's rights were lacking).[52]

Recent years have seen a significant growth of investment law jurisprudence on applying the DCF approach in valuating non-producing mineral properties. In *Khan Resources v. Mongolia*, the Canadian claimant held a majority stake in the Dornod uranium project in Mongolia.[53] In July 2009, Mongolia passed a new mining law giving the government a 51 per cent interest in the property without compensation and subsequently refused to re-register certain of the claimant's licences over the property. At the time, the claimant had obtained a definitive feasibility study and established proven reserves.[54] The claimant sought compensation of US$358 million as the fair market value of the project.

Having found Mongolia liable, the tribunal held that the DCF method could be appropriate to calculate the value of non-producing mineral projects with 'proven reserves' (such as the Dornod project), but found that 'the level of certainty required for the DCF method to be used [had] not been attained' in the circumstances of the case. The tribunal pointed out in particular the following uncertainties affecting the claimant's case:

- the availability of financing;
- the claimant's capacity of moving the project into operation alone and the possibility of securing a strategic partner;
- the claimant's long-term commitment to the project;
- the possibility and timing of consolidating other exploration areas into existing resources; and
- the conclusion of new cooperation agreements with the government and with business partners.[55]

In *Rusoro v. Venezuela*,[56] the claimant had acquired 58 concessions and contracts for conducting gold exploration and mining activities in Venezuela. Starting in 2009, Venezuela implemented a number of measures restraining the export of gold products, and in September 2011 nationalised the industry. In 2012, the claimant filed for International Centre for Settlement of Investment Disputes (ICSID) arbitration, seeking among other things damages of US$2.23 billion based on unlawful expropriation. By the time of the nationalisation decree, four mines in the claimant's portfolio were producing and seven pre-production properties had established reserves and resources.[57]

51 ibid.

52 id., para. 848.

53 *Khan Resources Inc, Khan Resources BV and Cauc Holding Company Ltd v. The Government of Mongolia*, UNCITRAL, Award on the Merits, 2 March 2015.

54 id., para. 391.

55 id., para. 392.

56 *Rusoro Mining Ltd v. Bolivarian Republic of Venezuela*, ICSID Case No. ARB(AF)/12/5, Award, 22 August 2016.

57 id., para. 723. ft. 556,557.

The tribunal articulated the following test for applying the DCF method:

> *DCF works properly if all, or at least a significant part, of the following criteria are met:*
> *The enterprise has an established historical record of financial performance;*
> - *There are reliable projections of its future cash flow, ideally in the form of a detailed business plan adopted in tempore insuspecto, prepared by the company's officers and verified by an impartial expert;*
> - *The price at which the enterprise will be able to sell its products or services can be determined with reasonable certainty;*
> - *The business plan can be financed with self-generated cash, or, if additional cash is required, there must be no uncertainty regarding the availability of financing;*
> - *It is possible to calculate a meaningful WACC, including a reasonable country risk premium, which fairly represents the political risk in the host country;*
> - *The enterprise is active in a sector with low regulatory pressure, or, if the regulatory pressure is high, its scope and effects must be predictable: it should be possible to establish the impact of regulation on future cash flows with a minimum of certainty.*[58]

The tribunal declined to use the DCF methods to value the claimant's operating mines and more advanced projects separately from the rest of the claimant's portfolio and held that certain specific circumstances of the case made the use of the DCF method inappropriate, including:

- the claimant's lack of proven record of financial performance;
- the highly volatile gold price and the challenge in retrospectively assessing the market impact of Venezuela's expropriation decision;
- the uncertainty regarding the financing for the new development;
- the unrealistically low country risk discount assigned by the claimant's expert; and
- the increasing regulatory pressure in the Venezuelan gold sector and the impossibility to predict its impact to future cash flows.[59]

Tethyan Copper v. Pakistan[60] is another recent example of a claimant obtaining compensation based on the income approach for a pre-operational mineral property. The claimant (owned by two of the largest gold and copper companies in the world) was engaged in substantial drilling and exploration activities at the Reko Diq copper and gold project in the Baluchistan region of Pakistan. The claimant had submitted a project feasibility study and applied for a mining lease to enable large-scale construction and operation, but the lease application was rejected by Pakistan. The tribunal found that Pakistan had unlawfully expropriated the project in breach of its treaty obligations.[61] The claimant sought US$8.5 billion (pre-interest) in compensation, based on the 'modern' DCF valuation method.[62] Pakistan

58 id., para. 759.

59 id., paras. 781, 785.

60 *Tethyan Copper Company Pty Limited v. Islamic Republic of Pakistan*, ICSID Case No. ARB/12/1.

61 *Tethyan Copper*, Award on Damages, 12 July 2019, para. 2.

62 The methodology (also known as the 'certainty equivalent' or CeQ DCF method) differs from the traditional DCF approach mainly in the sequence and techniques used to account for systematic risks (i.e., fluctuation

argued that no damages should be awarded because the claimant had failed to prove the feasibility of the project and because the proposed modern DCF method was, according to Pakistan, untested and unreliable and produced 'artificially inflated results'.[63]

The *Tethyan* tribunal reviewed in detail earlier cases, including *Gold Reserve*, *Rusoro* and *Crystallex v. Venezuela*,[64] and concluded that the application of 'a DCF method (or a similar income-based valuation methodology)' for the valuation of non-operational assets 'depends strongly on the circumstances of the individual case'. The tribunal laid out the following threshold two-part inquiry:

> *The first key question is whether, based on the evidence before it, the Tribunal is convinced that in the absence of Respondent's breaches, the project would have become operational and would also have become profitable. The second key question is whether the Tribunal is convinced that it can, with reasonable confidence, determine the amount of these profits based on the inputs provided by the Parties' experts for this calculation. If the Tribunal reaches the conclusion that there are 'fundamental uncertainties' due to which it is not convinced that the project would have reached the operational stage and would have been able to generate profits, it cannot apply the DCF method. If it reaches the conclusion that no such 'fundamental uncertainties' preclude reliance on the DCF method but is not convinced by the inputs provided by the Parties' experts, it may conclude that it cannot apply the DCF method or it may conclude that certain deductions have to be made to account for additional risks or uncertainties faced by the project.*[65]

On the first issue, based on a detailed review of the challenges raised by Pakistan concerning the future viability and profitability of the project (including the likelihood of concluding a concession agreement with Pakistan and the resulting commercial and fiscal regime; the reliability of the claimant's resources estimation; the sufficiency of the metallurgical tests; the likelihood of obtaining necessary funding; and the feasibility and adequacy of the various plans in place addressing specific execution risks),[66] the tribunal concluded that but for Pakistan's violations, 'the Reko Diq project would have gone forward and become operational and profitable in due course'. The tribunal was convinced that 'based on the Feasibility Study . . . and the commitment shown by claimant as well as its two owners . . . , claimant would have been able to obtain the necessary funds and would also have brought the

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in metal price and production quantities) and asymmetric risk (i.e., risks unique to the investment, such as terrorist attack in the case of Reko Diq). Rather than assessing and indiscriminately compounding the implications of both risks in the choice of discount rate, this method will first seek to account for asymmetric risk by adjusting cash flow components so affected to generate a 'statistically expected outcome'. In addition, this method will use the future price of the commodity in question (which is deemed to be more certain than an analyst forecast price) to more fully account for the systematic risk in revenue calculation, and seek to take into account management flexibility (i.e., ability to reduce operational loss by shutting down the plant in a low price environment) and its impact on valuation. The resulting cash flow will then be discounted by a risk-free rate (i.e., only reflecting the time value of money) to arrive at a 'certainty equivalent' valuation. id., paras. 342–46.

63 id., paras. 107, 126.

64 *Crystallex International Corporation v. Bolivarian Republic of Venezuela*, ICSID Case No. ARB(AF)/11/2.

65 id., para. 330.

66 Section VII, C, Award.

necessary experience to successfully execute the project', noting the shareholders' global experience in operating copper and gold mines, their involvement from the early stage of the development and their substantial equity undertaking.[67]

On the second issue, the tribunal concluded that the proposed modern DCF method was suitable. The tribunal placed great weight on industry practice. In particular, the tribunal referenced opinions issued by CIMVAL, holding that standards and guidelines issued by CIMVAL 'reflect international best practices'[68] and are 'good evidence of the valuation methodology likely in practice to have been used by an actual buyer in the limited market for large-scale mining enterprises at the relevant time'.[69] In response to Pakistan's objection that there was no precedent for using the modern DCF method in investment arbitration, the tribunal held that 'the absence of investment treaty jurisprudence . . . does not in itself constitute a valid ground for rejecting a valuation method if the Tribunal is otherwise convinced that it is sound to apply it in the present case', noting that the law may well evolve with the development of valuation techniques in the industry.[70] Following some substantial adjustments to the calculation presented by the claimant, the tribunal awarded a pre-interest amount in excess of US$4 billion.[71]

Market-based approaches

The *Crystallex v. Venezuela*[72] case provides an example of the use of market-based approaches to value a non-producing project. The claimant had entered into an operating contract with a Venezuelan state-owned company to develop the Las Cristinas gold mine. Venezuela later refused to issue the environment permit citing environmental impacts, and the state-owned company eventually rescinded the operating contract. By that time, the claimant had completed a feasibility study (which had been approved by the Venezuelan authorities) and had established both proven and probable reserves. In 2011, the claimant commenced arbitration at ICSID under the Venezuela–Canada bilateral investment treaty seeking US$3.8 billion in damages.

Citing the CIMVAL Code as support, the tribunal agreed with the claimant that the asset in question was a 'development property'[73] and held that the use of market comparables was appropriate to value a development property like the Las Cristinas project.[74] In response to the argument made by the respondent that the comparables proposed by the claimant were distinguishable, the tribunal stressed that there were no exactly alike companies in the world and that the comparison was 'made with objects similar to the subject rather than with identical objects'.[75]

67 id., paras. 331–32.
68 id., para. 347.
69 id., para. 348.
70 id., para. 360.
71 id., para. 1742.
72 *Crystallex*, ICSID Case No. ARB(AF)/11/2.
73 *Crystallex*, Award, 4 April 2016, paras. 878, 883–84.
74 id., para. 901.
75 id., para. 902.

The *Crystallex* tribunal also applied the market capitalisation approach, noting that its application was 'particularly appropriate and reliable' to quantify the loss by reference to the difference in the market capitalisation of the claimant between the 'last clean date' and the valuation date.[76] In so deciding, the tribunal noted that the claimant was effectively a one-asset company and that its shares were actively traded on two stock exchanges, 'so that transactions were occurring with sufficient frequency and sufficient volume to provide pricing information on an ongoing basis that reflects the expectations of a multitude of arm's length buyers and sellers on the underlying value of the company'.[77]

Having found both market-based methods suitable, the tribunal further noted that the figures produced under the two methods were in close proximity of each other and awarded the claimant US$1.2 billion, being the average of the two valuation results.[78]

The tribunal also stated with respect to the P/NAV method (which the claimant had also proposed) that 'conceptually it would have no difficulties in accepting it as a method per se'.[79] The tribunal nevertheless found that the claimant's application of the method and, in particular, the comparables that it had used to derive a P/NAV multiple were unreliable.[80]

Other tribunals have been more hesitant to use market-based approaches. The tribunal in *Gold Reserve*, for example, rejected the application of the comparables method, noting 'many variables are specific to each mine (such as climatic and geological conditions) all of which have an impact on value'.[81] Likewise, in rejecting the comparables approach, the *Rusoro* tribunal emphasised that suitable comparables would need to reflect the 'special characteristics' of the case in question (i.e., 'a Russian managed company operating in a Bolivarian political environment').[82] Similarly, the tribunal in *Khan Resources* noted 'the difficulty of finding truly comparable companies' as the comparables provided by the claimant were 'based in different countries, under varying climatic, geographical and regulatory conditions to those experienced by Khan'.[83] In *Bahgat v. Egypt*, the tribunal likewise rejected Egypt's comparable transaction valuation on the ground that the iron ore projects used as comparators did not include steel-manufacturing facilities, which were an integral part of the integrated facility that the claimant was developing.[84]

As regards the market capitalisation valuation approach, the tribunal in *Khan Resources* acknowledged the possibility of assessing the value of a 'single-project' listed company by reference to its market capitalisation movements,[85] but emphasised the importance of conducting a sanity-check of market-based valuation numbers against the 'inherent value of the project'.[86] The tribunal found that the results of the market capitalisation method were unreliable in the circumstances of the case, given a large difference between the

76 id., paras. 889, 891.

77 id., para. 890.

78 id., para. 918.

79 *Crystallex*, Award, 4 April 2016, para. 896.

80 ibid.

81 *Gold Reserve*, Award, 22 September 2014, para. 831.

82 *Rusoro*, Award, 22 August 2016, para. 782.

83 *Khan Resources*, Award, 2 March 2015, para. 399.

84 *Bahgat*, Award, 22 December 2019, para. 501.

85 *Khan Resources*, Award on the Merits, 2 March 2015, para. 400.

86 id., para. 407.

valuation proffered by the respondent using the market capitalisation approach (between US$14.8 million and US$20.4 million) and the independent valuation result contained in the definitive feasibility study (US$275.9 million).[87] The tribunal noted that the large difference could mean either that 'the market was indeed already suspicious of Mongolia's motives and therefore approached [the valuation of the claimants] cautiously' (i.e., that its market price had already been contaminated) when the definitive feasibility study was issued, or that, as the claimants also argued, 'the "illiquid" nature of the market at the time [made] the approach unreliable' in the circumstances.[88]

In *Stans v. Kyrgyzstan*, the tribunal also rejected the market capitalisation valuation proffered by the claimant as unreliable. It emerged during the arbitration that the technical consultant responsible for the technical and economic assessment of the project had advised the claimant in two reports that the proposed operation would be unprofitable given the then current sluggish rare earth price globally (and continued feasibility study would be 'pointless'). The reports were never made public.[89] The tribunal rejected the claimant's market capitalisation valuation outright, noting that the market was not adequately informed about the real value of the claimant due to the non-disclosure of the reports, which if disclosed would 'in all probability have significantly changed the market's perception of the company's value'.[90]

Cost-based approach

Several tribunals have noted that cost-based compensation may not adequately reflect the value of development stage projects. The tribunal in *Khan Resources* stated that a 'sunk investment' approach would not be suitable for a project that had moved beyond 'a minimal stage of development, particularly after the release of the [definitive feasibility study]'.[91]

The *Crystallex* tribunal observed that the CIMVAL Code constituted 'important standards in the industry' and, taking note that the claimant had completed a feasibility study and established reserves and thus that the project constituted a 'development property' under the CIMVAL Code,[92] rejected the cost-recovery valuation proffered by the respondent. In particular, the tribunal held that, despite the fact that the Las Cristinas project was not in production, the claimant had made a case of 'future profitability' and projections could be made 'with a sufficient degree of certainty' given that (1) the size of the mineral deposits was known (with proven reserves), (2) the value of these deposits could be determined based on market prices (noting, in particular, that gold is less prone to market fluctuations than other commodities), and (3) the development costs of an open-pit mine like the one that was contemplated for the project are well-known in the industry and could reasonably be predicted.[93]

87 ibid.

88 ibid.

89 *Stans Energy Corp.*, Award, 20 August 2019, paras. 309–15.

90 id., para. 759.

91 *Khan Resources*, Award on the Merits, 2 March 2015, para. 409.

92 *Crystallex*, Award, 4 April 2016, paras. 878, 883–84.

93 id., para. 879.

The case of *Bear Creek v. Peru*[94] is a reminder that broad categories and industry guidelines (such as those adopted by the CIMVAL Code) are no substitute for a fact-based analysis tied to the circumstances of the case. The claimant in *Bear Creek v. Peru* held options to mining concessions for the Santa Ana silver project subject to obtaining the required authorisation from the Peruvian government. In 2007, the government issued a decree recognising the project as a public necessity and authorising the claimant to acquire, own and operate it. Four years later, in the face of protests by indigenous communities, the government issued a new decree revoking the finding of public necessity. The claimant filed for arbitration at ICSID, claiming damages of US$522 million based on a DCF valuation of the project.

As support for the quantum of its claim, the claimant contended that the project qualified as a 'development property' under the CIMVAL Code at the time of the taking (and therefore that the DCF method was an appropriate valuation method),[95] as the claimant 'had established a Mineral Reserve, was in the process of completing the [environmental and social impact assessment], and was readying for development of the site with expected production by the end of 2012'.[96] While the project faced local opposition, the claimant argued that a 'social licence to operate' (i.e., the consent of the neighbouring communities to the mining development relating to the state's consultation obligations under an international convention concerning indigenous peoples) could have been obtained 'had it been provided an opportunity to invest the time and money to do so' and that such challenges were not unexpected for miners and were reflected in the valuation.[97] Peru countered that the DCF method was too speculative for a 'still-on-paper' project and that only cost-based recovery should be allowed,[98] stressing that the claimant had not obtained the required approvals for the exploitation phase and that community opposition could thwart a project even after an environmental approval was obtained.[99]

The tribunal found Peru liable for expropriation of the project, but declined to award damages based on a DCF valuation. Agreeing with the respondent that the project was at an early stage, the tribunal noted that the project lacked many governmental approvals at the time of the taking, and held that there was 'little prospect' for the claimant to obtain the necessary social licence even if the governmental approvals were obtained.[100] The tribunal concluded that, in fact, 'the Project [was] well and truly at an end' given the long-standing local community opposition.[101] While the DCF method could be appropriate to value an early stage pre-production project in certain circumstances, including where the claimant could show 'expertise and proven record of profitability of concessions it (or indeed others) had operated in similar circumstances', the tribunal held that the claimant failed to provide

94 *Bear Creek Mining Corporation v. Republic of Peru*, ICSID Case No. ARB/14/21.

95 *Bear Creek*, Award, 30 November 2017, para. 581.

96 *Bear Creek*, Expert Report of FTI Consulting, 29 May 2015, para. 7.16.

97 *Bear Creek*, Award, 30 November 2017, para. 579.

98 id., para. 590.

99 id., paras. 642, 643.

100 id., para. 600.

101 id., para. 657.

'convincing evidence of its ability to produce profits' among the challenges and uncertainties faced by the project.[102] The tribunal awarded damages based on the amounts invested, which were assessed at approximately US$18 million.[103]

Bahgat v. Egypt[104] is another reminder that much will depend on the specific facts of the case. The case involved the expropriation of an integrated iron ore mining and steel-manufacturing project in Egypt. The project was at a relatively advanced stage and had obtained a feasibility study.[105] Based on an assessment of the thoroughness of the claimant's technical studies, the tribunal found that the project was 'technically and economically viable' at the time of the taking.[106] Emphasising that the project did not qualify as a going concern,[107] the tribunal (by a majority) nonetheless went on to reject the DCF valuation proffered by the claimant and instead awarded compensation based on the claimant's sunk costs, awarding US$39.77 million (before interest). In declining to apply the DCF method in that case, the tribunal distinguished *Gold Reserve* and *Crystallex*, noting the 'particularity of the gold market' (i.e., the rather unique 'commodity nature' of gold that could help to reduce the uncertainties in applying the DCF method). The tribunal did not appear convinced that the same level of certainty could be achieved when it came to the valuation of an iron ore extraction and steel-manufacturing project.[108]

Other approaches

Recent cases have adopted a variety of other approaches to establish the fair market value of the mining investment in question. In *Khan Resources*, having found that none of the other methods were suitable, the tribunal considered that certain third-party offers for the project made before the taking provided the best indicator of the project's value. On that basis, the tribunal selected one such offer and, after making certain adjustments, valued the investment at US$80 million.[109]

In *Rusoro*, having rejected the DCF and comparable methods, the tribunal decided to assess the 'genuine value' of the investment (a portfolio of 58 different mining titles and rights) by weighing three different valuations, namely: (1) the claimant's maximum enterprise value of US$700.6 million, deriving from the claimant's peak market capitalisation in 2008 plus net debt; (2) the net book value of the claimant's assets of US$908 million at the time of the taking; and (3) the amount originally invested by the claimant, adjusted to reflect the increase of gold price after the acquisition (US$1.1287 billion).[110] The tribunal awarded US$966.5 million, based on a weighted average of the three valuations.[111]

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102 id., paras. 601–03.

103 id., paras. 656–61.

104 *Mohamed Abdel Raouf Bahgat v. Egypt*, PCA Case No. 2012-07.

105 id., paras. 472–74.

106 id., para. 479.

107 id., para. 433.

108 id., paras. 444–45.

109 *Khan Resources*, Award on the Merits, 2 March 2015, para. 419.

110 *Rusoro, Award*, 22 August 2016, para. 788.

111 id., paras. 789, 790. In January 2019, the Paris Court of Appeal partially set aside the award on the ground that the tribunal had exceeded its jurisdiction when considering the market value of the projects as reflected more than three years before the expropriation while the applicable treaty contained a three-year limitation

In *Bilcon v. Canada*,[112] the claimant was seeking to develop the Whites Point quarry in Nova Scotia to produce aggregates products. The project raised environmental concerns and faced local opposition. Following environmental assessments by the federal and provincial authorities, a joint review panel recommended against permitting the project because of its adverse impact on the 'community core values' of the local area, which led to the project rejection in late 2007. In 2008, the claimant filed for arbitration against Canada under the North American Free Trade Agreement (NAFTA), seeking damages of at least US$101 million.

The tribunal found that Canada's handling of the environmental review process had denied the claimant a 'fair opportunity' to have the environmental impact of the project assessed according to the law (and thus to obtain an environmental permit) in breach of its obligations under NAFTA.[113] At the quantum stage, the tribunal rejected the claimant's DCF valuation given the 'particularly pronounced' uncertainties of the investment's long-term profitability and other development conditions,[114] as well as the sunk cost approach that Canada proposed.[115] Instead, in line with its finding that Canada's handling of the environmental review process had denied the claimant a 'fair opportunity' to obtain an environmental permit,[116] the tribunal went on to assess the value of that opportunity, assuming the environmental assessment had been conducted in a 'fair and non-arbitrary manner'.[117] According to the concurring arbitrator, such a 'lost opportunity' based valuation is an 'in-between approach' between the DCF calculation for lost profit and the cost-based recovery, applicable when an internationally wrongful act denies the investor's opportunity to obtain the regulatory approval and to otherwise progress the project.[118]

In valuing the lost opportunity, the tribunal first considered the expenses incurred by the claimant in preparing for and participating in the environmental assessment and in dealing with negative governmental findings,[119] and held that the value of the lost opportunity should exceed the total figure by a 'reasonable margin' as no rational business person would otherwise commit those expenses.[120] As a secondary indicator of value, the tribunal considered that, while the DCF method was not appropriate in the circumstances, 'the prospect of future earnings must not be disregarded entirely' and sought 'to establish an implied value range of the investment opportunity presented by the Whites Point Project,

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period (which the tribunal had applied on the merits to exclude Venezuela's responsibility for certain acts). See Paris Court of Appeal, No. RG 16/20822 (29 January 2019). In late March 2021, the French Court of Cassation overturned the decision of the Paris Court of Appeal on the ground that the limitation period in the treaty did not constitute a jurisdictional requirement. See Court of Cassation, Case No. Y 19-11.551 (31 March 2021).

112 *Bilcon of Delaware et al v. Government of Canada*, PCA Case No. 2009-04, Award on Jurisdiction and Liability, 17 March 2015, and Award on Damages, 10 January 2019.

113 *Bilcon*, Award on Jurisdiction and Liability, 17 March 2015, para. 603.

114 *Bilcon*, Award on Damages, 10 January 2019, paras. 276–78.

115 id., para. 233.

116 *Bilcon*, Award on Jurisdiction and Liability, 17 March 2015, para. 603.

117 *Bilcon*, Award on Damages, 10 January 2019, para. 281.

118 ibid.

119 ibid.

120 id., paras. 282, 288.

as it was seen by economic operators at different points in time' by reviewing the financial terms of three past transactions involving the project.[121] On that basis, the tribunal awarded the claimant US$7 million.[122]

Conclusion

As shown above, tribunals engage in fact-intensive analyses in valuing non-producing mineral projects. The reported cases reflect a variety of approaches and a broad range of results and demonstrate an increasingly sophisticated understanding by investment treaty tribunals of the mining industry. Invariably, key considerations in such assessments are the development stage of the property and the adequacy of information and associated level of confidence in the project's future profit generation potential.

121 id., paras. 288–99.

122 id., para. 303.

Appendix 1

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