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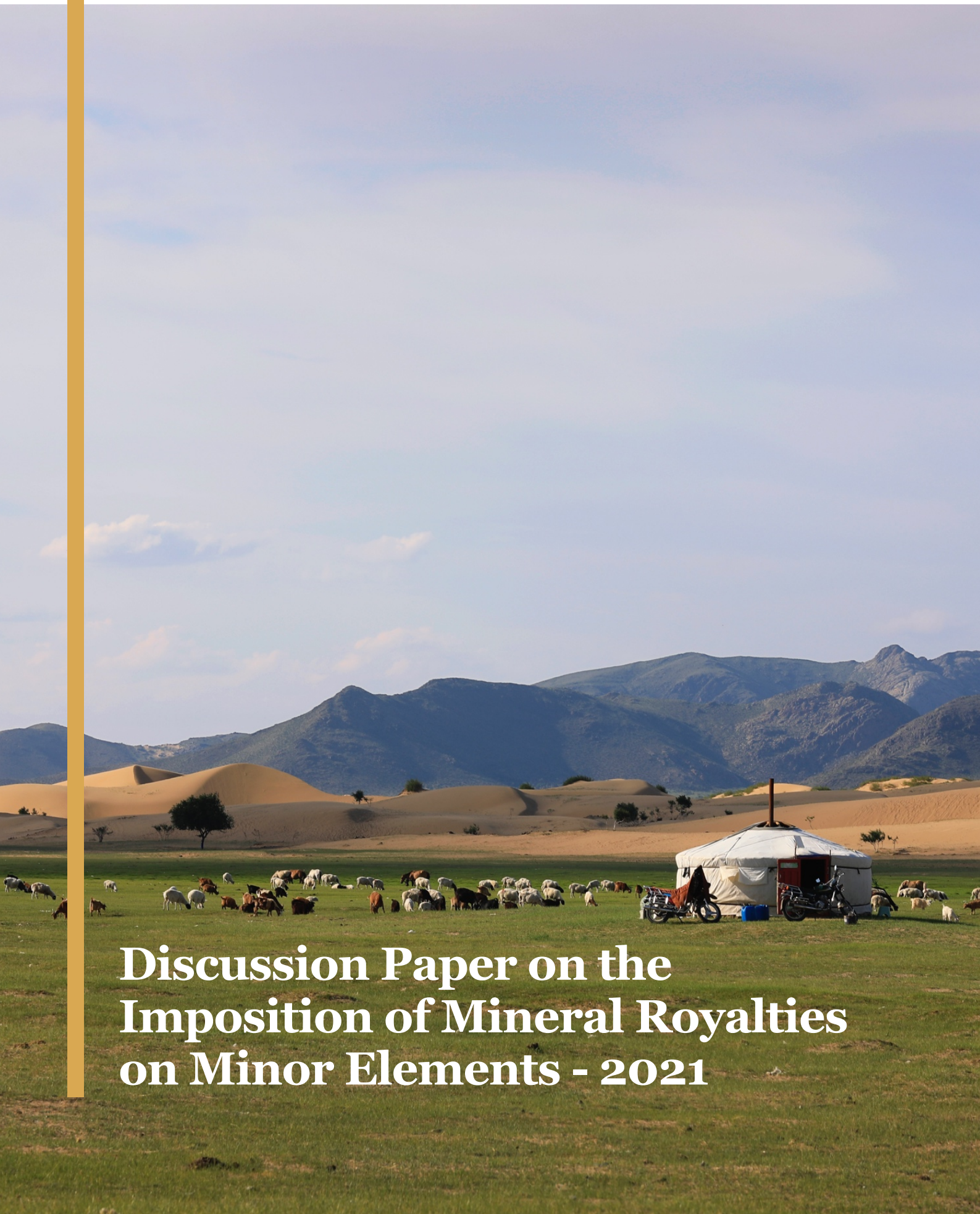

Discussion Paper on the Imposition of Mineral Royalties on Minor Elements - 2021

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General conclusions

Strictly from the Government's point of view, but not necessarily from that of industry, the current Mongolian value-based royalty regime has many positive aspects and does not require any significant amendments other than addressing administrative issues arising from the imposition of mineral royalties on 'minor metals' contained in mineral products such as ores and concentrates. Varying the royalty rate as a function of both metal prices and degree of downstream processing makes the system economically efficient and equitable, while basing royalties, in the majority of cases, on the gross sales value linked to published commodity prices with no allowable deductions makes it unambiguous, hard to avoid and relatively easy to comply with.

The administrative difficulties addressed in this report stem primarily from a too literal interpretation of the term 'sales value' as it concerns 'minor metals' in Article 47 of the Law on Minerals and related Regulations.

The current Mongolian approach goes beyond the general international practice of levying royalties on minor minerals for which the miner receives a 'credit' or payment in addition to the sales price for the major metal contained in the mineral product, resulting in mineral royalties being imposed on:

1. Minerals/elements for which buyers apply a 'penalty' in the form of a discount on the sales price realized by the miner for the major metal contained in the mineral product on account of their deleterious effect on the smelting and refining processes, and

2. Minor minerals for which the miner receives no 'credit' or payment in addition to the sales value of the major metal and that may be present in the mineral product in concentrations so low as to make it impossible to commercially extract them under current and foreseeable metallurgical technologies.

The scope of the present research, in addressing point 1 above, included detailed quantitative case studies comparing the royalty value bases and collections for actual copper, zinc and iron ore concentrates in Mongolia, with the related payment by smelters or Net Smelter Value (NSV) and the royalty payments that they would have incurred if they were produced in the leading Australian mining jurisdictions of Western Australia and Queensland. This included gathering comprehensive information relating to the 'credit' and 'penalty' rates applied by smelters/refiners for typical minor metals/elements contained in various types of concentrates.

In all three cases and particularly for copper concentrates, the royalty collected under the Mongolian regime vastly exceeded those under the Australian regimes. This was the case even if the component of royalty collections attributable to 'minor metals' was removed.

In addition, the proportion of royalty collected in Mongolia attributable to 'minor metals' ranged between 1.5% in the copper concentrate case and 25.6% for the zinc one.

Mineral royalty collections statistics indicate that in 2020 only 73.25 billion MNT ($29.30 million) out of a total of 1,572.47 billion MNT ($628.99 million) were collected on 'minor metals. This represents

4.66% of total royalty revenue for the year of which 4.24% or 66.74 billion MNT ($26.70 million) is attributable to gold and silver as 'minor metals' that is to say not as the primary metals in semi-processed gold products. Gold and silver were the only 'minor metals' for which the copper and the zinc miners received a 'credit' payment from the smelters, probably of the order of 85% of their value, while having to pay royalties to the Mongolian Government on a number of other minor metals including 'penalty' metals for which they received no payment at all. This was the case for instance for the iron content in copper and aluminium and sulphur in iron ore concentrates. Indeed some 1.105 billion MNT ($0.44 million) were collected on the aluminium content of iron ore concentrates, even though the sellers may have been penalized twice, firstly because buyers imposed a price penalty and secondly because Government levied a mineral royalty on it. In effect the market may place a negative value on some of these minor metals, while Government may deem that they have a high 'sales value', even though they may not be recoverable and, in the case of aluminium, may form costly slag in the blast furnace. In this light it should come as no surprise to Government if the parties involved may feel aggrieved and claim lack of procedural fairness.

The second part of the study addressed point 2 above by reviewing what the international best practice currently is regarding the imposition of mineral royalties on 'minor metals.' A review of the royalty regime of a large number of mining jurisdictions throughout the world indicated that:

- none of the jurisdictions examined appear to have specific laws and regulations providing for the levying of royalties on metals for which miners receive no payment, making

- the current Mongolian practice is rather unique in the world.

Asides from specific volume or weight-based royalty regimes that are not a function of sales value, the majority of royalty regimes are either value- or profit-based. Minor metals issues, of course, do not arise in the case of profit-based royalty systems as they rely entirely on 'realized' financial measures to establish their royalty bases, auditable through the related sales invoices.

Value-based royalty regimes, by contrast, are split between those based on actually 'realized' revenue as from related sales invoices and, as in the case of Mongolia, those based on 'estimated' sales value. Mongolia, however, differs from the rest of value-based regimes in that it imposes a royalty on all metals irrespective of whether the seller actually received payment for them or not.

This does not mean that the issue of 'minor metals' does not arise in other jurisdictions besides Mongolia, but rather that it is addressed primarily at an earlier stage of the approval process, primarily when a company submits to Government a Notice of Intent (NoI) to develop a mineral deposit. While it is justifiable to assume that the interests of companies and of Government should be broadly aligned, it is at this stage that Government may question whether the development, as proposed in the Feasibility Study (FS) tabled in support of the Notice of Intention to mine (NoI), is optimal from the point of view of the state. Questioning should include the rationale why commercial recovery of certain 'minor metals' occurring in comparatively high concentrations has not been considered feasible. Accordingly, the development plan may be reconsidered, or the final mining agreement may include an obligation on the mining company to review the commercial feasibility of extracting one or more of the most promising minor metals at some point in the future in light of changes in commodity prices and possible technical advancements in relevant metallurgical processes.

Another important question is how low should the level of concentration of individual 'minor metals' be before they do not justify extraction and can be disregarded as 'prima facie' commercially irrelevant and, therefore, be exempt from royalties? An interesting approach in this regard is to be found in the Western Australian royalty regulations that prescribe the minimum vanadium content of iron ore (magnetite) concentrates above which a royalty applies irrespective of whether vanadium is produced or not. This measure was deemed necessary because the rapidly rising price of iron ore risked rushed and suboptimal development of significant local resources of vanadiferous magnetite.

While the issue of 'minor metals' royalties is a relatively minor component of the broad spectrum of mining governance provisions in Mongolia, it does nonetheless contribute to an international general perception of the country's mining regulatory regime inhibiting foreign direct investment in mineral exploration and mining. This is regretful given the country's recognized very high mineral potential.

It is considered that the direct and indirect potential benefits of rectifying the 'minor metals' anomaly would over time largely outweigh the opportunity cost of implementing the necessary regulatory amendments in terms of the related, relatively minor, revenue foregone.

For instance, the revenue that would have been foregone in 2020 by exempting from mineral royalties all the non-precious minor metals would have been of the order of 6.513 billion MNT ($2.61 million). This represents a mere 0.41% of total mineral royalty collected. In addition, exempting non-precious minor metals from royalties would significantly simplify the related administrative processes, resulting in significant offsetting savings to Government, particularly in terms of the reduced requirement for chemical assays. To the extent that under the current system miners receive no payment for non-precious minor metals/elements, removal of the imposition of royalties on them, and particularly on penalty metals/elements, would be and be seen by industry as fair.

By contrast, miners receive payment for the largest proportion of the total value of precious minor metals, that is to say gold and silver other than as primary metals, in the form of 'credits' in addition to the price received for the main metal(s) in copper, zinc and other concentrates and semi-processed gold products, The total amount of royalty collected on precious 'minor metals' in 2020 amounted to 66.742 billion MNT ($26.70 million), of which only about 14.6% or 9.715 billion MNT ($3.88 million) is estimated to have been collected on precious 'minor metals' for which miners had not received payment. While in theory it would appear fair to exempt from royalty this proportion of precious 'minor metals' for which miners were not paid, doing so would not only entail foregoing the relevant revenue. but also introducing significant additional administrative complexity and compliance costs on both Government and industry. This is because the collection process would presumably have to be amended to include adjustments to the royalty payable by the miners based on regular declarations by them as to the amount of 'credits' for precious' minor metals' received from the smelters for each sale of concentrate.

Recommendations

On the basis of the above conclusions, it is recommended that the Mongolian Government should:

1. Impose a mineral royalty on minor metals/elements in mineral products, the recovery of which is potentially economically profitable and technologically possible, irrespective of whether they are actually extracted or not during further processing of the mineral products.

2. Publish, as proposed in Appendix 1, a list of the above minor metals/elements in mineral products that should be subject to royalty based on internationally accepted principles and practices in trade and in extractive/metallurgical technology.
3. Determine the 'sales value' of minor metals/elements to be subject to royalty based on their reference price, as regularly published by the Government, and their percentage content in mineral products as determined by a laboratory authorized/certified/accredited in Mongolia, without taking into account minimum payment thresholds and without deducting the extracting and, treatment and refining charges customarily imposed by smelters.
4. Review, and from time to time update as necessary, the list of minor metals/elements in mineral products to be subject to royalty taking into account emerging improvements in the processing technology of mineral products and the market prices of minor metals/elements contained in them.
5. Exempt from mineral royalty the minor metals/elements specified for various mineral products in Appendix 1, including:
   (a) minor metals/elements, recognized in international trading as "penalty" because of their deleterious effect on smelting and refining processes; and
   (b) minor metals/elements that are impossible and/or clearly uneconomic to be recovered under current mineral processing technologies and prices.
6. The list of minor metals/minerals exempted from royalty shall be established, and from time to time reviewed as necessary by the Government, taking into account improvements in the extraction technology and/or market price of individual minor metals/elements that may render their recovery economically feasible.
7. Ensure, prior to approval to mine, whether the feasibility study tabled in support of the notice of intent to develop a mine has adequately canvassed the commercial feasibility of extracting some of the 'minor metals' occurring in comparatively high concentrations and what criteria were adopted to discard as 'prima facie' technically and/or commercially unfeasible minor metals occurring in low concentrations.
8. Introduce amendments to the Law on Minerals and/or related Regulations bestowing on Government discretionary power to set and from time to time review as necessary maximum concentration limits for any individual minor metal above which a mineral royalty would become payable whether or not the metal is extracted or not in practice. These limits should be set if/when necessary with reference to international industry practice and updated as necessary in light of metallurgical technological and marketing improvements.
9. To the extent that the changes to the royalty regime proposed in this report will be welcome by the mining industry, involve them and seek their advice in their formulation and finalization as soon as broad agreement as to a possible course of action is reached within Government.

1 INTRODUCTION

1.1 Background

The Government of Mongolia and the Government of Australia, through the Department of Foreign Affairs and Trade (DFAT), have partnered for the Australia Mongolia Extractives Program 2 (AMEP 2) to assist Mongolia to sustainably manage its resource-led growth and to improve the investment attractiveness of its extractives sector. AMEP 2 is funded by the DFAT and implemented by Adam Smith International (ASI) under the leadership of the Mining Policy Department of the Ministry of Mining and Heavy Industry (MMHI).

The purpose of the present component of AMEP 2 is to address and hopefully help resolve conflicting interpretations/understanding of the imposition of royalties on minor elements between the MMHI, the Ministry of Finance (MoF) and General Department of Taxation (GDT) in order to inform the process of designing an amended technical guideline.

The current report considers fundamental mineral royalty principles and objectives, and reviews international good practice relating to the imposition of royalties on minor elements, with particular focus on payable credit by-products and penalties for elements deleterious to the smelting and refining processes. The analysis is supported by detailed modelling of mineral royalty calculations for a range of actual Mongolian shipments of copper, zinc and iron ore concentrates, comparing them with the corresponding royalties that would have been levied had the same concentrates been produced and exported from the leading mining jurisdictions of Western Australia and Queensland.

1.2 Current Mongolian Royalty Issues

The Mongolian practice of levying mineral royalties on 'minor metals' contained in mineral products such as ores and concentrates, under Article 47 of the Law on Minerals, has generated administrative difficulties and deep discontent in industry. Addressing these difficulties, that stem primarily from too literal an interpretation of the term 'sales value' as it concerns 'minor metals' in the Law on Minerals and related Regulations, is the main objective of this report.

The current Mongolian approach is quite unique in so far as it goes beyond the general international practice of levying royalties on minor minerals for which miners receive a 'credit' or payment in addition to the sales price for the major metal contained in the mineral products sold, resulting in mineral royalties being imposed on:

- Minerals/elements for which buyers apply a 'penalty' in the form of a discount on the sales price realized by the miner for the major metal contained in the mineral product on account of their deleterious effect on the smelting and refining processes, and

- Minor minerals for which the miner receives no 'credit' or payment in addition to the sales price of the major metal and that may be present in the mineral product because:
    - It would be technically impossible to extract them from specific ores or concentrates, and/or
    - even if their extraction is technically possible, their concentrations are so low as to make it impossible to extract them commercially under current and foreseeable metallurgical technologies.

In addition, the law as it currently stands is ambiguous as it does not provide any criteria as to how metals to be subject to royalties should be selected and why. At the limit, in the absence of specified

concentrations for each metal/element below which no royalty should apply, a strict application of the law should theoretically result in royalties being levied on all of them which, of course, is nonsensical. On the other hand, the selection as to which metals to tax entails the exercise of significant administrative discretion not backed by relevant delegated ministerial powers in the legislation and could be considered arbitrary.

2 MINERAL ROYALTIES: PRINCIPLES, OBJECTIVES, TYPES AND ADMINISTRATIVE CONSIDERATIONS

2.1 Fundamental Principles

The legal basis for levying mineral royalties is ground in the following generally recognized principles:

- Minerals in the ground belong to the State. With rare and highly localized exceptions, this is the fundamental principle underpinning the mining legislation of all the mining nations in the world including Mongolia.
- Mineral royalties are, strictly speaking, not a tax, but the price paid by miners in consideration for the right to extract and sell the State's nonrenewable mineral resources. This philosophy is a widely accepted by both governments (including that of Mongolia) and industry.
- Consequently, mineral royalties should be based on the value of the ore at the point of extraction or mine-head value.
- The mine-head value should ideally be derived with reference to the price realized on the arm's-length sale of the first downstream mineral product sold to an unrelated party. While many jurisdictions base their royalties on the 'realized' sales price, many like Mongolia, base them on an 'estimated' sales value derived from the quantity of mineral sold multiplied by an appropriately referenced market price.
- Accordingly, no mineral royalties should be charged on any value added to the minerals by downstream processing beyond the mine head. As discussed in more detail later, many jurisdictions including Mongolia that use a value-based royalty system, broadly comply with this principle by charging royalty rates that decrease depending on the amount of downstream processing carried out to turn crude ore into their first mineral product sold.

2.2 Reconciling Conflicting Government's Royalty Objectives

The policy as to the amount of revenue to be raised through the imposition of mineral royalties and the type of royalty system to be used cannot be formulated without cognizance of a range of other Government's objectives, including:

- Revenue maximization
- Investment attraction and expanding the tax base
- Economic efficiency
- Equity
- Clarity, stability and ease of administration

Unfortunately, from the Government's point of view, some of these objectives are mutually incompatible and cannot be optimized individually but need to be balanced in the form of acceptable compromises.

While all governments would like to maximize revenue, comparatively high royalty rates will discourage foreign direct investment (FDI) in mineral exploration and mining with limited international capital being redirected to more fiscally competitive international jurisdictions. As a consequence, growth in the tax base will be constrained, resulting in fewer captive mines being highly taxed rather than a larger number of mines less heavily taxed. This has to some degree been happening in Mongolia in recent times.

On the other hand, attracting FDI through fiscal incentives will reduce revenue and make it more unpredictable, as well as introducing administrative complexity.

Ideally the type of royalty system selected should not distort investment decisions leading to efficient economic utilization of resources by preventing, or at least limiting, high-grading and sub-optimal exploitation of mineral deposits. In this respect the Mongolian value-based system, with rates varying as a function of commodity prices and of the level of downstream processing, is a reasonably economically efficient compromise. Its minor inefficiency is compensated for by being relatively simple to administer and hard to avoid, while generating stable and predictable revenue as long a mine continues to operate.

Stability and transparency of the royalty system is a very desirable attribute from the investor's point of view who often insists on a 'stability agreement' being in place before committing significant initial capital to a mine development. From the Government's point of view entering into this type of agreements to cater for the needs of individual developers is often inevitable in spite of their long-term negative consequence in terms of constraining Government's future capacity to increases royalty rates in response to significant often unforeseen increases in metal prices and other changing circumstances and creating expectations on the side of future developers of being granted the same conditions as in past contracts in spite of circumstances having evolved. The result in the end may be multiple royalty systems creating administrative complexity as well as potential claims of inequitable treatment on the side on new investors denied the incentives provided to earlier developers.

2.3 Mineral Royalties as a Component of the Mining Taxation Package

Asides from a large number of other minor imposts and free-carried government equity in projects, mineral royalties and corporate income tax (CIT) represent the main sources of government revenue in the context of mining. The proportion of revenue levied by mineral royalty relative to CIT varies among different jurisdictions, making direct comparisons on the basis of royalty rates alone deceiving. Meaningful comparisons between different mining fiscal regimes need to be on the basis of the aggregate revenue collected from all the components of their fiscal packages.

Appendix 2 provides basic information about the components of the mining fiscal regime of the majority of the world mining jurisdictions. While Mongolia ranks among some of the highest royalty regimes in the world, this is to some degree balanced by its CIT rate that at 25% is in the low side of the international range. In this respect Mongolia as many other jurisdictions in the world has been counteracting the greater opportunity for tax minimization provided by the administrative complexity of CIT by relying more on the generally harder-to-avoid mineral royalty components of its fiscal packages.

This trend is confirmed by the composition of total taxes levied from the extractive sector in Mongolia in 2019, as shown in Table 1, where mineral royalties represented 45.4% of all taxes levied compared to 27.7% for CIT, with only a minor proportion (i.e. MNT 231.7 billion or 7.3%) of the total tax collected from the petroleum industry.

Royalty collections have increased rapidly in recent year in Mongolia due to both increases in commodity prices and production volumes outperforming the corresponding increases in profits and consequently in CIT collections.

Table 1. Individual Sources of Extractive Sector Taxation Revenue

Tax Revenue from Extractive Sector			
2019	**MNT Billion**	**$ Million**	**%**
Royalty	1425.7	542.5	45.4%
CIT	869.2	330.7	27.7%
Vat	43.1	16.4	1.4%
Others	800.5	304.6	25.5%
TOTAL	**3138.5**	**1194.3**	
Source: Modified from EITI 2020 Report			

In addition to royalties and CIT, government revenue is also generated by a large number of other taxes and imposts that, while individually less onerous, collectively represent a significant proportion of the overall government take. The majority of these imposts such as capital gain tax (CGT), value added tax (VAT), import-export duties and excises, withholding tax on remittance of interest and dividends abroad, stamp duties on transfer of assets, payroll and other financial transaction taxes, are applicable across the economy. Other imposts, such as mining license fees and tenement rentals, various inspection fees, certain forms of local government rates etc. are by contrast industry specific. Most of these imposts, which in the case of Mongolia account for about ¼ of the total tax levied on the extractive sector, are also in general hard to avoid.

Appendix 3 provides a listing of and extracts from all the Mongolian laws that enable Government to collect mineral royalties. Central among these is the Law on Minerals enacted in 2006 and related Regulations that since then have been the subject of numerous and important amendments the latest in 2019. The Law on Minerals is enforced under the umbrella of the Constitution of Mongolia and interfaces with other pieces of legislation such as the Law on Subsoil, the General Law on Taxation and other taxation laws, as well as with the Law on Investment and other laws.

2.4 Types of Mineral Royalties

The amount of mineral royalty to be levied is generally derived by multiplying a 'royalty base' by a 'royalty rate'. There are different mineral royalty systems generally distinguished by their individual royalty, including:

- Volume or weight: a fixed dollar amount per either cubic meter or tonne; or
- Value (ad valorem): a percentage of the gross or net 'sales value', either realized or, as it is the case of Mongolia, estimated with reference to published commodity prices; or
- Profit/rent: a percentage of the profit (generally specifically calculated for the purpose) or of the economic rent generated by individual projects, with the latter currently confined to the petroleum industry; or
- Hybrid: in general a profit-based royalty subject to a minimum ad valorem royalty to ensure a degree of revenue stability.

While profit- or rent-based royalties are economically efficient and equitable in terms of the royalty-payer's ability-to-pay, they are administratively complex and more easily avoided, and generate unstable revenue flows with often little or no revenue in the early stages of projects.

It is to circumvent the above drawbacks that the majority of mining jurisdictions have opted for value-based royalty systems, with some including Mongolia lessening the loss in economic efficiency by making royalty rates a function of both commodity prices and/or level of downstream processing.

Figure 1 schematically displays the degree to which each royalty type achieves the government's objectives discussed in Section 2.2 above.

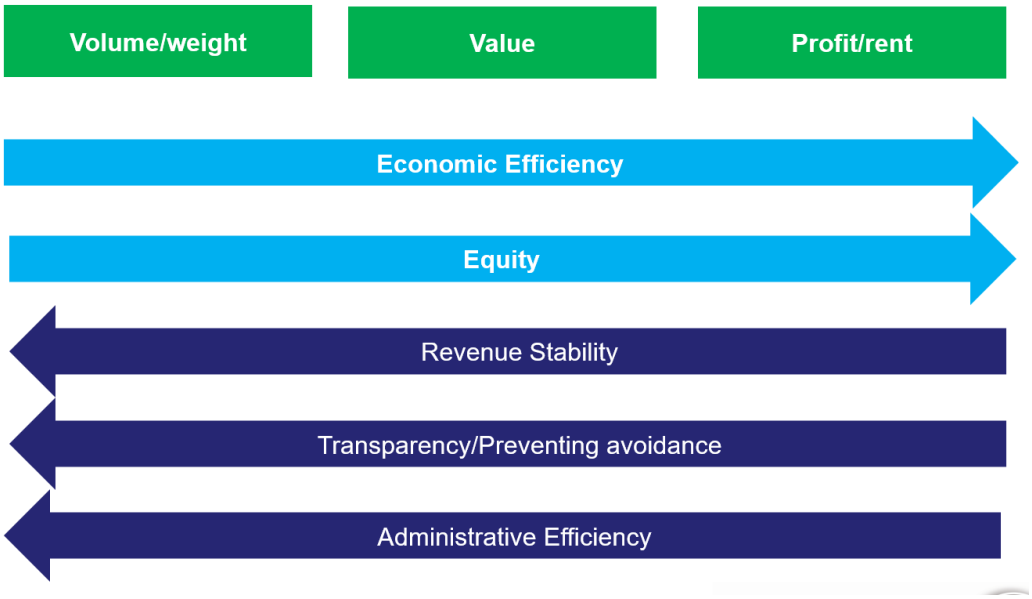

Figure 1. Main objectives achieved by the various types of mineral royalties

2.5 Focusing on Value-based or *ad valorem* royalties

As already pointed out, value-based royalty is by far the most commonly applied system in the world. Although royalty collection should relate to the value of the ore at the mine-mouth, very few sales of crude ore take place at that point with most mineral products being sold after having undergone some degree of value-adding downstream processing. It is at the point of the first arm's-length sale of a mineral product to an unrelated party that a taxing authority obtains reliable pricing information. It has then the option of applying an appropriate royalty rate on the realized sales value at the point of sale or derive a corresponding royalty value base at any point upstream from it by netting back the relevant downstream processing costs between the two points as shown in Figure 2. For the sake of economic efficiency and not to discourage investment in downstream processing, as discussed below, the royalty rates to be applied at any point along the mineral value chain between ore and refined metal will need to decrease with increasing downstream processing.

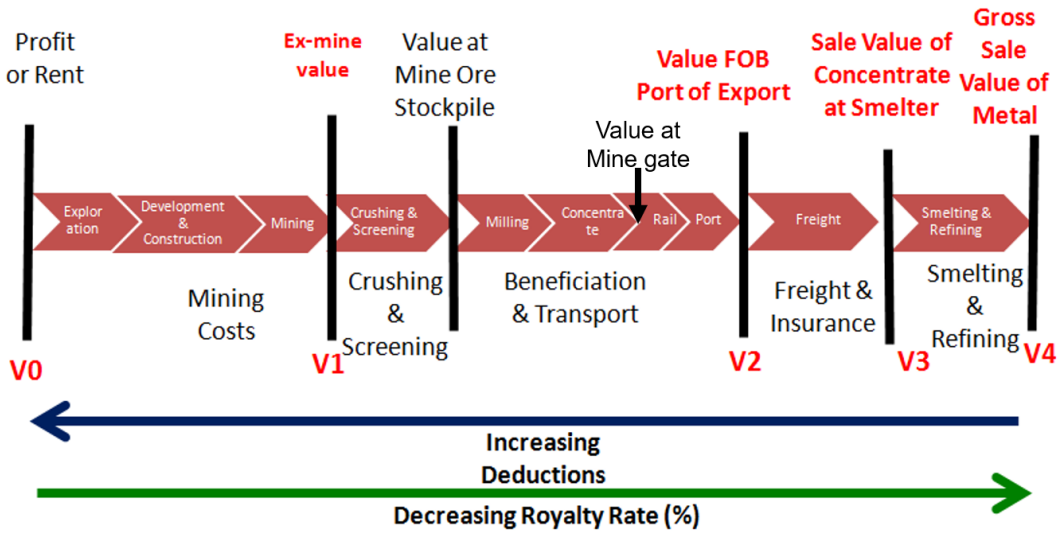

Figure 2. Potential points along the mining value chain at which mineral royalties could be levied

Source: Modified from Guj et al, 2012

2.5.1 Taxation point/royalty value base

In establishing an appropriate royalty sales value base, the taxing authority confronts, as shown in Figure 3, the choice as whether to use either the:

- 'Realized' sales value, or
- 'Estimated' sales value of the mineral(s) contained in the product sold.

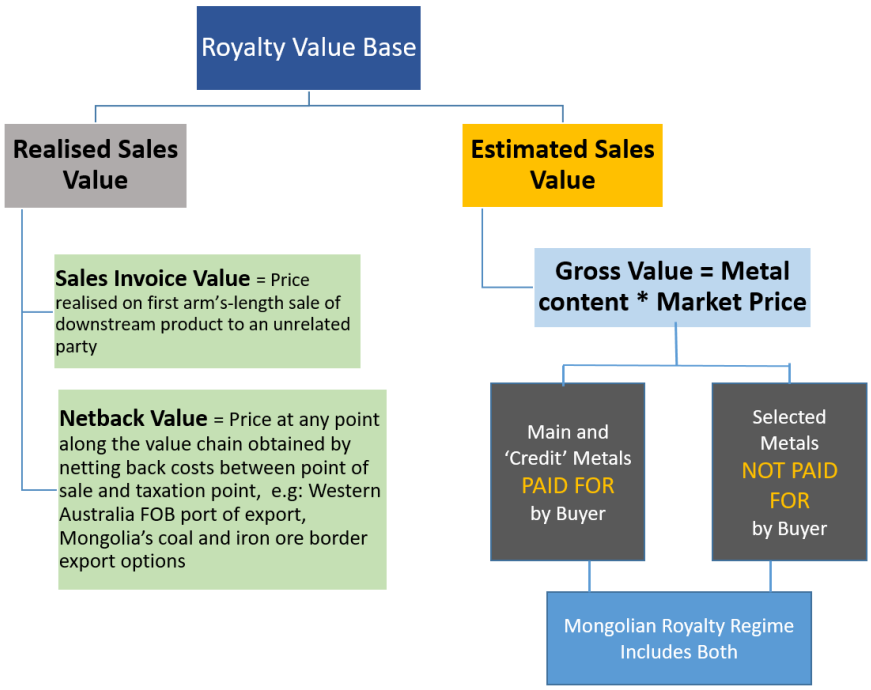

Figure 3. Schematic categorization of the different types of value bases used in value-based royalty systems

Furthermore, if the realized sales value is adopted as the royalty value base can be either the:

- Sales invoice value at the point of sale without allowing any cost deductions; or
- Netback value at any point along the value chain obtained by deducting specified costs incurred upstream of the point of sale.

The alternative is to select a gross estimated sales value obtained by multiplying the metal content of each metal in the ore or concentrate for which the miner has received payment by their respective market prices on the date of sale or by an average price over a defined period as specified in the royalty regulations. International jurisdictions using a value-based royalty system are roughly equally split in their choices between 'realized' versus 'estimated' sales value bases.

As discussed in more detail later, Mongolia differs from other jurisdictions using an estimated gross sales value as a royalty base in so far that it includes in its sales value base the value of selected minor metals for which the seller received no payment.

Under the Mongolian royalty regime, the 'gross' sales value base for various metals is obtained by multiplying their content in the mineral product sold by their average price for the previous month using metal prices regularly quoted by reputable market sources. The Mongolian Government, in compliance with Article 47.14 of the Law on Minerals and Government Resolutions No. 131 of 2013, No. 81 of 2016 and No. 342 and 465 of 2019, regularly publicizes the international market prices of export minerals. The latest prices for metallic commodities and their sources as publicized on 5 February 2021, are listed in Table 2 while a detailed list of prices for fluoride and coal of various qualities is provided in Appendix 4.

Table 2. Prices for Metallic Commodities and their Sources as publicized on 5 February 2021

Commodity	(USD/Ton)	Source
Zinc	2,707.70	https://www.lme.com/
Copper	7,970.50	
Black Lead	2,014.93	
White Lead	21,955.45	
Aluminum	2,003.80	
Molybdenum	22,527.91	
Iron Ore (56% content)	135.98	www.umetal.com
Iron Concentrate (60% content)	154.83	
Tungsten concentrate (65% content)	13,645.08	www.asianmetal.com
Manganese ore (36%content)	195.88	www.asianmetal.com
Gold *(MNT/gram)*	170,985.19	http://www.mongolbank.mn/
Silver *(MNT/gram)*	2,276.87	

The ‘reference’ prices used in estimating gross sales values are based on delivery places beyond the Mongolian border. For instance, the LME prices are set on a CIF basis for delivery to an accredited warehouse in the country of destination and iron ore prices on a CFR basis to a port of destination (e.g. Tianjin or Qingdao). As a consequence, jurisdictions that as Mongolia use an estimated gross sales value as a royalty base in effect levy royalty on transport costs incurred beyond their borders. This means that equal being the royalty rate applied, their royalty collections are higher than those in jurisdictions using the realized value of sales.

An exception to the gross estimated sales value approach is provided by the “Regulation on Calculation of the Sales Value of Coal, Iron Ore and Iron Ore Concentrate in Overseas Market for Minerals Royalty Purposes” under Government Resolution N.342 of 2019. Under this resolution the ‘Contract Sales Price’ is allowed to be used for royalty calculation, subject to up to 30 percent of difference from the monthly reference sales value defined by the Joint Working Group and to adding costs incurred up to Mongolian Border checkpoint, if such cost is not included in the given Sales Contract price”. This is the ‘realized’ royalty value base commonly used in other international jurisdictions and corresponds to value V2 in Figure 2, that is to say the value of the mineral product FOB at the border or port of export.

Figure 4 portrays the relationship between the various value components and how they are combined in determining the different types of royalty value bases. The figure emphasizes the difference between realized and estimated gross royalty value bases and highlights how the Mongolian regimes differentiates itself in the latter group.

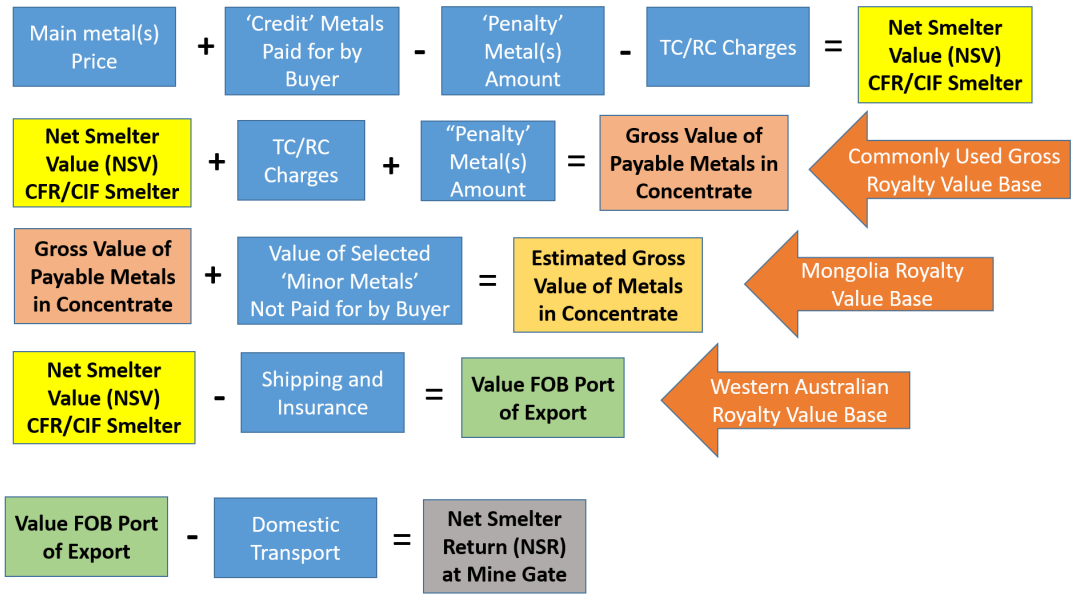

Figure 4. Diagram portraying the relationship between the sales price paid by smelters for concentrates (NSV) and other forms of gross and net values used as bases in value-based royalty systems

2.5.2 Royalty rates

Given a royalty value base, Government needs then to determine and legislate for one or multiple royalty rates designed to achieve the desired level of mineral royalty collections. The approach to royalty rates setting is very different in different jurisdictions, as schematized in Figure 5, and includes for all or each commodity:

1. Single rate for all mineral products, or
2. Differential rates decreasing as a function of downstream processing (e.g., Western Australia (WA)), or
3. Progressive rates increasing as a function of commodity prices (e.g., Queensland (Q)), or
4. Combination of price progressive rates with additional rates decreasing as a function of downstream processing (e.g., Mongolia)

The royalty rates adopted by the various international mining jurisdictions are provided in Appendix 2. It must be emphasized once again that comparisons among different jurisdictions on the basis of royalty rates alone to identify high taxing regimes are meaningless and that comparisons should be based on governments' total tax takes including CIT and other major imposts. In this context, Mongolia, while featuring one of the highest royalty regimes in the world compensates for it by its CIT rate being at the low side of the international range. Accordingly, in 2019, as already shown in Table 1, CIT collections represented only just over ¼ of total taxes levied from the extractive sector and were a little over ½ of the amount of mineral royalties collected.

A single rate for all mineral products of a commodity (i), although applied by many jurisdictions, is undesirable because it creates an economic disincentive for mining companies to invest in downstream processing activities.

For this reason, some jurisdictions, such as Mongolia and WA, have opted for differential rates decreasing as a function of downstream processing (ii), e.g., WA uses 7.5% for ore, 5% for concentrate and 2.5% for metal.

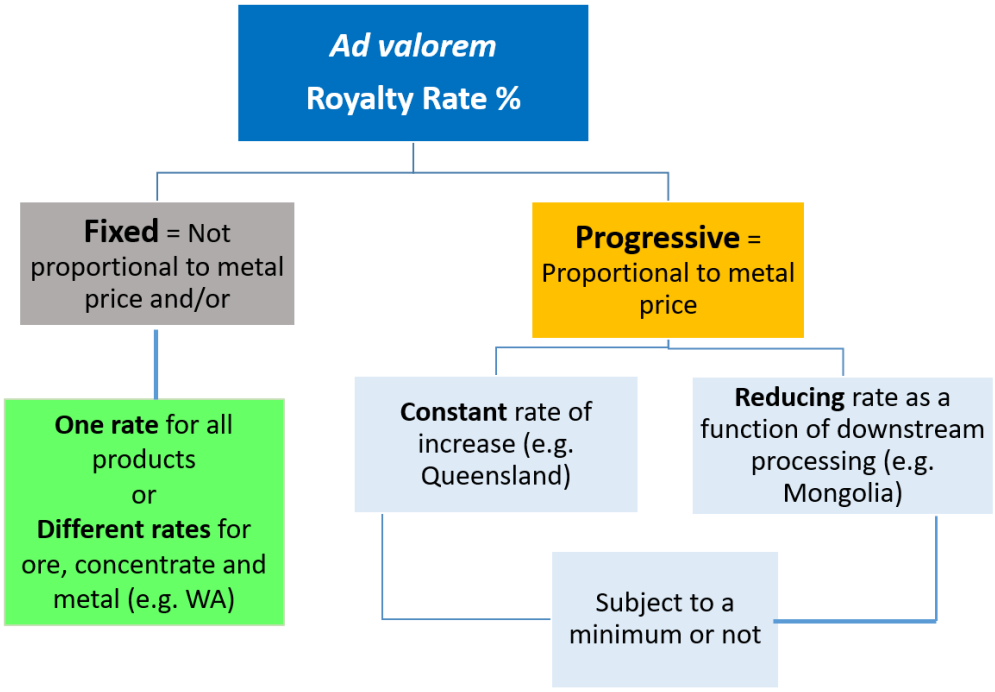

Figure 5. Diagram categorizing the various types of royalty rates used in value-based royalty systems

Other jurisdictions like Queensland have adopted progressive royalty rates for each commodity that increase continuously as a function of changing commodity prices (iii). Mining companies make provisional monthly royalty payments based on 1/3 of the payments made during the previous quarter. These are then subject to retrospective reconciliation at the end of each quarter based on

average commodity prices and corresponding rates for each commodity as regularly published by government.

Finally, Mongolia is unique in adopting a combination (iv) of a general rate of 5% for virtually all mineral commodities (with minor exceptions such as for domestic coal and common minerals sales) with additional price progressive rates decreasing as a function of downstream processing as schematized in Figure 6.

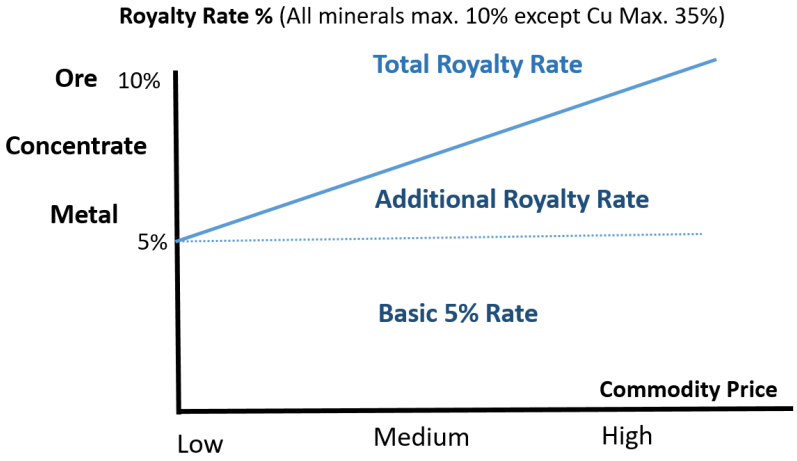

Figure 6. Diagram illustrating the characteristics of the Mongolian progressive royalty rates

An exhaustive list of the current additional rates is tabulated in Appendix 3 that covers the legal background to mineral royalties in Mongolia. Rate range between 0%, generally when prices of commodities are low to 5% when prices are high. A notable exception is copper which, if sold as copper ore when the price of copper exceeds US$ 9,000 per tonne, attracts additional royalty at a rate of 30%. Under high price conditions, as shown in Table 3 the corresponding rates for concentrates and metal are 15% and 5% respectively.

Table 3. Example of Mongolian Progressive Royalty Rates Applying to Various Copper Metal in Mineral Products per Tonne with Price Ranges

Reference product type to be used for valuation	Market price range in USD	Surtax royalty percentage to be imposed in addition [to the base royalty] depending on the processing level of the product		
		Ore	Concentrate	Product
Copper metal in mineral product	0-5000	0	0	0
	5000-6000	22	11	1
	6000-7000	24	12	2
	7000-8000	26	13	3
	8000-9000	28	14	4
	9000 <	30	15	5

3 INTERNATIONAL MARKETING AND VALUATION OF ORES AND CONCENTRATES

3.1 Types of sales contracts

3.1.1 General considerations

The sale of mineral products can, depending upon the commodity, take place at various stages of their downstream processing.

Significant bulk sales of crushed and screened direct shipment ore (DSO), or after minor beneficiation and/or blending, take place for some commodities such as iron ore and bauxite.

By contrast, trading in base metals ores (e.g., copper, lead, zinc and nickel), is generally very limited and of a regional nature. Base metals, depending on the degree of downstream processing undertaken at the mine site, are generally exported and marketed, as in the case of Mongolia, as concentrates or, in other jurisdictions with better developed downstream processing capacity, closer to their metallic form (e.g., blister copper, copper cathode, nickel matte or pellets, etc.).

As standard market specifications and daily prices are publicly available for a diverse range of metallic forms, the closer the mineral product is to refined metal the less complex is the determination of an appropriate 'sales value' of a mineral product.

Mineral products, such as ores and concentrates, are essentially sold under two types of contracts, i.e.:

- Medium-to long-term offtake agreements, and/or
- Spot contracts through traders.

Offtake agreements are generally entered into between miners and specific smelter/refining companies and generally do not involve intermediaries. By contrast, spot sales tend to be mostly transacted through intermediary trading houses and more rarely between producers and users of the mineral commodity.

3.1.2 Iron ore and concentrate sales

Bulk ore and/or concentrate sales are mostly conducted under medium- to long-term supply agreements. Iron ore, for example, is sold as a number of products ranging from crude crushed and screened hematite-goethite-(limonite) ore, the so-called direct shipping ore (DSO), to beneficiated and blended ore, to (mostly magnetite) concentrates, pellets, sinters and briquettes. DSO is further classified physically into either lump (i.e., with a size greater than 6.3 mm and less than 31.5 mm) or fines (less than 6.3 mm).

In the past, high-grade (>60% Fe) hard lump hematite ore with low levels of impurities was sold at a 20% to 30% premium relative to fines of equivalent chemical composition. However, with changes in the operation of blast furnaces, this premium has now reduced to less than 5 to 10%. Channel iron deposits (CIDs) often occurring in the form of small spherical goethite particles called pisolites are generally of lower grade (around 54% Fe) but sought after because of their sintering qualities.

In the past, iron ore has been sold on the basis of yearly supply contracts using benchmark prices set by the first successful annual negotiation between a major producer and a steel mill. In recent years in spite of the progressive development of active spot and futures markets, annual contracts covering a number of shipments are still common. However, prices are generally set on the basis of shorter quotation periods often as the mean of the daily spot market prices over the preceding one to three

months based on a number of daily quoted price indices. Indices for ores of standard specifications (e.g. Platt's IONEX or the Metal Bulletin's MBIOI index) have been developed for a variety of iron ore fines with Fe grades ranging between 58 and 65% Fe and with specified normalized levels of P_2O_5, Al_2O_3, SiO_2, S and other impurities, delivered on a CFR basis to main Chinese destinations (e.g., Tianjin or Qingdao). The limits of tolerance and related 'penalty' rates for impurities will be dealt with in more detail below when discussing the relevant Mongolian iron ore case study. To the extent that the ore sold or transferred may be of a different iron grade from that of the indices used, proportional price adjustments are made on the basis of differences in the contained unit of iron per dry metric tonne.

Sometimes when impurities in iron ore and in base metal concentrates exceed the maximum allowable ranges the concentrate becomes unsellable, or sellable at very high discount to related users who can realize the value of their key metal content by blending 'dirty' concentrates with better quality materials of different origin.

3.1.3 Base metals concentrates sales

Base metals concentrates are partially processed mineral products, for which no standard market specifications or regular daily prices are available. They are sold primarily on a CIF basis either through:

- medium- to long-term ('Frame') smelting and refining contracts between the mines and smelters/refiners, or
- merchants by means of spot sales.

Base metals concentrates are a significant component of the 'new' metal supply, with "Custom" concentrates sold to smelters/refiners unrelated to the miners accounting for just under twice the amount of "integrated" concentrates transferred to related smelters/refiners. In the case of copper for instance the split is 43% to 27% respectively after deducting around 30% of copper supplied as cathode directly produced by SX/EW.

Under long-established sales contracts to credit-worthy (Tier 1) customers title passes and a first provisional payment covering the bulk (90%) of the value of the concentrate is affected at the time of shipment, with a second provisional payment covering the balance (10%) after assaying is carried out at the smelter. For less credit-worthy (Tier 2) buyers, 100% provisional payment is expected soon after the concentrate leaves port. The terms of sale, which are generally fixed over the life of the contract, include a quotation period and a price reference period, which is generally the average of the cash settlement price over a single month anchored to the time of shipment or arrival. The latter is known as the MAMA (month after the month of arrival) system for final payment reconciliation. Price references are normally the LME and the London Bullion Market as quoted in publications such as Platt's and Metal Bulletin.

3.2 Net Smelter Value

As shown in Figure 6, the treatment and refining (TC/RC) charges and other terms (e.g., metal deductions) embodied in concentrates sales contracts are based on formulae that are broadly accepted and practiced in industry. These charges are deducted from the value of the main metal(s) contained in the concentrate after accounting for any 'credit' and 'penalty' minor metal(s), as discussed below, to determine the price of the concentrate at the smelter or Net Smelter Value (NSV).

If the shipping and insurance costs are netted off the NSV the corresponding value FOB port of export is obtained. This is often used as the royalty value base in many jurisdictions.

The Net Smelter Return (NSR) at the mine gate is obtained by netting off from the above FOB value all relevant domestic transport, insurance and other related expenses.

The NSV as a proportion of the value of the contained metal(s) will vary for concentrates of different mineral commodities and within each commodity for different types, grades and metallurgical quality of concentrates. Table 4 provides some order of magnitude of typical NSVs for various base metals sulphides concentrates as a percentage of the value of the main metal contained in the concentrate excluding credits and penalties for possible 'minor metals'.

Table 4. Typical ranges of grades of base metals sulphides concentrates and approximate smelter payments as a percentage of the value of the contained metal(s)

METAL	TYPICAL GRADE OF SULPHIDE CONCENTRATE %	APPROXIMATE SMELTER PAYMENT AS % OF VALUE OF CONTAINED METAL
Cu	22-30[a]	72-80
Pb	45-70	45-60
Zn	48-56	52-56
Ni	9-14	65-75[b]

[a] Primarily from chalcopyrite. Higher concentrates grades may be obtained from some secondary copper minerals.
[b] Payments in the range of 50% to 65% may apply in the case of significant impurities and some long-term contracts.

The NSV formulae have common structures but differ slightly for different types of concentrates. Benchmark TC/RC charges are generally negotiated annually between some of the larger miners and smelters and then tend to be adopted by the rest of the industry. TC/RC charges vary with the availability and value of different metal concentrates and tend to be more stable in long-term arrangements than in spot sales.

TC/RC charges are made up of various components including a:

- a minimum metal deduction as a set percentage of the main metal content as an alternative to a negotiated percentage of payable metal,
- treatment charge (TC), a fixed US dollar amount per dry tonne of concentrate,
- refining charge (RC) for the main base metal(s) expressed as US dollars per pound of metal being processed. This charge does not apply to all metals, e.g., not to zinc concentrates,
- deduction and sometimes a refining charge for 'credit' metals/elements recovered as by-products, and
- deduction proportional to the degree to which the content of each 'penalty' metal/element exceeds the upper limit of its acceptability range.

Minor metals/elements credits and particularly penalties vary for different metal concentrates as a reflection of their different impact on different processing costs. Their different rates will be discussed in detail below when dealing with different Mongolian concentrates case studies.

In addition, particularly in the past but more rarely now, various forms of price participation (PP) have been used for smelter to share in the benefits of anomalously high metal prices and provide some relief to miners at times of very low prices.

4 MONGOLIAN MINERAL CONCENTRATES CASE STUDIES: INTERNATIONAL ROYALTY COMPARISONS

4.1 General Considerations about the Mongolian Mining Industry

4.1.1 Importance of the Mongolian ores/concentrates/metals exports

By any measure Mongolia is a typical 'mineral economy'. In 2019 the Mongolian extractive sector accounted for 23.7% of GDP, 57.3% of industrial production, 83.5% of exports and 49.9 % of total investment. The tonnages and value of Mongolia's 2019 mineral exports is broken down into its components in Table 5. Petroleum products accounted for an additional US$385 million.

Table 5. Volume and Value of 2019 Mongolian Mineral Exports

Type of minerals	2019		
	Tonnes x 1,000	US$ Million	Value %
Coal	36466.8	3074.4	48.7%
Copper, concentrate	1403.6	1795.9	28.4%
Iron ore, concentrate	8448.8	576.4	9.1%
Raw or semi-processed gold (Kg)	9069.5	418.4	6.6%
Spar	700.1	205.5	3.3%
Zinc ore, concentrate	134.8	189	3.0%
Molybdenum ore, concentrate	5.7	49	0.8%
Tungsten ore. Concentrate	0.7	6.5	0.1%
TOTAL		6315.1	100.0%
Source: The Mongolian Customs Office in EITI 2020 Report			

About 91.3% of Mongolia's mineral exports, including all copper and iron concentrates and the bulk (98.2%) of coal, were destined to China, with 4.1% of remaining export to the United Kingdom and the rest to a number of other destinations.

Although reliable estimates of mineral resources and reserves in Mongolia are not readily available because in many cases confidential, the general consensus, as discussed in the following section, is that they are vast, and that the country's mineral exploration potential is extremely high.

Mineral production has been growing rapidly in recent years and there is little doubt that mining is and will continue to be the engine for on-going economic development and growth in Mongolia.

4.1.2 International perception of Mongolia's attractiveness to exploration and mining investment

Mongolia's world ranking relative to other countries covered by the reputable Frazer Institute annual survey of the perception of international mining companies, were extracted for three key measures (i.e., 'Best-practice mineral potential', 'Taxation regime' and 'Investment attraction') for the period between 2002 and 2017, after which Mongolia ceased to be covered by this survey.

The 'Best-practice mineral potential' compares the 'purely' geological prospectivity of a jurisdiction by assuming its policies are "best practices" (i.e., world class regulatory environment, highly competitive taxation, no political risk or uncertainty, and a fully stable mining regime).

'Investment attraction' covers the uncertainty concerning the interpretation, administration, and enforcement of existing laws and regulations, including those relating to the environment, taxation and conflicting land claims. It also considers political stability in general, the rule of law and the security and enforceability of stability and other agreements.

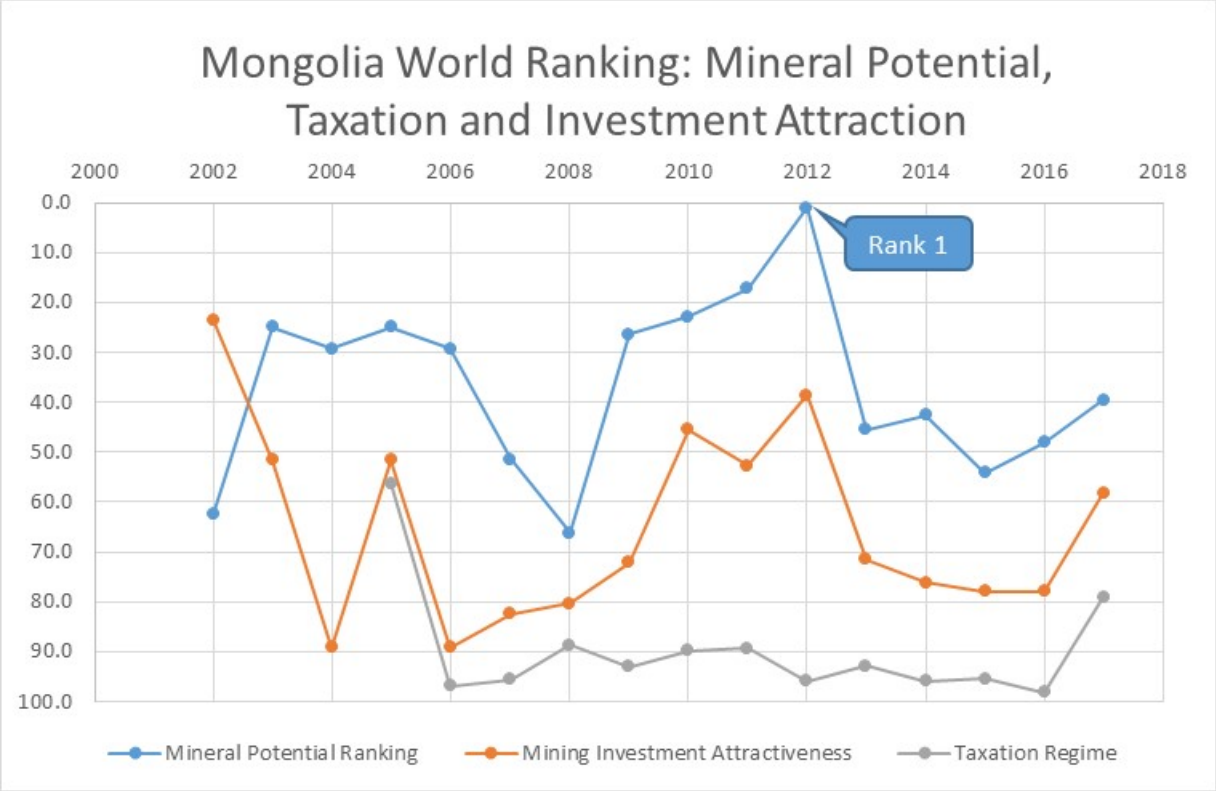

Figure 7. Mongolia World Ranking Mineral Potential. Taxation Regime and Investment Attraction

Normalized to a 100% basis. Source: Frazer Institute Annual Surveys of Mining Companies from 2002 till 2017. Note that Mongolia was not included in surveys conducted after 2017.

It will be noted, as shown in Figure 7, that, on the basis of perceptions about its purely mineral potential, Mongolia has ranked within the first quartile essentially over 8 out of 10 years between 2003 and 2012, with the exception of the 2007-08 global financial crisis. Indeed in 2012 it actually ranked as the most prospective mining jurisdiction in the world, even though in the same year it was identified as the jurisdiction with the greatest need for mining policy improvement.

In spite of its high prospectivity, however, Mongolia has generally ranked well below the world median in terms of investment attraction (i.e., in 13 out of 16 years) 9 of which well within the fourth quartile. Even in 2012 when Mongolia was rated as the most geologically prospective country in the world it only ranked 39th in terms of investment attraction, falling to 71st in the following year. Irrespective, a peak in foreign direct investment (FDI) in Mongolia, largely driven by mining investments, was reached in 2013 at US$ 4.5 billion, but this was followed by a rapid decrease to US$ 94 million by 2017, accompanied by an 80% devaluation of the Tugrik relative to the American dollar.

Issues relating to the Mongolian 'Taxation regime' ranking after the proclamation of the 2006 Law on Minerals and of the Law on Tax on the Certain Product Price Increase that until 2011 imposed a 68% windfall profit tax on gold, copper ore and copper concentrate have no doubt contributed to the above poor investment attraction rankings. Mongolia's reputation in terms of its taxation regime has fallen from a roughly median position in 2005 to consistently below the 90th percentile, which is to say among the least desirable regimes in the world.

The mining industry values taxation regimes that are clear and stable and in this respect, it could be argued that, while the issue of 'minor metals' royalties is a relatively minor component of the broader spectrum of mining governance provisions in Mongolia, it does nonetheless contribute to the

international perception of the country's mining regulatory regime being unclear and unfair thus inhibiting FDI in mineral exploration and mining. This is regretful given the country's recognized high mineral potential and, in our view, makes clarifications and amendments to regulations imposing royalties on 'minor metals' contained in mineral products but not specifically paid for by the buyers a high Government's priority.

4.2 International best practice in the royalty treatment of 'minor metals' in concentrates

Asides from specific volume or weight based royalties, applied primarily to low-value, non-metallic, bulk minerals and construction materials (e.g. sand, aggregate etc.), the majority of international royalty regimes are either value- or profit-based.

The Mongolian royalty system is entirely value-based and does not currently make use of either profit-based royalties or specific royalties based on volume or weight.

Profit-based royalty systems of various formulations apply to the majority of North American federal and provincial jurisdictions in the USA and Canada, to Tasmania and the Northern Territory of Australia, to Peru' and Chile in South America and a number of other jurisdictions. Hybrid royalty systems that include functional links to measures of realized profit are also found in other jurisdictions such as South Africa.

Profit-based royalty systems rely entirely on 'realized' revenue measures to establish their royalty value bases. In the overwhelming majority of cases revenue accrued over the royalty return period is represented by the aggregate value of all mineral product sales as witnessed by their related sales invoices. The invoices detail the price received for any major metal and the credit and/or the penalty incurred for each minor metal as well as smelting and refining charges. Revenue will include the value of minor metals only to the extent that buyers have paid for them.

To the best of our knowledge none of these jurisdictions applies royalties on any minor minerals for which the seller receives no payment.

Our review then focused on the royalty regime of a large number of mining jurisdictions throughout the world that, like Mongolia, impose value-based mineral royalties. Once again, value-based royalty regimes based on the value of 'realized' sales by definition limit the imposition of royalties on metals for which the seller did receive payment. As a consequence, if a parallel to the Mongolian system, that imposes a mineral royalty on metals irrespective of whether the seller actually receives payment for them or not, existed it would probably be confined to jurisdictions that base their royalties on 'estimated' gross sales value.

In the event, in spite of a very wide-ranging review and personal inquiries with relevant administrators, no immediate parallels to the Mongolian system were identified and it can be reasonably concluded that the Mongolian system is unique or, given the extreme difficulty in locating relevant provisions in the regulations of various jurisdictions, at the limit extremely rare.

This probably reflects a justifiable assumption on the side of mining jurisdictions that, under normal marketing circumstances, a seller would not dispose of potentially valuable metals contained in his/her ores and/or concentrates without receiving payment for them and their acceptance of the fact that minor metals not paid for by the buyers in effect have no market value. The expectation is that, as long as the price for ores and concentrates is set through arm's-length negotiations between two willing and unrelated parties, freely conducted in contestable markets under no compulsion, the interest of Government and that of the miner should be aligned. Furthermore, many mining codes include provisions requiring the sellers to endeavor to achieve the best sales price for their mineral

products under the prevailing market conditions and for the Minister, if not satisfied that the best possible price was obtained for the relevant metal(s), to have the power to deem an alternative appropriate price for them with reference to more reliable market information.

This does not mean that the issue of 'minor metals' does not arise in other jurisdictions besides Mongolia, but rather that it is addressed primarily at an earlier stage of the approval process, primarily when a company submits to Government a Notice of Intent (NoI) to develop a mineral deposit. It is at this stage that Government may question whether the development, as proposed in the Feasibility Study (FS) tabled in support of the NoI, is optimal from the point of view of the state. Questioning should include the rationale why commercial recovery of certain 'minor metals' occurring in comparatively high concentrations has not been considered feasible. Accordingly, the development plan may be reconsidered, or the final mining agreement may include an obligation on the mining company to review the commercial feasibility of extracting one or more of the most promising minor metals at some point in the future in light of changes in commodity prices and possible technical advancements in relevant metallurgical processes.

Another important question is how low should the level of concentration of individual 'minor metals' be before they clearly do not justify extraction and can be disregarded as 'prima facie' commercially irrelevant and, therefore, be exempt from royalties?

An interesting approach in this regard is to be found in some elements of the Western Australian mining legislation dealing with iron ore.

For example, the Iron Ore (Nimingarra) and the (Hope Down) Agreements, regulating mining of these manganese rich iron ore deposits in the Pilbara region of WA, define iron ore as 'manganiferous ore' if its manganese content exceeds 2%. The implication is that below this content level manganese is likely to have no commercial significance and would not influence the price paid by the smelter for the related iron ore. Nonetheless, in view of the generally elevated manganese content of these orebodies the WA Government included in the agreements the following obligation on the side of the companies:

"The Company agrees to investigate in due course the feasibility of the beneficiation of ores from the mining area "B" herein mentioned and of establishing within the State of Western Australia a plant for producing metallised products or ferro manganese and to review this matter from time to time with a view to its being in a position to submit to the State proposals for such establishment as are hereinafter provided."

In the event production of metallised products or ferromanganese has proven unfeasible to date.

Another interesting reference to minor metals can be found in Section 86 of Division 5 of the Western Australian Mining Regulations (1981 as amended) that prescribes the minimum vanadium content of iron ore (magnetite) concentrates above which a royalty applies irrespective of whether vanadium is produced or not, as follows:

"Vanadium - The rate is —

a) *if sold as a concentrate (vanadium oxide), 5% of the vanadium pentoxide price; or*
b) *if sold in metallic form (ferrovanadium), 2½% of the ferrovanadium price; or*
c) *for vanadium not realised on contained vanadium from a product (such as magnetite) where the average grades of vanadium are over 0.275% V_2O_5 in the ore and a vanadium circuit is not installed — 5% of the vanadium pentoxide price".*

This measure was deemed necessary because the rapidly rising price of iron ore risked rushed and suboptimal development of significant local resources of vanadiferous magnetite.

While we recommend that the Mongolian Government discontinue their practice of levying royalties on non-precious metals for which the miners do not receive payment, there may be instances where it may become necessary to determine and legislate maximum concentration limits for some minor metals occurring in mineral products above which a mineral royalty would become payable whether or not the metals are extracted or not in practice. These limits should be set with broad reference to the average grade of the relevant metals in ores from which they are recovered as a by-product in a wide sample of mining operations worldwide and updated as necessary in light of metallurgical technological and marketing improvements.

To enable this, amendments should also be introduced into the Law on Minerals and/or related Regulations bestowing on the relevant Minister discretionary power to set and from time-to-time review as necessary the 'minor metals' content limits, accepting that in exercising his/her discretionary powers the Minister will need to act with reference to industry standards and exercise procedural fairness.

4.3 Mongolian Concentrates Case Studies

4.3.1 General outline of the case studies

As discussed in more detail in Section 4.1.1 above, the bulk of the value of Mongolian mineral exports, asides from coal, fluorspar and gold that do not present any issue in the context of 'minor metals', is represented by copper, iron ore and zinc concentrates. Accordingly, the case studies that follow concentrate primarily on these commodities, emphasizing the royalty treatment of 'minor metals' contained in them.

This part of our analysis was to select some representative Mongolian mineral concentrates and for each of them construct a spreadsheet model calculating and comparing the relevant:

- Mineral royalties paid in compliance with the Mongolian Law on Minerals,
- Net Smelter Value or 'contract sales price' received by the miners under generally accepted international smelting and refining contract conditions, and
- Mineral royalties that would have been paid at the time for the same concentrates under the royalty regimes of two leading Australian mining jurisdictions, i.e., Western Australia (WA) and Queensland (Q).

The models also distinguished between 'minor metals' for which the miner received a 'credit' or payment in addition to that relating to the main concentrate metal, as well as the price discount incurred for the presence of 'penalty' metals. This distinction is very important in estimating the revenue foregone in the context of any policy formulation that would consider exonerating from mineral royalties all the minor metals for which a miner does not receive any payment.

The sections that follow summarize the main conclusions drawn from this financial modelling, with the corresponding fully elaborated model calculations being provided as appendices.

4.3.2 Case Study 1: Copper concentrate

Asides from royalty based on the copper content (22.41% Cu) of the concentrate used in this example, the Mongolian Government, as detailed in Appendix 5, did levy royalties on its elevated iron (23.42% Fe) and silver (80.42 g/t Ag) contents. For some unspecified reason, however, no royalty was levied on any of the other metals such as zinc (1.08% Zn), aluminium (1.09% Al) and to a lesser degree

molybdenum (615 ppm), as well as on very low concentrations of other elements such as F, Pb, Cd and Se, as detected by a Customs accredited laboratory.

At the prices prevailing at the time of sale, the royalty rates listed in Table 6 were applied by the Mongolian Government on the estimated 'sales value' of these metals, i.e. on the volume sold times their respective published prices.

Table 6. Royalty collected by the Mongolian Government per wet tonne of copper concentrate

	Content	Royalty Rate %		Royalty collected
		Basic	Additional	
Main Metal	**%**			
Copper	22.41%	5.00%	12.00%	**209.90**
Minor Metals	**%**			
Iron	23.42%	5.0%	1.2%	1.22
Silver	0.0084%	5.0%	0.0%	2.09
Subtotal				**3.30**
TOTAL				**213.21**
	Main metal and by-product paid for by buyer			

Table 6 shows royalty collected by the Mongolian Government per wet tonne of copper concentrate in the case study including $1.22 on iron for which the miner received no payment.

In the case of Western Australia (WA), the standard 5% royalty rate would have applied to the FOB value of payable copper and 2.5% to that of silver.

In the case of Queensland (Q), the royalty rate applicable at the average copper price for the 3rd quarter of 2019-20 during which the sale of concentrate took place, as published by Government would have been 4.70% and that for silver 5.0%.

Detailed spreadsheets models of Case Study 1 calculations are provided in Appendix 5

Table 7 provides a comparison between the mineral royalties paid in Mongolia and those that would have been payable in WA and Q. The two central columns of Table 7 display the Net Smelter Value (NSV), that is to say the price received by the miner on the sale of the concentrate CIF smelter, from which the value of the concentrate FOB the port of export from Australia was derived by subtracting an estimate of the sea freight and insurance costs. The latter is the royalty value base for both the WA and Q royalty calculations shown on the right side of the table.

As already discussed, the NSV is net of the smelter charges and TC/RC 'benchmark' charges that at the time were estimated to include at 1% Cu metal deduction, a treatment charge (TC) of $60 per dry tonne of concentrate and a refining charge (RC) of $0.06 per pound of metal refined.

It can be seen how, even before consideration of minor metals, the royalties collected on copper concentrates in Mongolia are vastly above the corresponding Australian ones (i.e., $209.90 versus $52.97 and 49.80 respectively). A large proportion of the Mongolian royalty is attributable to the 12% additional royalty rate on top of the basic 5% applicable to copper concentrates at the relatively high copper price prevailing at the time.

Table 7. Comparison of the Royalty Value Base and Collection in Mongolia

MONGOLIAN COMPARATIVE CASE STUDY 1: COPPER CONCENTRATE									
(All values US$ per wet tonne of concentrate)									
	Mongolian Law on Minerals			International	Australian Mining Laws				
CASE 1 - Cu CONCENTRATE	Royalty value base	Royalty		Net Smelter Payment CIF Smelter	Value FOB port of export	Western Australia Royalty		Queensland Royalty	
			%				%		%
Main metal	1234.73	209.90	98.45%	1106.48	1059.48	52.97	98.99%	49.80	97.88%
Minor metals:									
(i) Paid for by buyer	41.74	2.09	0.98%	21.61	21.61	0.54	1.01%	1.08	2.12%
(ii) Not paid for by buyer	19.64	1.22	0.57%	na	na	na		na	na
(iii) Penalties				0.00	Note 1				
Subtotal Minor metals	61.38	3.30	1.55%						
TOTAL	**1296.11**	**213.21**	100%	**1128.10**	**1081.10**	**53.51**	100%	**50.88**	100%
Minor metal as % total	4.74%	1.55%		1.92%	2.00%	1.01%		2.12%	
Note 1 - Penalty and sea freight have been deducted from payable value of main metal to get FOB value.									

Table 7 shows the comparison of the royalty value base and collection in Mongolia with the corresponding international NSV and the Western Australian and Queensland regimes.

4.3.2.1 Credit metals

In the example the Mongolian royalty on the minor metals 'paid for by the buyer' (i.e., $2.09) relates to the silver content of the concentrate, while $1.22 was levied on its iron content.

Smelters provide 'credit' payments for some 'payable' minor metals. These are often, but not exclusively, precious metals (e.g., gold, silver, PGMs etc.). In the example silver is recognized as a 'credit' metal and 'paid for by the buyer' to the miner net of a metal deduction and refining charge as discussed below. By contrast, iron ore was subject to royalty in Mongolia even though it was 'not paid for by the buyer'.

Table 8 (AusIMM, 2012) provides an indication of the likely payments and processing charges for precious metals commonly found in copper concentrates. These charges together with comparatively lower royalty rates explain why the WA and Q royalties on payable silver are lower than those charged in Mongolia (i.e., $ 0.54 and 1.08 respectively).

Table 8. Example of Precious Metals Credits and Processing Charges of Copper Concentrates

Metal	Refining Charge	Payable Metal
Gold	US$ 3 to 7 per payable ounce	0% for < 1 g/dmt
		90% for <3g/dmt
		94% for <5g/dmt
		95% for <10 g/dmt
		96% for <15 g/dmt
		96.5% for <20 g/dmt
		97% for <30 g/dmt

		98% for <50 g/dmt
		98.25% for >50 g/dmt, with no minimum deduction
Silver	US$ 0.3 to 0.4 per payable ounce	90% subject to a 20 to 30 g/dmt deduction

Example of precious metals credits and processing charges relating to copper concentrates (Source AusIMM, 2012) is shown in Table 8.

4.3.2.2 Penalty metals

Penalties or price discounts are applied by the smelters when the level of individual 'penalty' metals/elements potentially deleterious to their processes exceeds specified acceptable thresholds, thus imposing:

- additional environment or occupational health control costs,
- additional waste disposal costs,
- additional smelting costs,
- increased refining costs, and
- reduced smelter and/or refinery throughput.

In this light, the Chinese government imposes upper limits on the concentrations of some elements (Table 9), beyond which importing the concentrate is banned (FitzGerald, 2012).

Table 9. Upper Concentration Limits for Importing Copper Concentrates into China

Element	Upper limit (%)
Pb	≤6.0
As	≤0.5
F	≤0.1
Cd	≤0.05
Hg	≤0.01

Similar thresholds and penalty rates for various metals/elements commonly found in copper concentrates, can be found, as shown in Table 10, in AusIMM (2012) and in Fountain (2013), while Salomon-de-Friedberg and Robinson (2014), as shown in Table 11 report generally higher rates.

Table 10. Example of Penalty Metals Deductions for various Non-Precious Metals Found in Copper Concentrates

Metal	Threshold (ppm/dmt)	Penalty
Arsenic	2000	US$2 (to $2.50) per 1000 ppm
High As	>10,000	US$5+ per 1000 ppm

Lead	10000	US$1.50 per 10000 ppm
Zinc	30000	US$1.50 per 10000 ppm
Mercury	10	US$0.20 per 1 ppm
Bismuth	500	US$2.00 (to $3) per 100 ppm
Antimony	1000	US$0.50 per 100 ppm
Nickel + Cobalt	5000	US$0.30 per 1000 ppm
Al_2O_3 + MgO	10000	US$4.50 per 10000 ppm
Cl	500	US$0.50 per 100 ppm
F	330	US$0.10 per 10 ppm

Example of penalty metals deductions for various non-precious metals commonly found in copper concentrates is shown in Table 10. Source: AusIMM, 2012, grey highlights Japanese smelters in Fountain, 2013.

Alternative and more punitive list of 'penalty' metals in copper concentrates is shown in Table 11 (Source: Salomon-de-Friedberg and Robinson, 2014).

Table 11. Alternative and More Punitive List of 'Penalty' Metals in Copper Concentrate

Element	Penalty Limit, %	$/t per extra 0.1 %
Antimony	0.05	15
Arsenic	0.2	2
- higher arsenic	>1	>5
Bismuth	0.02	25
Cadmium	0.03	30
Fluorine	0.03	15
Lead	1	0.3
Mercury	0.0005	3000
Nickel + Cobalt	0.5	1
Selenium	0.03	15
Zinc 3	0.3	0.3

4.3.3 Case Study 2: Zinc concentrate

This case study is based on a zinc concentrate with the chemical characteristics displayed in Table 12, as ascertained by a Customs accredited laboratory.

Table 12. Royalty collected by the Mongolian Government per wet tonne of zinc concentrate

	Content	Royalty Rate %		Royalty collected US$
		Basic	Additional	
Main Metal	**%**			
Zinc	47.81%	5.00%	2.40%	**87.84**
Minor Metals	**%**			
Aluminum	0.39%	5.0%	0.0%	0.36
Molybdenum	0.00144%	5.0%	0.0%	0.01
Lead	0.85%	5.0%	1.6%	1.04
Copper	1.17%	5.0%	13.0%	15.39
Iron	10.81%	5.0%	3.5%	2.17
	g/t			
Gold	0.56	5.0%	0.0%	1.68
Silver	240.27	5.0%	0.0%	9.60
Subtotal				**30.3**
TOTAL				**118.09**
	Main metal and by-product paid for by buyer			

Note that the miner was only paid for the zinc and silver content even though he/she had to pay royalties on all the other metals.

Asides from royalty based on its zinc content (47.81% Zn), the Mongolian Government levied royalties on minor metals and at the rates listed in Table 13.

For some unspecified reason, however, no royalty was levied on other metals/elements such as Sulphur (31.73%) and cadmium (0.246%).

At the prices prevailing at the time of sale (1st January 2021), the royalty rates listed in Table 13 were applied by the Mongolian Government on the estimated 'sales value' of these metals, i.e., on the volume sold times their respective published prices.

Table 13. Comparison of the royalty value base and collection in Mongolia with the corresponding international NSV and the Western Australian and Queensland regimes

MONGOLIAN COMPARATIVE CASE STUDY 2: ZINC CONCENTRATE									
(All values US$ per wet tonne of concentrate)									
	Mongolian Law on Minerals			International	Australian Mining Laws				
CASE 2 - Zn CONCENTRATE	Royalty value base	Royalty		Net Smelter Payment CIF Smelter	Value FOB port of export	Western Australia Royalty		Queensland Royalty	
			%				%		%
Main metal	1186.97	**87.84**	74.38%	902.11	851.24	42.56	0.95	35.75	89.90%
Minor metals									
Paid for by buyer	191.97	9.60	8.13%	80.36	80.36	2.01	0.05	4.02	10.10%
Not paid for by buyer	167.81	20.65	17.49%	na	na	na	na	na	na
Penalties				-3.86	Note 1				
Subtotal Minor metals	359.77	**30.25**	25.62%	76.49	80.36	2.01	0.05	4.02	10.10%
TOTAL	1546.75	**118.09**	100%	978.60	931.60	**44.57**	100%	**39.77**	100%
Minor metal %	23.3%	25.6%		7.8%	8.6%	4.5%		10.1%	
Note 1 - Penalty and sea freight have been deducted from payable value of main metal to get FOB value.									

In the case of Western Australia (WA), the standard 5% royalty rate was applied to the FOB value of payable zinc and 2.5% to that of silver.

In the case of Queensland (Q), the royalty rate applicable at the average zinc price for the 3rd quarter of 2020-21 during which the sale of concentrate took place, was 4.20% and that for silver 5.0% as published by the Q Government.

Detailed spreadsheets models of Case Study 2 calculations are provided in Appendix 6.

Table 13 provides a comparison between the mineral royalties paid in Mongolia and those that would have been payable in WA and Q. The two central columns of Table 13 display the Net Smelter Value (NSV), that is to say the price received by the miner on the sale of the concentrate CIF smelter, and the value of the concentrate FOB port of export that is the royalty value base for both the WA and Q royalty calculations shown at the right of the table.

As already discussed, the NSV is net of the smelter charges that at the time were estimated at 8% Zn metal deductions and a 'benchmark' treatment charge (TC) of $86 per dry tonne of concentrate. As shown in Figure 8 the TC for zinc concentrates that traditionally have been hovering around $300/t have recently been falling due to pressures on the availability of quality zinc concentrates. Furthermore the 'spot' TCs, that in the past were of the same order as the 'benchmark' ones negotiated between major suppliers of concentrates and smelter, have recently been heavily negotiated downwards and at around $86/t are now less than half the benchmark.

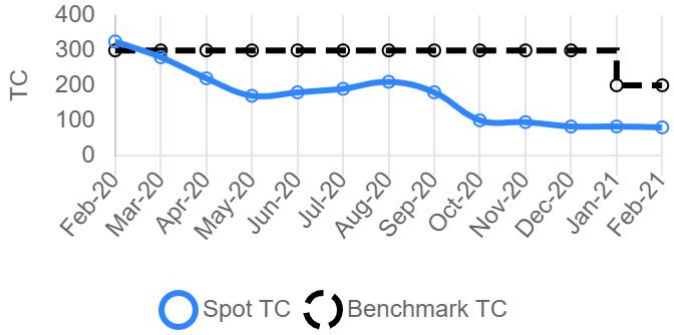

Figure 8. Recent benchmark and spot treatment charges for zinc concentrates

Contrary to the Cu example, no refining charges (RC) apply to Zn concentrates. However, an escalation charge of $0.06 was applied on the difference between the price of the refined metal (i.e. $2785/t Zn) and the escalation price threshold of $2500 per tonne.

From Table 13 it can be seen how, even before consideration of minor metals, the royalties collected on the zinc concentrate in Mongolia (i.e. $87.84) is roughly twice the corresponding Australian ones (i.e. $42.56 and 35.75 respectively). About 1/3 of the Mongolian royalty is attributable to the 2.4% additional royalty rate on top of the basic 5% applicable to zinc concentrates at the relatively high zinc price prevailing at the time.

4.3.3.1 Credit metals

In the example the Mongolian royalty on the minor metals 'paid for by the buyer' (i.e., $9.60) relates to the silver content which is recognized as a 'credit' metal and paid for by the smelter. Table 14 (AusIMM, 2012) provides an indication of the likely payments for precious metals commonly found in

zinc concentrates. Basically, payable silver will range from 60% to 90% after a deduction of 90 g (close to the traditional 3 troy ounces). The conservative side of this range was used in our model.

By contrast, the cumulative royalty amount of $20.65 was levied on the range of other minor metals as listed in Table 13 even though they were 'not paid for by the buyer'.

Table 14. Example of precious metals credits and processing charges relating to zinc concentrates

METAL	REFINING CHARGE	PAYABLE METAL
Gold	Deduct 1 g	Pay for 70 per cent of remainder.
Silver	• If Ag content >200 g/t: Deduct 90 g • If Ag content <200 g/t: Deduct 50 g	• Pay for 90 per cent of remainder • Pay for remainder
	• If Ag content >3 Toz/t: Deduct 90 g • If Ag content <3 Toz/t:	• Pay 60% of remainder • Pay 0%

Source AusIMM, 2012. Other sources shaded in grey.

4.3.3.2 Penalty metals

Table 15. Typical zinc sulphide concentrate specifications

Metal/Element	Range (%)
Zn	40.0 – 56.0
S	30.5 – 32.5
Fe	1.5 – 10.0
Pb	1.0 – 3.0
Cu	0.1 – 1.5
Cd	0.15 – 0.30
Ag	10 – 200 g/t
Au	0 – 2 g/t

Table 16. Typical penalty rates and specified acceptable thresholds for a range of potentially deleterious metals/elements occasionally found in zinc concentrates

Metal	Threshold (ppm/dmt)	Penalty
Arsenic	0.20%	Up to US$2/1%
Magnesium (MgO)	0.30%	US$1.5/0.1%
Magnesium (MgO)	0.40%	US$1.5/0.1%
Mercury	50 ppm	US$2/100 ppm
Mercury	102 ppm	US$1.50/10 ppm
Copper	1%	US$1.5/0.1%
Cobalt	0.04%	US$1/0.001%
Lead	1.50%	US$1.5/0.1%
Iron	8%	US$1.5/1%
Manganese	0.50%	US$1.5/0.1%
Silica (SiO_2)	2.50%	US$2/1%
Lead	3.5	US$2/1%

Example of penalty metals deductions for deleterious metals commonly found in zinc concentrates (Source: Modified from AusIMM, 2012, Data highlighted in grey Byambajav's personal communication).

In the example the smelter applied a $3.86 price penalty on account of the iron content in the concentrate that, at 10.81% exceeding the 8% threshold by 2.81%, while the Mongolian Government levied $2.17 in royalty deeming the iron content to have positive sales value of $25.60.

4.3.4 Case Study 3: Iron ore concentrates

This case study is based on an iron ore concentrate containing, besides 54.84% iron a range of other metals/elements including, as displayed in Table 17, minor amounts of Cu, Zn, Pb, and Ag. Assays by a Customs accredited laboratory also showed the concentrate to contain a range of deleterious metals/elements, such as aluminium, silica, phosphorous and sulphur, with the last one at 2.34% well above acceptable limits and therefore incurring a penalty.

Table 17. Royalty collected by the Mongolian Government per wet tonne of iron ore concentrate

				Under Art. 47 Standard Provisions		Under GR 342 Sales contract provisions	
Metal	**Content**	**Royalty Rate ($)**		**Royalty**	**Royalty**	**Royalty**	**Royalty**
		Basic	**Additional**	**Collected MNT**	**Collected US$**	**Collected MNT**	**Collected US$**
Main Metal	**%**						
Iron	54.84%	5.0%	3.5%	29661.86	10.41	31843.16	11.17
Minor Metals							
Copper	0.0273%	5.0%	12.0%	1011.91	0.36		
Zinc	0.0175%	5.0%	2.4%	101.19	0.04		
Aluminum	1.2600%	5.0%	0.0%	3575.47	1.25		
Lead	0.0047%	5.0%	1.6%	15.86	0.01		
Sulphur	2.43%					-4307.59	-1.51
	g/t						
Silver	2.68	5.0%	0.0%	279.73	0.10		
TOTAL				**34646.03**	**12.16**	**27535.57**	**9.66**
	Main metal and by-product paid for by buyer						

Table 17 shows royalty collected by the Mongolian Government per wet tonne of iron ore concentrate in the case study. Note that the miner was only paid for the iron content and incurred a penalty for the sulphur content.

Under Government Resolution N. 342 of 2019, in the case of iron ore exports, royalties may be paid based on either the:

- estimated 'sales value' as for the standard provisions of Article 47 of the Law on Minerals, or
- actual 'contract sales value' including transport costs to the border

as long as the difference in the amount to be collected by the second method is less than 30%. In our example the royalty applicable to the 'contract sales value' was lower than that under Article 47 by less than 30% and as a consequence the former was used as the relevant royalty value base.

The left side of Table 18 indicates that the Mongolian royalty calculated on the base of the actual 'contract sales value' at $10.10 is lower than that under Article 47 at $12.16 by less than 30%% and therefore under Government Resolution N. 432 of 2019 was used as the royalty value base. At the prices prevailing at the time of sale (29th December 2020) the applicable basic royalty rate would have been 5% with an additional 3.5% rate applying to the value of iron, with additional royalty rates varying for the minor metals ranging, as shown in Table 17, between 0% for aluminium and 12% for copper.

Table 18. Comparison of the royalty value base and collection in Mongolia with the corresponding international NSV and the Western Australian and Queensland regimes

MONGOLIAN COMPARATIVE CASE STUDY 3: IRON ORE CONCENTRATE											
(All values US$ per wet tonne of concentrate)											
	Mongolian Law on Minerals				International	Australian Mining Laws					
CASE 3 - Iron Ore CONCENTRATE	Royalty value base	Royalty			Net Smelter Payment CIF Smelter	Value FOB port of export	Western Australia Royalty		Queensland Royalty	
		Lesser of								
		Art. 47	%	Or sales				%		%
Main metal	122.46	10.41	85.61%	11.17	122.46	104.07	7.81	100%	1.65	100%
Minor metals										
Paid for by buyer	0.00	0.00		0.00	0.00	0.00	0.00	0.00%	0.00	0.00%
Not paid for by buyer	29.70	1.75	14.39%	-1.51	na	na	na	na	na	na
Penalties					-10.39	Note 1				
Subtotal Minor metals	29.70	1.75		-1.51	-10.39	0.00	0.00		0.00	
TOTAL	152.17	**12.16**	100%	**9.66**	112.07	104.07	**7.81**		**1.65**	
Minor metal %	19.5%	14.4%		-15.6%	-9.3%	0.0%	0.0%		0.0%	
Note 1 - Penalty and sea freight of $8/wt have been deducted from payable value of main metal to get FOB value.										

Under Government Resolution N. 432 of 2019 the lesser between the amount of royalty calculated under Article 47 and that based on the sales invoice applies as long as the difference does not exceed 30%.

It is worth pointing out that the 54.84% Fe grade of this concentrate is much lower than that of concentrates exported from WA (i.e., 60 to 70% Fe) and that the Mongolian concentrate would probably have been classified as 'beneficiated' iron ore and that the standard royalty rate of 7.5% would have been applied to the FOB value of the concentrate obtained by:

- adjusting the price on a pro-rata basis for the -1.16% difference in the iron grade from that of the standard 56% Fe fines,
- deducting, as discussed below, all relevant penalties to obtain the concentrate NSV, and
- deducting from it the sea freight from the export border estimated at $8 per wet tonne.

In the case of Queensland (Q), the royalty rate applicable at the FOB value of iron ore has two progressive steps, i.e., 1.25% if the price of iron ore is less than A$100/t and 2.5% above it. As at the time of the concentrate sale, the A$:US$ exchange rate was 0.7596, the 1.25% royalty rate applied up to $75.96/t and 2.5% above it.

Detailed spreadsheets models of Case Study 3 calculations are provided in Appendix 7.

As for the other commodities the Mongolian iron ore royalty at $9.66 is higher than that charged in the leading iron ore exporting jurisdiction of WA at $7.81 and even more so than Q at $1.75. This difference is largely attributable to the Mongolian royalty rate (i.e. basic plus additional adding up to 8.5%) being higher than 7.5% as used in WA.

4.3.4.1 Penalties

The concentrate was valued with reference to the contract specifications and limits of acceptability for a typical CFR spot sales agreement for iron ore fines through the Tianjin Bohai Commodity Exchange (Guj et al., 2017). These terms were similar to those of a number of other, albeit confidential agreements, sighted by member of the team. It will be noted that none of the metals/elements in the Mongolian example exceeded the maximum limit of acceptability, but that Sulphur exceeded the required 0.10% specifications and as a consequence incurred a penalty of 44.5 for each percent in excess of it amounting to -$10.39 in total.

Table 19. Penalties rates applying to iron ore concentrates

Penalty Metal/Element	Standard specifications %/dt	Maximum allowed %/dt	Penalty $/%
Aluminum	1.60%	2.70%	-1.5
Silica	6.50%	8.00%	-1.5
Phosphorous	0.08%	0.15%	-4.5
Sulphur	0.06%	0.10%	-4.5
Size >10mm	8.00%	15.00%	-0.18

5 THE WAY FORWARD: OPTIONS TO GUIDE 'MINOR METALS' POLICY AMENDMENTS

5.1 No Need for Major Reform of the Current Royalty Regime

The basic structure of the Mongolian royalty system is sound and does not require, in our view, any amendments other than as it concerns the handling of royalties on 'minor metals' not paid for by the buyers of ores and/or concentrates which is inconsistent with international practice. Furthermore, levying royalties on deleterious metals/elements attracting a 'penalty' and in effect having a negative 'market value', lacks in logic and procedural fairness.

Asides from this, the Mongolian royalty system has from the Government's point of view, but not necessarily from that of industry, many good aspects, e.g.:

- Basing royalties on gross estimates of sales value by not allowing any deductions makes royalties hard to avoid and, subject to minor amendments the subject of this report, potentially clear and easy to administer,
- The functional relationship of royalty rates to commodity prices and level of downstream processing makes the Mongolian regime one the most economically efficient among the international value-based regimes,
- The system appears to be supported by an effective process of physical/chemical checks by Customs and their accredited laboratories.

Royalty collections in Mongolia as a percentage of the sales value actually realized by miners are relatively high by world standards and, although to some degree compensated for by comparatively lower CIT collections, tend to discourage FDI and consequently to limit growth in the country's tax base.

On the positive side, indications are that addressing the 'minor metals' issue would not involve significant legislative amendments and at the same time result in simplification of current administrative processes. Disregarding for the time being the potential indirect economic benefits that the suggested amendments would bring about, including appeasing industry, the necessary changes, as discussed in more detail below, are likely to be achievable at relatively low net cost to revenue.

5.2 Logical Steps in Formulating 'Minor Metals' Royalty Policy

As already pointed out, the main difficulty with levying royalties on 'minor metals' in Mongolia arises from a too literal interpretation of the term 'sales value' in Article 47 of the Law on Minerals and related Regulations. The flow chart of Figure 9 is designed to provide a series of logical steps to interpret whether a metal contained in ores or concentrates actually has or could potentially have a 'sales value' in the form in which it is brought to market.

From the top of the flow chart, there is no doubt that if a major metal and or by-product metal(s) is to be eventually extracted from the ore or concentrate it has a sales value and should be subject to mineral royalty.

Conversely, if a metal/element is deleterious to the smelting and/or refining process of an ore or concentrate, as for instance aluminium in iron ore on account of its forming slag in steel-making, and the seller incurs a price 'penalty' on its account, then its sales value is in effect negative even though if it had been sold under a different form, e.g. as bauxite, the same metal/element may have demanded a positive price. On this account 'penalty' metals should not be subject to mineral royalties.

If a minor metal/element has been paid for by the buyer, in other words if a 'credit' has been added to the price for the main metal(s), it should be subject to a royalty whether or not it is immediately extracted from the ore or concentrate.

Any minor metal/element that, irrespective of its concentration in the ore or concentrate, cannot technically be extracted from them, has no sales value in the contest of these specific mineral products and should, therefore, not be subject to royalty.

The last question relates to minor metals/elements for which the seller did not receive any payment or 'credit', but which technically could be recovered from the ore or concentrate being sold.

In some cases, these metals/elements may occur at such low levels of concentration as to make their potential extraction even under the most optimistic price and technological assumptions so highly unlikely that they can be confidently considered to have no value.

In other cases, their content may be high enough to justify serious consideration as to the commercial feasibility of extracting them either under the current circumstances or given foreseeable market and technical improvements which will vary as a function of a range of factors including:

- the grade and metallurgical characteristics of the ore,
- logistical considerations in terms of location/transport, processing water and power availability etc.
- local social, environmental and waste disposal considerations,
- whether the overall metal/element content of the mineral deposit is large enough to justify the initial capital investment required to establish the necessary processing facilities, and
- perceptions of country and other risks.

If one could assume that the industry's and Government's interests should in most instances be aligned on the matter of optimizing the returns from potential mine developments, then the policy should be not to levy royalties on metals/elements for which the miners do not get paid.

If on the other hand Government felt that in some cases its interests may not be fully aligned with those of industry, then it can pursue the following approaches:

- It may question whether the development, as proposed in the Feasibility Study (FS) submitted by the company in support of its Notice of Intent (NoI) to develop the mineral deposit, is optimal from the point of view of the state and why commercial recovery of certain 'minor metals' occurring in comparatively high concentrations was considered unfeasible. If Government suspects that industry is reluctant to invest the capital necessary to extract some of these minor metals even though they may be generally considered to have the potential to be commercially viable, then it must investigate and understand the reasons for what it would appear to be an economically irrational behavior on the side of industry. The reasons may be complex and involve a combination of technical, environmental, financial and geopolitical risks, justifying higher than normal rates of discount. As a consequence, the development plan may be reconsidered, or the final mining agreement may include an obligation on the mining company to review the commercial feasibility of extracting one or more of the most promising minor metals at some point in the future in light of changes in commodity prices and possible technical advancements in relevant metallurgical processes.
- It could determine and legislate for broad upper content limits for specific metals/elements in specific types of ores and concentrates to be set above which extraction would be theoretically considered commercially justifiable and royalty would become payable

irrespective of whether the metals/elements are paid for and /or extracted. Because of the factors listed above, these limits can only be very broad approximations based on a general review of the circumstances prevailing in mining operations throughout the world where extraction of the various metals actually takes place and need to be subject to regular official reviews in light of marketing changes and metallurgical advances. These limits will not be designed to be technical benchmarks for the feasibility of development in the Mongolian context or elsewhere, but merely administrative instruments to levy mineral royalties. As already discussed, this is the approach adopted by Western Australia specifically for some manganiferous and vanadiferous iron ores and concentrates. In reality the amount of royalty that would be collected under this potential policy may prove to be relatively insignificant in the broader scheme of things and after the related administrative costs are taken into consideration. Should this be the case the rationale for exempting from royalties all the minor metals/elements for which miners do not get paid may be re-enforced, particularly in the case of non-precious metals/elements as discussed below.

The main conclusions flowing from the above discussion are that in line with international best practice no royalty should be levied on metals/elements:

1. for which the seller incurs a price 'penalty',
2. that, irrespective of their concentration in the ore or concentrate, cannot be extracted from the ore/concentrate in its form under current and foreseeable technology',
3. that occur at such low levels of concentration as to make their potential extraction highly commercially unfeasible even under the most optimistic price and technological assumptions,
4. that occur in concentrations not exceeding limits to be set by Government for specific metals/elements if/when needed below which extraction would not be considered 'prima facie' commercially justifiable, and provided that the revenue thus generated may not prove comparatively insignificant particularly when taking the related administrative costs into consideration,
5. failing which the alternative of exempting from royalties all minor metals/elements for which the miners receive no payment, and in particular non-precious ones, should be considered as the preferred course of action.

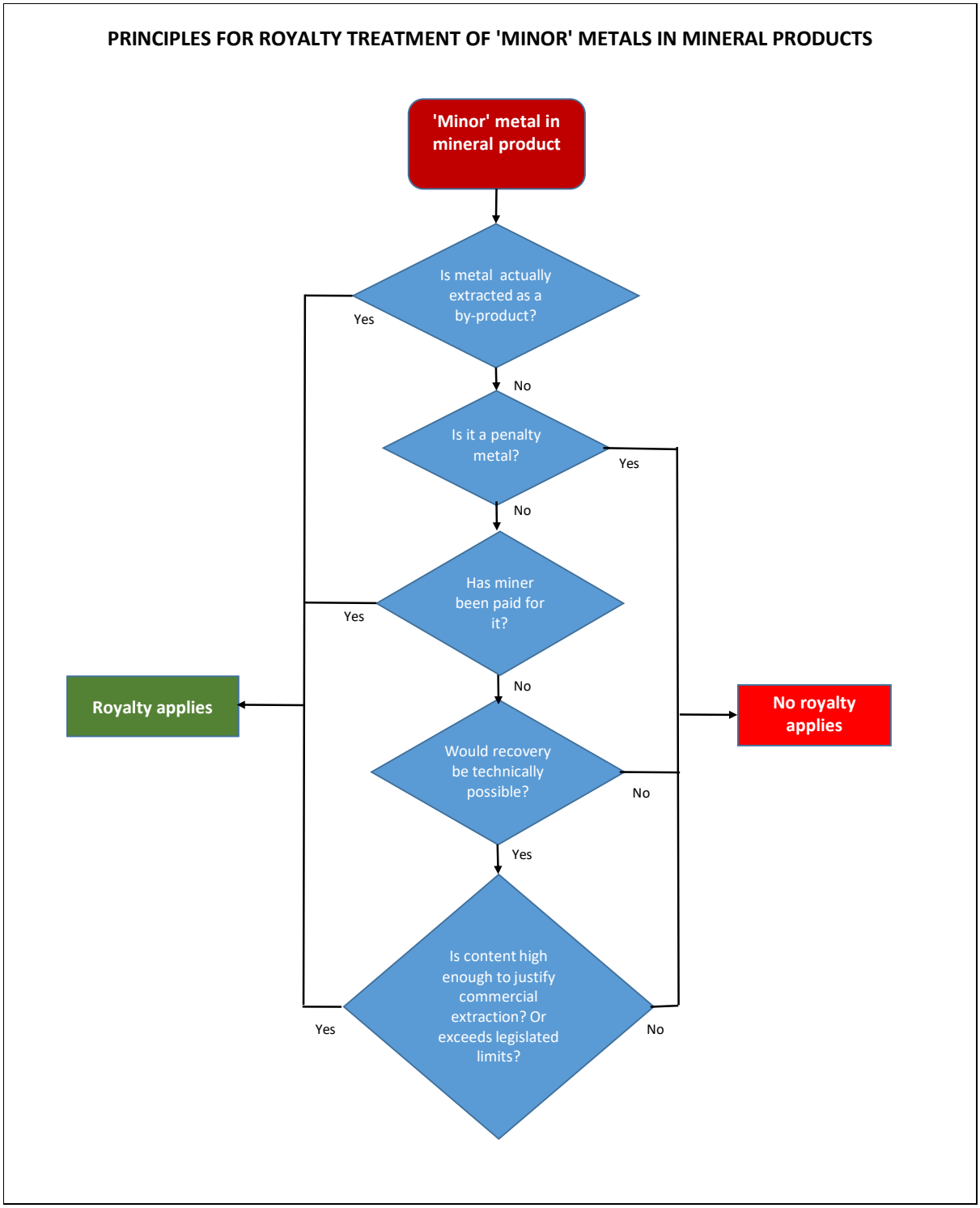

Figure 9. Principles for royalty treatment of 'minor metals' in mineral products

5.3 Economic Consequences of Implementing the Recommendations of this Report

It is considered that the direct and indirect potential benefits of rectifying the royalty regime as applied to 'minor metals' would over time outweigh the opportunity cost of implementing the necessary regulatory amendments in terms of the related revenue foregone. Two possible amendments have been considered, i.e. exempting from mineral royalties:

- all non-precious minor metals, and

- the small proportion of precious minor metals, i.e. of gold and silver other than produced as the primary metals in raw or semi-processed gold products, for which the miners do not get paid in the form of credits in the price of concentrates paid by buyers.

As discussed in more detail below, the amount of royalty foregone in both possible amendments is relatively modest and the first would probably generate significant administrative savings for Government.

5.3.1 Opportunity Cost of Rectifying the 'Minor Metals' Royalty Regime

An accurate estimate of the revenue that could potentially be foregone by implementing the recommendations contained in this report has been made using detail historical figures of the mineral royalties collected on individual minor metals during 2019 and 2020. These data, displayed in Appendix 8 and summarized in Table 20, were kindly provided by Mr. N. Munkhbileg of the Mongolian General Tax Office.

Table 20. Break up of Mongolian mineral royalty collections for 2019 and 2020 in primary and minor metals

Mineral Royalty Collected	2019	2020	
	Billion MNT	Billion MNT	Million USD
Total for all metals including:	**1,323.40**	**1,572.47**	**628.99**
1 - Primary metals	***1,262.79***	***1,499.22***	***599.69***
2 - Minor metals	***60.61***	***73.25***	***29.30***
Minor metals including:			
1 - Precious metals	***55.91***	***66.74***	***26.70***
Gold	47.73	49.98	19.99
Silver	8.18	16.76	6.71
2 - Non-precious minor metals	***4.70***	***6.51***	***2.61***
Total royalty on minor metals as % of total royalties collected	4.58%	4.66%	
Royalty on precious minor metals as % of total royalty collected	4.22%	4.24%	
Royalty on non-precious minor metals as % of total minor metals	0.36%	0.41%	

Source: Mr. N. Munkhbileg, Mongolian General Tax Office

In 2020 royalty levied on minor metals amounted to 73.25 billion MNT, roughly equivalent to $ 29.3 million, and represented just under 4.7% of total mineral royalties collected in that year amounting to 1,572.47 billion MNT or $ 628.99 million.

The amount of royalty collected on non-precious minor metals, i.e. 6.51 billion MNT or $ 2.61 million, only represented 8.9% of the royalty collected on all minor metals and a mere 0.41% of the total minerals royalty collected on all metals/elements in that year. This relatively modest figure represents the revenue that would be foregone by exempting from mineral royalties all non-precious minor metals. Furthermore, the potential impact on revenue would be in part offset by savings in administration costs because of the simplification of the system reducing compliance costs and the lower level of chemical assays required to monitor it.

The bulk of the minor metals royalties was levied on gold and silver (i.e. 66.74 billion MNT or $ 26.7 million) produced as minor metals in various concentrates, particularly copper concentrates, as shown in Table 21. This amount is, of course, in addition to 142.71 billion MNT ($ 57.08 million) collected as royalty on gold occurring as the primary metal in raw and semi-processed gold products.

It is to be expected that the vast majority of the gold and silver values on which royalties were levied was actually represented, with the exception of that contained in iron ore concentrates, by metal that either Government or the smelters had paid for in terms of 'credits'. Tables 22 and 23 are an attempt to estimate the proportion of royalties levied on precious minor metals for which the miners were subject to metal deductions and refining charges or did not receive any payment because of extremely low contents.

Table 21. Royalty collection matrix

METAL	Cu Concentrates	Au Semi-processed	Zn & Pb Concentrates	Iron ore Concentrate	Total MNT B
Precious Metals					
Au	45.937	1.859	2.182	0.0003	49.979
Ag	6.699	5.207	4.857	0.0001	16.763
Subtotal precious metals MNT B	52.637	7.066	7.039	0.0004	**66.742**
Subtotal non-precious metals MNT B	0.000	0.343	4.415	1.7545	**6.513**
TOTAL (ALL MINOR METALS) MNT B	**52.637**	**7.409**	**11.454**	**1.7549**	**73.255**
	100%	**Paid for**	**85%**	**Mostly paid for**	
	50%	**Partly paid for**	**0%**	**Not paid for**	

Table 21 shows royalty collection matrix, broken by type of concentrate and estimates of percentage of minor metals paid for by buyers, used to estimate the potential royalty revenue that would have been foregone in 2020 had the recommendations of this report been in force.

For the purpose of estimating the revenue that could potentially be foregone if the recommendation to limit royalties to metals for which miners receive payment were to be implemented, it was assumed, as shown in Table 22, that payment would be received for all gold and silver purchased by the Mongolian Bank (highlighted in green), for 85% of gold and silver contained in copper concentrates and of silver contained in zinc and lead concentrates (highlighted in brown) and 50% of gold contained in zinc and lead concentrates (highlighted in blue). In addition, it was assumed that no payment would have been received for precious metals in iron ore concentrates and for all non-precious minor metals (highlighted in yellow).

On the basis of these assumptions it was estimated, as shown in Table 23, that the revenue that would have been foregone in 2020 if precious metals for which the miners had not been paid had been exempted from mineral royalties would have been of the order of 9.719 billion MNT or $ 3.89 million. While this figure is a very broad approximation, the amount of revenue foregone is likely not to be very significant in the context, and only represents around 14.6% of all royalties collected on precious minor metals.

Contrary to the case of non-precious minor metals however, the process of providing this relief to the mining industry would be likely to involve some administrative complexity and additional compliance costs. Presumably Government would have to continue to, in the first instance, charge royalties as usual and subsequently make appropriate adjustments following regular declarations by industry and audit by Government of the amount of precious minor metals for which it had received 'credits' from the smelters.

In summary, Government has the option to exempt from royalty:

- all non-precious minor metals/elements at a cost to revenue of the order of 6.51 billion MNT or $ 2.61 million, a reduction of a mere 0.41% in total mineral royalty collections, resulting in significant system simplification and administrative cost savings, and
- that proportion of precious minor metals for which miners do not receive payment at a cost to revenue of the order of 9.715 billion MNT or $ 3.89 million, a modest reduction of 0.62% in total mineral royalty collections, but entailing some additional administrative complexity and compliance costs, or
- all minor metals for which miners do not receive payment at a cost of the order of 16.228 billion MNT or $ 6.49 million for a combined 1.03% reduction in total mineral royalty collections or about 21.15% of the total royalty collected on all minor metals i.e., 73.255 billion MNT or $ 29.30 million in 2020.

Table 22. Estimate of the royalty revenue that would have been foregone in 2020

MINOR METAL/PROCUCT	ESTIMATED REVENUE FOREGONE 2020	
	MNT Billion	$ Million
Au and Ag in semi-processed Au products	0.000	0.00
Au and Ag in Cu concentrates	7.896	3.16
Silver in Zn-Pb concentrates	0.729	0.29
Gold in Zn-Pb concentrates	1.091	0.44
Au and Ag in iron ore concentrates	0.000	0.00
Subtotal precious minor metals in all products	**9.715**	**3.886**
Subtotal non-precious minor metals in all products	**6.513**	**2.61**
TOTAL FOR ALL NOT-PAID-FOR MINOR METALS	**16.228**	**6.491**

Table 22 shows the estimate of the royalty revenue that would have been foregone in 2020 if the recommendations of this report had been in force

This amount is not too large in the broader context of total mining taxation and particularly if one considers, as discussed below, the significant monetary and non-monetary benefits of implementing the recommended amendments.

5.3.2 Potential Monetary and Non-monetary Benefits

As summarized in Table 23 below, mining benefits can be either monetary/financial, or non-monetary/economic.

The first group includes primarily:

- cash savings derived from the simplification of the administrative processes relating to the collection of mineral royalties and the handling of possible related legal disputes,
- additional royalties, corporate income tax (CIT), and a variety of other, individually minor but collectively significant, government taxes and imposts directly levied on possible new mining projects. It is very likely that as a consequence of rectifying the 'minor metals' anomaly the Mongolian royalty regime will be perceived by industry as more acceptable and Government as more sensitive to industry's needs. This is likely to attract additional investment in mineral exploration and mine development in the country over time expanding its royalty and tax bases and consequently its direct tax collections,
- additional personal income taxes paid by both people employed by the new exploration and mining projects and those of their suppliers and service providers,

- significant indirect fiscal revenue generated by the high employment and other multipliers that for the mining industry are estimated by Bivens (2019) to be as high as 3.9 jobs in the broader economy for each direct job in mining.

The second, non-monetary/economic group includes a potentially vast range of obligations directly imposed on the mining company as conditions of its mining permit. Some of these, referred to by some authors as 'quasi royalties', include establishment of common use infrastructure, payments to local communities in excess of actual disturbance, preferential local procurement at non-market competitive rates, provision of education and training beyond immediate companies' needs etc.

Non-monetary socio-economic benefits and costs are also likely to arise indirectly throughout the broader economy of the country beyond the immediate area impacted by the project. Economists refer to these as economic externalities which can be both positive and negative.

Quantitative valuation of potential externalities in monetary terms would require complex economic modelling and cost-benefit analysis (CBA) well beyond the scope of this report.

Table 23. Characterization of mining benefits and costs

	MONETARY/FINANCIAL	**NON-MONETARY/ECONOMIC**
DIRECT	• Mineral royalties • Corporate income tax (CIT) • Capital gain tax (CGT) • Dividends from free-carried government equity • Export-import duties and excises • Tenement fees and rentals • Withholding tax on cross-border dividends, interest and other remittances. • Various other taxes and imposts, e.g., VAT, stamp duty, payroll tax, etc.	• Contribution to the cost of establishing or upgrading common-use infrastructure • Provision of utility services to near mine communities • Compensation payments to the community in excess of actual disturbance • Obligation to provide local training and employment • Preferential procurement from local suppliers

INDIRECT	Effect of economy-wide employment and other multipliers:
	• Personal income tax levied from the employees of:
	  ○ mining companies and of
	  ○ their service providers and suppliers
	• Corporate income tax and other taxes and imposts levied from service provider and supplier companies
	• Taxation of shareholders' dividends
		Socio-economic externalities:
		• Positive:
		  ○ Regional development of frontier areas
		  ○ Contribution to regional geoscience knowledge and investment attraction
		  ○ Contribution to the country's strategic resource self-sufficiency
		• Negative:
		  ○ Impact on the natural environment
		  ○ Impact on indigenous communities

Source: Modified from Lilford and Guj, 2020

5.3.3 Industry consultation and input in finalizing the 'minor metal' policy

Although industry tries hard to emphasize the vast range of positive externalities generated by mining projects, the mining taxation dialogue is invariably cast almost entirely in monetary terms. The relationship is seen strictly as a zero-sum game balancing government's short- to medium-term revenues against mining companies' profits, where a gain to one is a loss to the other.

Thus, although a symbiotic relationship should exist between government and industry in the formulation of effective and mutually acceptable regulatory regimes, rarely the possibility of synergistic, win-win arrangements, based on cooperative communication, consultation and awareness of each other's needs and expectations actually occurs. Not surprising, for these reasons industry and government invariably view each other with a degree of suspicion and the relationship in most jurisdictions is by and large far from cooperative and transparent and in many cases, it is downright adversarial.

This should not be the case in this instance given that Government already sees a need for and is exploring possible strategies to try to resolve the 'minor metals' issue. To the extent that the proposed changes will be welcome by the mining industry, it may prove advantageous to involve them and seek their advice in the formulation of possible amendments as soon as broad agreement as to a possible course of action is reached within Government itself. This interaction with industry may also be an opportunity to explore with them possible avenues to soften the potential revenue impact on Government.

6 CONCLUSIONS

The current review reached the following main conclusions:

1. The current Mongolian value-based royalty regime has, from the point of view of Government, many positive aspects and does not require any significant amendments other than addressing some administrative and equity issues arising from the imposition of mineral royalties on 'minor metals' contained in mineral products such as ores and concentrates. These administrative difficulties stem primarily from too literal an interpretation of the term 'sales value' as it concerns 'minor metals' in Article 47 of the Law on Minerals and related Regulations.

2. The current Mongolian approach goes beyond the general international practice of levying royalties on minor metals for which the miner receives a 'credit' or payment in addition to the sales price for the principal metal(s) contained in ores and concentrates, resulting in mineral royalties being imposed on elements for which the:

    a) buyers apply a 'penalty' in the form of a discount on the sales price realized by the miner for the principal metal(s) contained in the mineral product on account of their deleterious effect on the smelting and refining processes, and

    b) miner receives no 'credit' or payment in addition to the sales value of the principal metal(s) and that may be present in the mineral product in concentrations so low as to make it impossible to commercially extract them under current and foreseeable metallurgical technologies.

3. A review of the royalty regime of a large number of mining jurisdictions throughout the world indicated that the current Mongolian practice is rather unique, as none of the international jurisdictions examined appeared to have regulations that would allow the imposition of mineral royalties on 'minor metals' for which the miner did not receive payment.

4. Quantitative case studies comparing the royalty value bases and collections for actual copper, zinc and iron ore concentrates in Mongolia, with the related Net Smelter Value (payment) (NSV) and the royalty payments that they would have incurred if they were produced in the leading Australian mining jurisdictions of Western Australia and Queensland indicates that:

    a. Royalty collected under the Mongolian regime vastly exceed those under the Australian and many other international regimes. This was the case even if the component of royalty collections attributable to 'minor metals' was removed.

    b. The proportion of royalty collected in Mongolia attributable to 'minor metals' ranged between 1.5% in the copper concentrate case and 25.6% for the zinc case. However, in aggregate about 4.7% of total royalties actually collected in 2020 was attributable to minor metals and about 22% of it was collected on minor metals for which the miner received no payment.

    c. Silver was the only 'minor metal' in the three case studies for which the copper and the zinc miners received a 'credit' payment from the smelters, while having to pay

royalties to the Mongolian Government on a number of other minor metals even though the smelters may have imposed a 'penalty' on them because deleterious to the smelting and refining processes. This practice is considered to lack in logic and equity particularly in cases, such as aluminium in iron ore concentrates, where not only it cannot be recovered during the steel making process, but in fact promotes the costly formation of slag in the blast furnace.

5. In the majority of jurisdictions, the 'minor metals' issue tends to be addressed during the approval process, primarily when a company submits to Government a Notice of Intent (NoI) to develop a mineral deposit. It is at this stage that Government has the best opportunity to question whether the development, as proposed in the Feasibility Study (FS) is optimal from the point of view of the state. It should particularly question the rationale why recovery of some "minor metals" occurring in comparatively high concentrations has not been considered as commercially feasible. Accordingly, the development plan may be reconsidered, or the final mining agreement may include an obligation on the mining company to review the commercial feasibility of extracting one or more of the most promising minor metals at some point in the future in light of changes in commodity prices and possible technical advancements in relevant metallurgical processes.

6. Another important question is how low should the level of concentration of individual 'minor metals' be before they do not justify extraction and can be disregarded as 'prima facie' commercially irrelevant and, therefore, be exempted from royalties? An interesting approach in this regard is to be found in the Western Australian royalty regulations that prescribe the minimum vanadium content of iron ore (magnetite) concentrates above which a royalty applies irrespective of whether vanadium is produced or not. This measure was deemed necessary because the rapidly rising price of iron ore risked rushed and suboptimal development of significant local resources of vanadiferous magnetite.

7. While the issue of 'minor metals' royalties is a relatively minor component of the broad spectrum of mining governance provisions in Mongolia, it does nonetheless contribute to an international general perception of the country's mining regulatory regime inhibiting foreign direct investment in mineral exploration and mining. This is regretful given the country's recognized very high mineral potential.

8. It is considered that the direct and indirect potential benefits of rectifying the 'minor metals' anomaly would over time outweigh the opportunity cost of implementing the necessary regulatory amendments in terms of the related revenue foregone. Revenue foregone in 2020 would have been 6.51 billion MNT or $ 2.61 million if all non-precious minor metals and of the order of 9.715 billion MNT or $ 3.89 million if the small proportion of precious minor metals for which miners did not receive payment had been exempted from royalties.

9. Exempting from royalties all non-precious minor metals would result in significant simplification of the related administrative processes with consequential offsetting savings in terms of compliance costs and in particular of the reduced requirement for chemical assays. By contrast, royalty exemption for the proportion of precious minor metals for which miners do not receive payment would be likely to introduce additional administrative complexity and compliance costs.

7 RECOMMENDATIONS

On the basis of the above conclusions, it is recommended that the Mongolian Government should:

1. Impose a mineral royalty on minor metals/elements in mineral products, the recovery of which is potentially economically profitable and technologically possible, irrespective of whether they are actually extracted or not during further processing of the mineral products.
2. Publish a list, as proposed in Appendix 1, of the above minor metals/elements in mineral products that should be subject to royalty based on internationally accepted principles and practices in trade and in extractive/metallurgical technology.
3. Determine the 'sales value' of minor metals/elements to be subject to royalty based on their reference price, as regularly published by the Government, and their percentage content in mineral products as determined by a laboratory authorized/certified/accredited in Mongolia, without taking into account minimum payment thresholds and without deducting the extracting and, treatment and refining charges customarily imposed by smelters.
4. Review, and from time to time update as necessary, the list of minor metals/elements in mineral products to be subject to royalty taking into account emerging improvements in the processing technology of mineral products and the market prices of minor metals/elements contained in them.
5. Exempt from mineral royalty the minor metals/elements specified for various mineral products in Appendix 1, including:
    a. minor metals/elements, recognized in international trading as "penalty" because of their deleterious effect on smelting and refining processes; and
    b. minor metals/elements that are impossible and/or clearly uneconomic to be recovered under current mineral processing technologies and prices.
6. The above list of minor metals/minerals exempted from royalty shall be established, and from time to time reviewed as necessary by the Government, taking into account improvements in the extraction technology and/or market price of individual minor metals/elements that may render their recovery economically feasible.
7. Ensure, prior to approval to mine, whether the feasibility study tabled in support of the notice of intent to develop a mine has adequately canvassed the commercial feasibility of extracting some of the 'minor metals' occurring in comparatively high concentrations and what criteria were adopted to discard as 'prima facie' technically and/or commercially unfeasible minor metals occurring in low concentrations.
8. Introduce amendments to the Law on Minerals and/or related Regulations bestowing on Government discretionary power to set and from time-to-time review as necessary maximum concentration limits for any individual minor metal above which a mineral royalty would become payable whether or not the metal is extracted or not in practice. These limits should be set if/when necessary with reference to international industry practice and updated as necessary in light of metallurgical technological and marketing improvements.
9. To the extent that the changes to the royalty regime proposed in this report will be welcome by the mining industry, involve them and seek their advice in their formulation and finalization as soon as broad agreement as to a possible course of action is reached within Government.

REFERENCES

Australasian Institute of Mining and Metallurgy (AusIMM) (2012) Cost Estimation Handbook. AusIMM Monograph N. 27

Bivens, J. (2019) Updated employment multipliers for the U.S. economy | Economic Policy Institute (epi.org)

Extractive Industry Transparency Initiative (EITI) (2020) Mongolia 2019 EITI Report | Extractive Industries Transparency Initiative

Fountain, C. (2013). The Whys and Wherefores of Penalty Elements in Copper Concentrates. Metallurgical Plant Design and Operating Strategies (MetPlant 2013) 15 - 17 July 2013, Perth WA

Frazer Institute (2020) Annual Surveys of Mining Companies, 2020. https://www.fraserinstitute.org/categories/mining

Guj P., Bocoum B., Limerick J., Meaton M. and Maybee B. (2013) – "*How to Improve Mining Tax Administration and Collection Frameworks: A Source Book"* – Published jointly by the World Bank and nthe centre for Exploration Targeting (UWA)

Lilford, E. and Guj, P. (2020) *Mineral Taxation: Reconciling the interests of government and industry*. Springer

Salomon-de-Friedberg, H. and Robinson, T. (2014) Tackling impurities in copper concentrates. Teck Resources Limited, 12380 Horseshoe Way Richmond, BC Canada V7A 4Z1

APPENDICES

Appendix 1. List of metals/elements subject and exempt from mineral royalties in selected mineral products.

Mineral products	Minor metals/elements subject to royalty	Minor metals/elements exempt from royalty
Copper concentrate	Gold	Iron
	Silver	Zinc
	Selenium	Lead
	Tellurium	Tin
	Platinum	Nickel
		Cobalt
		Aluminum
		Magnesium
		Molybdenum
		Mercury
		Bismuth
		Antimony
		Arsenic
		Cadmium
		Sulfur
		Fluorine
		Chlorine
Zinc concentrate	Gold	Iron
	Silver	Copper
	Cadmium	Cobalt
		Lead
		Tin
		Nickel
		Molybdenum
		Tungsten
		Antimony
		Arsenic
		Magnesium
		Mayganese
		Mercury
		Silicon oxide
		Sulfur
Iron ore, concentrate		Aluminum
		Copper
		Zinc
		Lead
		Silver
		Titanium
		Silicon
		Fluorine
		Chlorine
		Phosphorus

Appendix 2. Comparison of Selected Mining Taxation Packages

NOTE – Royalty rates are ad valorem unless otherwise specified. Specific weight-based royalties, that may co-exist with the ad valorem systems not listed.						
Country	**CIT Rate**	**Royalty Range**	**VAT/ GST**	**Import/ Export Duties**	**Withholding Tax**	**Govt/Local/Social Participation**
Argentina	35.0%	3% of realized pit-head value	n/a	5 – 10%	0%	Y
Afghanistan		Product: Primary 7.5%; Secondary 5%; and Tertiary 2.5% of gross revenue or market value				
Australia	30.0% being progressively reduced to 26%	All States 1.6 – 15.0%	n/a	n/a	30%	N (Aboriginal rights)
a – Western Australia		2.5 – 5 - 7.5% Of realized FOB value of metal, concentrate, ore				
b - Queensland		1.5 – 15.0% Price progressive				
c – New South Wales		Coal 6.2 – 8.2% Deep u/g to open pit Non-coal: 4.0% of 'ex-mine" value				
d - Victoria		2.75% of 'net market value'				
e – Northern Territory		22.5% of profit				
f - Tasmania		Hybrid, 1.9% of NSR + profit. Max 5.35% NSR				

Botswana	22.0%	Precious stones:10% Precious metals: 5% Other minerals 3% of 'gross market value' at mine gate	12%	variable	7.5%	N
Burkina-Faso	28%	5%	18%	30%	12.5%	Y
Brazil	34.0%	Rock, sand etc.,: 1% Gold: 1.5% Diamonds: 2% Bauxite, Mn, Nb, salt: 3% Iron ore: 3.5%	3.65 – 9.25 %	0%	0%	N
Cambodia	20%	3 - 5%	10%	variable	0%	Y
Canada Federal (excludes Provinces)	15.0% (Fed. only)	1 – 20% of income / profit	n/a	n/a	25%	Y
a - Ontario	10%	10% of profits (5% for remote area)				
b- Saskatchewan	10%	5% of net profit up to 1Moz precious or 1Mt base metals cumulative production since start of mining, 10% above it				
c – British Columbia	12%	2% of profit and 13% on revenue				
d - Quebec	11.6%	16% of profits				
e – Newfoundland	15%	20% of profits				
f - Alberta	11.5%	1% of income at mine mouth				

		plus 12% of profits				
Chile	18.5%	0 – 14% of profit	n/a	n/a	35%	N
China	Nat. 25.0% Prov. 3%	0.5 – 4%	13%	variable	10%	Y
DRCongo	30.0% and 50% on super-profit	0.5 – 10%	16%	n/a	10%	Y
ROCongo	30.0%	3 – 5%	0.2 – 1%	n/a	20%	Y
Germany	30.0%	n/a	n/a	n/a	26.375%	N
Ghana	35.0%	5% of gross revenue	15%	n/a	8%	Y
India	25.0%	2 – 10%	1 - 5%	10 – 40%	0%	Y
Indonesia	25.0%	3 – 7% 13.5% for coal (rates vary with production tonnages)	n/a	n/a	20%	Y
Japan	41%	0.7 – 1%	10%	n/a	20%	N
Kazakhstan	20.0%	0 – 5.7%	variable %	coal 2%	15%	Y
Kenya	37.5%	5 – 12%	16%	0 – 5% on minerals	10%	Y
Korea	20%	n/a	10%	n/a	27.9%	N
Laos	20%	Precious stones: 10% Semi-precious stones, precious and unusual metals: 7% Ferrous and base metals: 6% Others:2-4% of sales value	10%	variable	5 – 20%	N
Liberia	30%	3% plus 2% presumptive royalty	10%	2.5 – 20%	5%	Y
Malaysia	25%	5%	10%	0 – 10%	15%	N
Mali	30%	6%	18%	variable	10%	Y
Myanmar	25%	3 – 8%	10%	n/a	0%	Y

Mexico	30.0%	n/a	16%	n/a	10%	Y
Mongolia	10% below MNT 3 b in taxable income rising to MNT 300 M + 25% of income above MNT 3 b	Domestic: Coal and other common minerals: 2.5% Gold: 5% Exports: Basic 5% + Additional surtax (commodity price/ product type related): Copper 0 - 30% Others except Au: 0 -5%	10%	0 to 40% mostly 5%	10 to 20%	N
Mozambique	32%	1.5 – 8%	17%	n/a	20%	Y
Namibia	37.5% (55% diamonds)	Diamond and precious stones: 10% Dimension stone: 5% Au, base metals and U: 3% Industrials and semi-precious:2% of market value	15%	variable	10%	Y
Nigeria	30%	3 – 5%	5%	variable	10%	Not specified
Papua and New Guinea	30% (Non-res. 40%)	2%	10%	variable	Int. 15% Div. 10%	N
Peru	29.5%	Profit-based at 3 Gov. levels: Min Royalty 1 - 12%, Special min tax 2 - 8.4%,	n/a	n/a	5%	Y

		Min Contribution 3.4 - 13.2%				
Philippines	30%	2 – 8%	0 – 12%	n/a	12%	Y
Russia	35.5%	4.8 – 8%	n/a	select products	15%	Y
South Africa	28.0%	Min. 0.5 to 7% of 'gross sales' with rate determined as a function of EBIT Capped at 5% for 'unrefined' and 7% for 'refined' resources of gross sales	15%	n/a	10%	Y
Tanzania	Gen. 30.0% Min. 35%	6% of gross value plus 1% Custom inspection fee	18%	n/a	10%	Y
Thailand	20%	2 – 10%	7%	variable	15%	Not specified
Ukraine	18.0%	variable/t	20%	select products	15%	Y
UK	19.0%	n/a	variable/t	select products	0%	N
USA	21% reduced from 48.0%	0 – 12.5%	4.4%	n/a	30%	N
a - Montana		5 to 8% on NSR basis				
b - Alaska		3 to 7% of income				
c - Arizona		2% on income				
d - California		At least 10% of profit				
e - Idaho		5% of income				
f – New Mexico		At least 5% of gross returns				

g - Oregon		5% of income				
h - Utah		4% (non-metal) to 8% (metals) of profit				
Vietnam	20% (32 - 50% precious metals)	1 to 5%	10%	0 – 45%	10%	N
Zambia	30%	Cu: 5 to 10% price related Energy minerals: 5% Gemstones: 6% Not CIT deductible	16%	0 – 25%	20%	Y
Zimbabwe	25% (+3% AIDS levy)	1 – 15%	15%	variable	10 – 15%	Y

Appendix 3. Mongolian Legal Framework Concerning Mineral Royalty

The following pieces of legislation are relevant to the imposition of mineral royalties on minerals produced in Mongolia:

1. Constitution of Mongolia
2. Law on Subsoil
3. Law on Minerals and royalty imposing regulations
4. General Law on Taxation
5. Law on Value Added Taxation
6. Law on Investment

ONE. Constitution of Mongolia

Article 6 of the Constitution provides legal ground on ownership of the mineral wealth. On 14 November 2019, such Article 6 was revised by the Parliament and became effective starting from 25 May 2020. The Ministry of Mining and Heavy Industry is working on revision of the Law on Minerals in line with newly revised Constitutional revision. No draft has been disclosed yet for public discussion.

"Articles 6.1

1.1. *The land, its subsoil, forests, water, fauna, flora, and other natural assets in Mongolia shall be subject to the people's authority and under the protection of the State*.

1.2. *The land, except that in private ownership of the citizens of Mongolia, as well as the land subsoil, and its wealth, forests, water resources, and fauna shall be the public property of the State.*

The state policy regarding the use of natural resources shall be based on the long-term development policy and shall be aimed to ensure the rights for each of current and future citizens to live in a healthy and safe environment, and benefits from subsoil resources shall be accumulated to the Sovereign Wealth Fund and be distributed equally and fairly.

Within the scope of right to live in a healthy and safe environment, a citizen shall have the right to know about environmental impacts of any utilization activities of subsoil resources.

The legal basis to allocate majority of the benefits from utilization of the mineral resources of strategic importance shall be governed by the law in line with the principles that natural wealth should be under people's control."

TWO. Law on Subsoil

This Law was passed in 1989, prior to the current Constitution of Mongolia of 1992, and currently its application has become quite limited, as detailed schemes on geological study, exploration and exploitation have been separately defined in other laws, such as the Law on Minerals, Law on Petroleum, Law on Common Minerals and Law on Nuclear Energy.

However, with regards to royalty, it provides (1) general legal grounds on having royalty and defining royalty by law and (2) the State's requirement to capture mineral benefits to the extent possible, by requiring comprehensive study, use of most efficient technology and keeping record of wastes/overburden containing mineral content of economic value and reprocessing them. In this regard, the following articles are considered as relevant:

*"**Article 3. The subsoil of Mongolia is the property of the State***

The subsoil is the property of the State, in order words, it is the property of all people of Mongolia, in accordance with the Constitution of Mongolia. The subsoil may be given [to others] only for use. It shall be prohibited to change the right of the state to own the subsoil.

Article 10. The purpose of using the subsoil

1. The subsoil may be given for use for the following purposes:

1) conducting geological surveys

2) mining of minerals

3) building and using constructions and structures underground for purposes other than mining, including for storage of oil, gas and other substances and materials; for protecting and burying poisonous substances and industrial waste; and for removing wastewater.

4) meeting other needs of companies, organizations and individuals.

2. Issues related to exploration and mining of mineral resources in subsoil shall be regulated by the Law on Minerals.

3. Users of the subsoil shall obtain relevant authorization from possessors and users of land according with relevant regulations.

Article 11. Fees for the use of subsoil

1. The subsoil shall be used upon payment of a fee.

2. The maximum and minimum amounts of fees for use of subsoil shall be determined by the law.

CHAPTER FOUR

USING SUBSOIL FOR MINING

Article 31. Procedures of using subsoil for mining purposes

1. Mining entities and organizations shall use the subsoil in accordance with approved drawings, earth work plans and technical regulations of use.

2. The relevant state central administrative authority shall approve technical regulations of use for mining companies and organizations upon authorization of the state central administrative authority in charge of geology and mining.

3. Mining companies and organizations shall have the duty to liquidate damages caused by their actions such as environmental pollution, improper use of natural resources, damage and destruction of natural resources.

Article 32. Basic requirements on use of subsoil for mining

The following requirements should be met when using subsoil for mining of mineral raw materials:

1) to use methods to extract the core and co-existing minerals, as well as other components efficiently in its entirety and completely;

2) not to create overburden and waste exceeding the determined level, not to exploit selectively only from the content rich parts of the mineral deposits;

3) to conduct comprehensive final and utilization surveys, other geological works, as well as marketing activities necessary for use of the deposit; to keep complete technical documentation;

4) to continually account for [the remaining] reserves, changes in reserves, overburden and wastes;

5) not to damage the existing deposits that are being used, as well as any nearby deposits during earthworks, to protect and to store minerals left as reserves;

6) to record and to store production wastes that is mined as by-products and/or unutilized ores containing minerals content which have economic value;

7) to properly use and place the extracted gravel, fertile soil and the overburden;

8) to ensure safety for employees and [local] people, to protect the subsoil, other objects of nature, as well as constructions and structures; to take measures to prevent hazards, to approve and to implement plans on liquidation of consequences of hazards, to rehabilitate the mine site after the end of its use in a way that it can be used for economic purposes.

Article 33. Basic requirements on processing of mineral raw materials

The following basic requirements should be met during processing of mineral raw materials:

1) to use technologies to fully and completely extract valuable components of mineral resources;

2) to record and control the level and amount of extracted components at each state of processing;

3) to further study the composition of the mineral raw material and its technological qualities; to improve the technology;

4) to utilize wastes produced during the course of processing of minerals;

5) to record, calculate and protect industrial waste containing valuable components which have not been used.

CHAPTER EIGHT

THE NATIONAL REGISTRATION OF RESERVES OF

MINERAL RAW MATERIALS, DEPOSITS AND SUBSOIL

Article 45. National registration of reserves of mineral raw materials and deposits

1. Reserves of mineral resources, deposits and occurrences shall be registered with the central national registry.

2. The national registry of mineral deposits and the national identity of mineral reserves shall be maintained in order to plan geological surveys of subsoil, to determine location for mining plants, to use mineral deposits fully and rationally, as well as for other economic purposes.

3. The registry of mineral reserves, deposits and the subsoil, the registry of mineral deposits and the national identity of mineral reserve shall be maintained by the National Geological Library.

Article 46. The national record of mineral deposits

The national record of mineral deposits should contain information on the amount and quality of reserves for the core and co-existing minerals, as well as other components, earth-work machinery, hydrogeological and other conditions for using the deposits, and geological and economic assessments, separately for each mineral occurrence.

Article 47. The national identity of mineral reserves

The national identity of mineral reserves shall contain information on location of deposits whose production is meaningful [feasible], amount of their reserves, their quality, surveying, industrial capacity, mined resources and overburden, as well as amount of geologically surveyed reserves supplied.

Article 48. Determining the level of accuracy of assessment of mineral reserves

The State Geological Library and Information authority shall conduct analysis of accuracy of assessment of mineral reserves, the amount and quality of these reserves, existing conditions, the level of surveying, economic feasibility, and the level of readiness of the deposit for mining and shall determine accuracy of the assessment on the basis of this analysis.

Article 49. Removing mineral reserves from the national identity of mineral reserves

The issue of removing mined minerals, as well as minerals that are turned into unfeasible resources, reserves wasted during mining, or reserves that were not proven in the course of further surveying or mining shall be decided by the organization that has proven this reserve.

Article 50. The national registry of the subsoil to be used for purposes other than mining

The state central administrative authority in charge of geology and mining shall maintain a registry of subsoil to be used for purposes other than mining."

THREE. Law on Minerals and Regulations

LAW ON MINERALS

Current Law on Minerals was approved by the Parliament in 2006 and since then Article 47 on Royalties has been extensively amended. In addition to an initially defined base royalty of 5% on exported minerals and 2.5% on domestically sold or used minerals, in 2010 comprehensive table on surtax royalty based on market price and processed level of the mineral was added to be applicable. The royalty payment period was also shortened from 'within next quarter' to 'within 20th day of following month'.

The taxable amount for royalty is defined based on the 'sales value' defined below by the Government Resolution No.81, 2016 in accordance with Article 47 of the Minerals Law. In practice, according to the Government Resolution 131, 2013, the Minister for Finance (NOF) and the Minister for Mining (former name, now Minister of Mining and Heavy Industry (MOMHI)) established a Joint Working Group responsible for declaring "monthly reference sales values" applicable for imposing of royalties in that month.

Such Joint Group is consisting representatives of MOF, MOMHI, General Tax Office and General Customs Office and Mineral Resources and Petroleum Authority. It should be noted that to this date, the exact methodology used in calculating given "monthly reference sales value" has not been made public but seems to be based on a weighted average estimates derived from a number of different market price sources as disclosed in various web pages.

The types of market price sources defined by the Government Resolution No.81, 2016 are as follows:

Sales value sources	Types of minerals
London Metal Exchange price	Copper, zinc, white lead, black lead, molybdenum
Mongolbank (Central bank of Mongolia) declared price	Gold and silver
Web sources disclosing market value	Iron, coal, fluorspar, permonate ammonia, wolfram, manganese
Sales contract price	Iron and coal (if the Sales Contract price does not differ by more than 30 percent from the "monthly reference sales value" declared by the Joint Working Group as disclosed by the Mineral Resources and Petroleum Authority web page)

With regards, imposing royalty "on all types of minerals", such phrase is stated under the Articles 47.3.3, 47.10 and 47.16 of the Law on Minerals. It should be noted that under the Law on Minerals, there is no mention of whether there should be any exemption or waver from royalties on certain minerals, indeed relevant to the minor elements. As a consequence, the MOF and tax authorities are relaying on the literal wording of the Law on Minerals to impose royalties on all types of minerals.

Moreover, requirement to impose royalty to each and all types of exported base and minor elements/minerals, except coal, iron ore and iron concentrate, subject to the Customs' laboratory test result, is defined by Article 2.8 of the Government Resolution No.465, dated 25 December 2019.

Historically, the same requirement was defined by the Guideline approved by the Head on General Tax Authority and implemented between 2010 and 2019.

Following are relevant parts from the Article 47 of the Law on Minerals relevant with Royalties:

*"**Article 47. Royalties***

47.1.The payer of royalties shall be as follows:

47.1.1. mineral license holder;

47.1.2. person who exported mineral products;

47.1.3. person who sold gold to Mongolbank or commercial banks authorized by Mongolbank.

/This section was partially nullified by the order No. 04 of the Constitutional court, dated 30 October 2019 /

/This section was amended by the law dated 22 November 2019/

47.2.The sales value specified in Article 47.16 of this law shall be determined as follows:

/This section was amended by the law dated 22 November 2019/

47.2.1. If product is exported, the sales value shall be defined based on principles of using the recognized average monthly prices of the products, or similar products at the international market and recognized in international trade;

47.2.2. If product is sold in the domestic market or used, the sales value shall be based on the domestic market price for the particular product or similar product;

47.2.3. If market reference sales value of the product sold at international or domestic markets is impossible to determine, the sales value of the product shall be the sales revenue declared by the license holder.

47.7.The royalty rates shall be as follows:

47.3.1. *The [base] royalty rate for extracted coal which is utilized for own use, or domestically sold or shipped shall be two and one-half (2.5) per cent of its sales value;*

47.3.2. *The [base] royalties for gold sold to Mongolbank or commercial banks authorized by Mongolbank shall be five (5.0) per cent of its sales value and additional surtax royalty rate specified in Article 47.5 of this law shall not apply.*

47.3.3. *The [base] royalty rate for all types of minerals other than those set forth in Article 47.3.1 and 47.3.2 of this law shall be five (5.0) per cent of their sales value.*

/This section was amended by the law dated 22 November 2019/

47.7.Depending on increase in the market price and processed level of the mineral product, an additional surtax royalty rate shall be imposed in addition to the [base] royalty specified in Article 47.3.3 of this law as follows:

/This section was amended by the law dated 22 November 2019/

№	**Product name and type**	**Measure ment unit**	**Reference product type to be used for valuation**	**Market price range /in USD/**	**Surtax royalty percentage to be imposed in addition [to the base royalty] depending on the processing level of the product**		
					Ore	Concentrate	Product

1	Copper	Ton	Copper /in metal/	0 - 5000	0.00	0.00	0.00
				5000 - 6000	22.0	11.0	1.00
				6000 - 7000	24.0	12.0	2.00
				7000 - 8000	26.0	13.0	3.00
				8000 - 9000	28.0	14.0	4.00
				9000 <	30.0	15.0	5.00
2	Gold	Ounce	Gold /pure/	0 - 900			0.00
				900 - 1000			1.00
				1000 - 1100	-	-	2.00
				1100 - 1200			3.00
				1200 - 1300			4.00
				1300 <			5.00
3	Zinc	Ton	Zinc /in metal/	0 - 1500	0.00	0.00	0.00
				1500 - 2000	1.00	0.80	0.40
				2000 – 2500	2.00	1.60	0.80
				2500 – 3000	3.00	2.40	1.20
				3000 - 3500	4.00	3.20	1.60
				3500 <	5.00	4.00	2.00
4	Molybdenum	Ton	Molybdenum	0 - 35000	0.00	0.00	0.00
				35000 – 40000	1.00	0.80	0.50
				40000 – 45000	2.00	1.60	1.00
				45000 - 50000	3.00	2.40	1.50
				50000 - 55000	4.00	3.20	2.00
				55000 <	5.00	4.00	2.50
5	Iron	Ton	Iron ore	0 - 60	0.00	0.00	0.00
				60 - 70	1.00	0.70	0.40
				70 - 80	2.00	1.40	0.80
				80 - 90	3.00	2.10	1.20

				90 - 100	4.00	2.80	1.60
				100 <	5.00	3.50	2.00
6	Wolfram	Ton	Wolfram ore concentrate	0 - 25000	0.00	0.00	
				25000 - 30000	1.00	0.80	
				30000 - 35000	2.00	1.60	-
				35000 - 40000	3.00	2.40	
				40000 - 45000	4.00	3.20	
				45000 <	5.00	4.00	
7	Fluorspar	Ton	Fluorspar ore and concentrate	0 - 80	0.00	0.00	
				80 - 90	1.00	0.90	
				90 - 100	2.00	1.80	-
				100 - 110	3.00	2.70	
				110 - 120	4.00	3.60	
				120 <	5.00	4.50	
8	Floatation concentrate	Ton	Floatation concentrate	0 - 200		0.00	
				200 - 230		0.70	
				230 - 260	-	1.40	-
				260 - 290		2.10	
				290 - 320		2.80	
				320 <		3.50	
9	Tin	Ton	Tin /in metal/	0 - 17000	0.00	0.00	0.00
				17000 - 18000	1.00	0.80	0.50
				18000 - 19000	2.00	1.60	1.00
				19000 - 20000	3.00	2.40	1.50
				20000 - 21000	4.00	3.20	2.00
				21000 <	5.00	4.00	2.50
10	Lead	Ton		0 - 1500	0.00	0.00	0.00

			Lead /in metal/	1500 - 1800	1.00	0.80	0.40
				1800 - 2100	2.00	1.60	0.80
				2100 - 2400	3.00	2.40	1.20
				2400 - 2700	4.00	3.20	1.60
				2700 <	5.00	4.00	2.00
11	Silver	Ounce	Silver /pure/	0 - 25			0.00
				25 - 30			1.00
				30 - 35		-	2.00
				35 - 40			3.00
				40 - 45			4.00
				45 <			5.00
12	Magnesite	Ton	Magnesite concentrate	0 - 100	0.00	0.00	
				100 - 120	1.00	0.90	
				120 - 140	2.00	1.80	-
				140 - 160	3.00	2.70	
				160 - 180	4.00	3.60	
				180 <	5.00	4.50	
13	Aluminum	Ton	Aluminum /in metal/	0 - 2300	0.00	0.00	0.00
				2300 - 2600	1.00	0.90	0.50
				2600 - 2900	2.00	1.80	1.00
				2900 - 3200	3.00	2.70	1.50
				3200 - 3500	4.00	3.60	2.00
				3500 <	5.00	4.50	2.50
14	Rare earth elements	Kg	Rare earth element concentrate	0 - 10	0.00	0.00	
				10 - 20	1.00	0.90	
				20 - 30	2.00	1.80	-
				30 - 40	3.00	2.70	

				40 - 50	4.00	3.60	
				50 <	5.00	4.50	
15	Phosphorite	Ton	Concentrate	0 - 70	0.00	0.00	0.00
				70 - 90	1.00	0.90	0.50
				90 - 110	2.00	1.80	1.00
				110 - 130	3.00	2.70	1.50
				130 - 150	4.00	3.60	2.00
				150 <	5.00	4.50	2.50
16	Zeolite	Ton	Zeolite	0 - 200	0.00	0.00	
				200 - 250	1.00	0.90	
				250 - 300	2.00	1.80	-
				300 - 350	3.00	2.70	
				350 - 400	4.00	3.60	
				400 <	5.00	4.50	
17	Quartz stripe	Ton	Quartz	0 - 30	0.00	0.00	
				30 - 40	1.00	0.90	
				40 - 50	2.00	1.80	-
				50 - 60	3.00	2.70	
				60 - 70	4.00	3.60	
				70 <	5.00	4.50	
18	Salt stone	Kg	Salt	0 - 40	0.00	0.00	
				40 - 50	1.00	0.90	
				50 - 60	2.00	1.80	-
				60 - 70	3.00	2.70	
				70 - 80	4.00	3.60	
				80 <	5.00	4.50	
19	Ice saline	Ton	Ice saline	0 - 140	0.00	0.00	

				140 - 150	1.00	0.90	
				150 - 160	2.00	1.80	-
				160 - 170	3.00	2.70	
				170 - 180	4.00	3.60	
				180 <	5.00	4.50	
20	Gypsum	Ton	Gypsum	0 - 9	0.00		
				9 - 11	1.00		
				11 - 13	2.00	-	-
				13 - 15	3.00		
				15 - 17	4.00		
				17 <	5.00		

47.6. The regulation on calculating percentages of the royalty, imposing royalty payments, reporting and paying shall be approved by the Government.

/This section was amended by the law dated 22 November 2019/

47.7. The royalties shall not be imposed twice for minerals exported directly or for exported concentrate upon increasing contained volume of the mineral in such concentrate or and exported upon producing final products and depending on sales value and royalty percentages applicable on such mineral, the previously imposed payment shall be deducted based on payment slip specified in Article 47.18 and report imposed respective royalty as specified in Article 47.19 of this law.

/This section was amended by the law dated 22 November 2019/

47.8. The requirements, classifications, calculation principles, methods of processing levels for ore, concentrate and final products specified in Articles 47.5 and 47.17 of this law shall be approved by the Government based on the opinion of the central state administration body in charge of geology and mining, and financial issues [meaning ministries for mining and finance].

/This section was amended by the law dated 22 November 2019/

47.9. An exploration license holder may sell minerals extracted during the exploration activities for experimenting purposes upon registering types and quantities of the mineral with the professional inspection agency and getting permissions of the same agency and shall pay royalties equal to a rate applicable for the mining license holder.

/The numbering of this section was amended by the law dated on 25 November 2010/

47.10. The payers of royalties specified in Article 47.1 of this law, other than those who sold gold to Mongolbank or commercial banks authorized by Mongolbank, shall pay the royalties within 20th day of next month for all types of mineral products sold, shipped for sale, or used during the given month to the state budget and the royalties' final payment of the given year shall be settled and paid to the state budget within 10th day of February of next year.

/This section was amended by the law dated 26 March 2019/

47.11. The payers of royalties specified in Article 47.1 of this law, other than those who sold gold to Mongolbank or commercial banks authorized by Mongolbank, shall submit a quarterly report to the state administrative body in charge of professional inspection issues, in the form approved by the same agency, which indicates the quantity of products extracted, sold, shipped for sale and used, sales value and the total amount of royalties estimated for such quarter; and a quarterly report on the payment of royalty to the state administrative body in charge of tax issues, in the form approved by such agency, as accumulating royalties' payment amount, within 20th day of first month of following quarter. An annual report shall be submitted within 10th day of February of following year.

/This section was amended by the law dated 22 November 2019/

47.12. Mongolbank or commercial banks authorized by Mongolbank shall withhold the royalties from the sales value for gold sold to them at the rates as specified in Article 47.3.2 of this law and shall transfer such royalties' payments to the state budget.

/This section was added by the law dated 26 March 2019/

47.13. Mongolbank or commercial banks authorized by Mongolbank shall submit a royalty report which was transferred to the state budget as specified in Article 47.12 of this law in the form approved by the state administrative body in charge of tax issues within 20th day of following month.

/This section was added by the law dated 26 March 2019/

47.14. The Government shall publicly disclose a list of exchanges that defines international reference price for commodities and names of the market price sources per types of the products, which shall be used for the purpose of calculating the sales value of exported products.

/This section was amended by the law dated 22 November 2019/

47.15. For a taxpayer having the [tax] stabilization certificate under the Law on Investment, the royalties shall be paid at the rates specified in such certificate.

/The numbering of this section was amended by the law dated 26 March 2019/

47.16. The payers of royalties shall impose royalties on the sales value for all types of mineral products as specified in Article 47.7 of this law, without imposing it twice, for the following activities and shall pay it to the state budget.

47.16.1. sold and shipped for sale;
47.16.2. exported;
47.16.3. utilized for own use.

/This section was added by the law dated 22 November 2019/

47.7. Depending on increase in the market price and processed level of the mineral product, the additional surtax royalty rate shall be imposed on coal and coal products in addition to the [base] royalty specified in Article 47.3.3 of this law as follows:

/This section was added by the law dated 22 November 2019/

№	Name of product	Unit of	Comparable product for the purpose of valuation	Market price range / in USD/	Additional rate for royalties depending on the type of product
1	Raw coal	Ton	Coal	From 0 to 25	0.00
				From 25 to 50	1.00

				From 50 to 75	2.00
				From 75 to 100	3.00
				From 100 to 125	4.00
				125 and more	5.00
2	Processed coal (by dry and wet beneficiation process)	Ton	Coal	From 0 to 100	0.00
				From 100 to 130	1.00
				From 130 to 160	1.50
				From 160 to 190	2.00
				From 190 to 210	2.50
				210 and more	3.00
3	Final product (semi-coke, coke, gas, liquid fuel, coal-chemical products)	Ton	Coke	From 0 to 160	0.00
				From 160 to 190	0.50
				From 190 to 210	1.00
				From 210 to 240	1.50
				From 240 to 270	2.00
				270 and more	2.50

47.18. A mining license holder and a person who resold mineral products shall produce payment slip specified in tax legislations for every time mineral products are sold and shipped for sale and such payment slip shall reflect information on names, types of mineral products, its classification, quantity, sales value, and imposed royalties' amount.

/This section was added by the law dated 22 November 2019/

47.19. The payers of royalties who purchased mineral products from a person who does not hold mineral license, other than those set forth in Article 47.1.3 of this law, shall withhold royalties applicable for such mineral product to be purchased [from the purchase payment] and shall report and pay such [withheld royalty payment] to the state budget according to Articles 47.10 and 47.11 of this law.

/This section was added by the law dated 22 November 2019/

Article 47^2. Royalties for mineral deposits of strategic importance

47^2.1. If parties agreed to transfer the state ownership share in mineral deposits of strategic importance to the contracting other side and approved by the relevant authority, the party receiving such share, or the mining license holder shall impose and pay the special royalties for a use of reserves of the mineral deposits of strategic importance to the state budget in accordance with the procedures specified in Article 47.2 of this law.

47^2.2. The special royalties' rate for use of reserves of the mineral deposits of strategic importance specified in Article 47^2.1 of this law shall be approved by the Government.

47^2.3. The special royalties' rate for a use of reserves of the mineral deposits of strategic importance specified in Article 5.3 to 5.5 of this law shall not exceed 5 percent depending on the nature of each deposit.

/This provision was added by the law dated 18 February 2015 /

Article 47^3. Royalties for mineral products mined from derivative deposits

47^3.1. The base rate for royalties for mineral products mined from derivative deposits shall be 2.5 percent the same product sales value, and the additional surtax royalties' rate specified in Article 47.5 of this law shall be equal to zero percent.

47^3.2. The additional surtax royalties' rate for gold shall be determined as specified in Article 47.5 of

this law, regardless of those set forth in Article 47[3].1 of this law.

47[3].3. The sales value specified in Articles 47[3].1 and 47[3].2 of this law shall be determined under the principles specified in Article 47.2 of this law.

/This provision was added by the law dated 10 November 2016/"

REGULATIONS ON ROYALTIES

*Below is the relevant Articles of the "***Regulation on Royalty Calculation, Imposition, Reporting and Payment***" adopted by the* ***Government Resolution N.465 of 2019*** *on imposing royalties on minor elements, except coal, iron ore and iron concentrate, as per Custom Laboratory testing results.*

*"**Two. Calculating the sales value subject to Royalty***

2.1. Sales value subject to Royalty shall be calculated as follows:

2.1.1. sales value of mineral sold, shipped for sale or consumed in the domestic market in a given month shall be determined based on the domestic market price of the product or similar product.

2.1.2. sales value of mineral exported or shipped for export in the given month shall be determined based on the price announced to the public based on the price reference established by the Government under Article 47.2.1 of the Minerals Law;

2.1.3. sales value of gold and silver sold to the Bank of Mongolia and commercial banks authorized by the Bank of Mongolia shall be determined based on the price announced by the Bank of Mongolia on that day.

2.2. If the mineral content of the ore, concentrate, or product differs from the mineral content of the product, the price of which was announced to the public based on the price reference established by the Government, the sales value of the mineral shall be determined on a pro-rata basis according to the mineral content of the product with referenced price.

2.3. The mineral content, percentage, characteristics, and classification of all types of mining products sold in the domestic market shall be certified based on laboratory test results. The laboratory shall be Mongolian or internationally accredited.

2.4. The mineral content, percentage, characteristics, and classification of all types of minerals sold in the overseas market shall be certified based on customs laboratory test results.

2.5. The customs laboratory may use test results of an internationally recognized and Mongolian accredited to issue the certification specified in 2.4 of this Regulation.

2.6. The Customs authority shall deliver the name, type, content, characteristics, and exporter information of the exported mineral to the tax authority electronically in each instance.

2.7. The Royalty shall be imposed on the mineral based on the laboratory test report of the mineral product.

2.8. Sales value of mineral products other than coal subject to Royalty shall be calculated ***for each base and substitute metal [or minor elements] and mineral product based on the net percentage of the content determined by the laboratory test report.***

2.9. Expenses associated with the processing, smelting, refining, and transportation of the product and other operational expenses shall not be deducted from the sales value calculated in accordance with this Regulation."

*Below is the relevant Articles of the "***Regulation on Calculation of the Sales Value of Coal, Iron Ore and Iron Ore Concentrate in Overseas Market for Minerals Royalty Purposes***" approved by the* ***Government Resolution N.342 of 2019****, under which Contract Sales Price is allowed to be used for royalty calculation, subject to up to 30 percent of difference from monthly reference sales value defined*

by the Joint Working Group and adding costs incurred up to Mongolian Border checkpoint, if such cost is not included in the given Sales Contract price.

*"**Two. Calculation of the sales value of coal, iron ore, iron ore, and iron ore concentrate sold in overseas markets***

2.1. The business entity shall calculate the sales value of all types of coal, iron ore, and iron ore concentrate exported and shipped for export in the given month based on the price quoted in the reference price published in databases specified in Annex 2, 4, and 7 of Government Resolution No. 81 of 2016.

2.2. Where a business calculates the sales value of coal, iron ore, and iron ore concentrate exported and shipped for export in a given month subject to Royalty based on the contract price under paragraphs 3 and 6 of the Appendix to Government Resolution No. 81 of 2016, the sales value shall be calculated according to the conditions and requirements specified in this Regulation and submitted to the Tax Authority together with the quarterly and end-of-the-year Royalty Return as well as the information and data specified in the Regulation. This Regulation shall apply to the third quarter return of 2019.

2.3. The sales value of coal, iron ore and iron ore concentrate of a business entity subject to royalty based on the sales contract price shall be determined using the transaction price method specified in Article 17 of the Law on Customs Tariff and Customs Duty on the condition to deliver the products to the Mongolian border station.

2.4. If the following expenses and charges for delivery to the Mongolian border station were not included in the contract price, these shall be added in determining the sales value using the transaction price method specified in 2.3 of this Regulation:

2.4.1. transportation costs;

2.4.2. transportation and export documents related to transportation activities, clearance fees, insurance premiums, and expenses incurred for loading, unloading, storage, and transshipment of goods.

2.5. If the business entity has submitted the mineral sales contract that meets the requirements specified in Article 3 of this Regulation, the information, reports, and documentation specified in Article 5 within the period specified in Article 47.11 of the Minerals Law, the Tax Administration shall verify and finalize the calculation of the Royalties payable by the license holder to the budget based on the sales agreement of the business entity, and validate the Royalties Return.

2.6. If the amount of Royalties calculated by a business entity under Article 2.1 of this Regulation and paid to the budget in the particular month exceeds the amount calculated based on the sale contract price specified in 2.5, the overpaid Royalties shall be refunded or offset.

2.7. If the sales value of coal, iron ore, and iron ore concentrate exported and shipped for export by a business entity determined under Articles 2.3 and 2.4 of this Regulation is less by 30 percent or more than the price announced to the public based on the international market price of the product according to the principle of establishing the monthly average price recognized in the international trade under Article 47.2.1 of the Minerals Law and Article 47.14 of this Law, the sales value subject to minerals Royalty shall be determined as specified in Article 2.1 of this Regulation."

Other Regulations

In accordance with the Article 47.8 of the Law on Minerals, the "**Key principles and methodology for setting the standards, category and criteria for mineral ores, concentrates and products at the processing level**" is approved by the **Government Resolution No.193, 2011**. Such classification is used for royalty reporting in mostly on defining level of processing of the given mineral, ores from concentrates, concentrates from products.

Also, as per Law on Value Added Taxation, the Government also defines list of 'final exported mineral products' subject to '0' rate of VAT. However, such list is not relevant with the Royalty calculation and imposition under the Law on Minerals. More information will be provided by the part on Law on VAT below.

FOUR. Law on General Taxation

In accordance with Article 4.1 of the General Law on Taxation, 2019, only Parliament has power to define tax, change, exempt, wave and cancel the taxes, except stabilized taxes applied for the tax stabilization certificate as per Law on Investment, or tax regimes applied for special trade zones as per Law on Free Trade Zones.

As core classification, Royalties defined under the Minerals Law is considered as official state tax along with the license payments. Moreover, under the Article 9 of the General Law on Taxation, natural wealth, mineral reserves are taxable item and detailed scheme is stated to be defined by specified laws.

Even though, under the General Law on Taxation do not specify, base or minor element royalty matters, it is notable that tax exemption and/or waver issues are required to be resolved by the Parliament by way of approving specified laws.

FIVE. Law on Value Added Taxation

According to the Article 12.1.7 and 12.5 of the Law on Value Added, the Government is entitled to approve list of final mineral products exported, subject to "0" rate of VAT. Accordingly, under the **Government Resolution No.502, 2015**, the "**List of Final Mineral Product**" was approved.

Such list includes, uranium concentrate, molybdenum concentrate, molybdenum oxide, rare earth element concentrates, pure zinc, iron concentrate, purified silver, cathode copper, coal, pure white and black lead and fluorite with technical specifications and custom codes.

It should be noted that Law on VAT and above-mentioned list do not have any differed consideration on substituting minor elements contained in given mineral products. In other words, as per custom codes, it assumed that products are classified as per estimated base mineral percentage contained in the given ore or concentrate.

SIX. Law on Investment

In accordance with the Law on Investment, both domestic or foreign investors, subject to investment amount and regions invested may apply for a tax stabilization certificate, under which 4 main types of taxes, including corporate income tax, customs duty, value added tax and mineral resource royalty, can be stabilized for certain period as defined under the Article 16 of the Law on Investment.

Moreover, under the Article 20 of the same Law, the investor who is to invest more than MNT 500 billion may request and conclude an Investment Agreement, and stabilize its business activity environment, including stabilization of the same four type of taxes. The duration of such Investment Agreement will be not less than the period specified under the Article 16 for the tax stabilization certificates.

Meaning that as per Law on Investment, only tax rate of the defined four types of taxes can be stabilized but potential change in calculation methods and the way of imposing royalties are not included in the term of tax stabilization.

Appendix 4. Prices for Fluoride and Coal of Various Qualities Publicized by the Mongolian Government on 5/2/2021

(USD/Ton)

Fluoride	Fluoride concentrate /Floatation concentrate / ФФ-97	355.00	http://www.indmin.com
	Fluoride concentrate /Floatation concentrate / ФФ-95	347.68	
	Fluoride ore & concentrate FC-92	324.71	
	Fluoride ore & concentrate FC-85	300.00	
	Fluoride ore & concentrate FC-80	282.35	
	Fluoride ore & concentrate FC-75	264.71	

Coal			*(USD/Ton)*	
Type	Name	Quality Indicators	Prices	
Unprocessed coal	Anthracite	Volitile matter: V<8%, Ash: A<25%, Calorific value Q>5500	114.08	http://en.sxcoal.com/
	Coking coal	CSR: G>=50, Volitile matter: V=<28%, Ash: A<12.5%, 12.5%<15%, >15%	150.88	
	Weak-coking coal	CSR: G>=50, Volitile matter: V>28%, Ash: A<12.5%, 12.5%<15%, >15%	90.32	
	Non-coking coal	CSR: G<50, Volitile matter: V=28%-37%, Ash: A<=25%, Calorific value: Q>5000	80.30	
		CSR: G<50, Volitile matter: V>37% Ash: A>=25%, Calorific value: Q>=4500	79.76	
	Brown coal	Calorific value: Q<4500, Moisture: W<45%, V>40% Ash: A<20%	36.16	
Concentrated coal	Anthracite	Volitile matter: V<8%, Ash: A<12%, Calorific value Q>7000	123.73	
	Coking coal	CSR: G>=60, Volitile matter: V<28%, Ash: A=<10.5%, 10.5%<12%, >=12%	153.95	
	Weak-coking coal	CSR: G>=60, Volitile matter: V>28%, Ash: A=<10.5%, 10.5%<12%, >=12%	122.13	
	Non-coking coal	CSR: G<60, Moisture: W<12, Ash: A<=20%, >=20% Calorific value: Q>5000, >=4500	75.19	

Coking	Coking coal	Overall sulphur content: S<1.4%, Ash:A<11.0%-14.0%, Moisture: W<2.0%, Volitile matter: V<1.2%-2.0%, Calorific value: Q>5300	283.51	

Appendix 5. Case Study 1 - Copper Concentrate

5.1 Mongolian Mineral Royalty Calculation

5.1.1 Main Mineral: Copper

№	Elements in copper concentrate	Date	Amount of copper concentrate, metric ton	Moisture	Dry weight of concentrate /metric ton/ 7=5-5*6	Calculation of Sales Value				
						Content of elements by Laboratory test /Customs laboratory report/	Price reference for given month, based on International market price information /$/	Amount (net weight) of elements /metric ton/ 10=7*8	Exchange rate (average per given month), announced by Mongolbank (₮/$)	Sales value subject to Royalty /₮/ 12=9*10*11
0	1	3	5	6	7	8	9	10	11	12
1	Copper (major element)	2020.01.24	1.0	8.91%	0.91	22.41%	6,048.65	0.20413	2744.38	3,388,560.6

Calculation of Copper Royalty				
Royalty rate		Amount of Royalty /₮/		
Base (Primary)	Additional	Base (Primary) 15=12*13	Additional 16=12*14	Total 17=15+16
13	14	15	16	17
5.0%	12.0%	169,428.03	406,627.27	576,055.31

5.1.2 Minor Metal: Silver

№	Name of Element	Date	Weight of Product (copper concentrate) /gram/	Calculation of Sales value					Price of 1 oz. of Silver /$/ 10=6/9*31.103
				Content Percentage /Customs laboratory report/	Price, announced by the Mongolbank /₮/	Net weight of Silver /gram/ 7=4*5	Sales value /₮/ 8=6*7	Exchange rate (₮/$)	
0	1	2	4	5	6	7	8	9	10
1	Silver	2020.01.24	910,900	0.0084	1497.08	76.52	114,549.97	2744.38	16.97

Calculation of Royalty				
Royalty rate		Amount of Royalty /₮/		
Base	Additional	Base 13=8*11	Additional 15= 14+15	Total 16=14+15
11	12	13	14	15
5%		5,727.50		5,727.50

5.1.3 Minor Metal: Iron

Name of elements	Date	Amount of copper concentrate /metric ton/	Moisture	Dry weight /metric ton/ 7=5-5*6	Calculation of Sales value						
					Price reference announced (International market price information)			Content Percentage of the Elements in concentrate /Custons laboratory report/	Value per unit of the Elements /$/ 15=10*14	Monthly averaged exchange rate, announced by the Mongolbank (₮/$)	Sales value subject to Royalty /₮/ 17=7*15*16
					Content Percentage of the Elements in products, price reference of which announced	Announced average price for given month /$/	Price for 1.0 % of element's content in product /$/ 10=9/8				
1	3	5	6	7	8	9	10	14	15	16	17
Iron	20.01.24	1.0	8.91%	0.91	23.42	83.6	3.57	6.04	21.56	2744.38	53,897.8

Calculation of Royalty				
Royalty rate		Amount of Royalty /₮/		
Base	Additional	Base 20=17*18	Additional 21=17*19	Total 22=20+21
18	19	20	21	22
5%	1.2%	2,694.89	646.77	3,341.67

5.1.4 Combined total royalty for copper and minor metals

№	Elements in copper concentrate	Calculation of Royalty				
		Royalty rate		Amount of Royalty /₮/		
		Base (Primary)	Additional	Base (Primary)	Additional	Total 6=4+5
0	1	2	3	4	5	6
1	Copper (major element)	5.0%	12.0%	169,428.0	406,627.3	576,055.3
2	Silver	5.0%		5,727.5	-	5,727.5
3	Iron	5.0%	1.2%	2,694.9	646.8	3,341.7
	TOTAL AMOUNT OF ROYALTY FOR 1 TON OF COPPER CONCENTRATE (in Mongolian currency - togrog-MNT)					585,124.5
	Amount of Royalty for Minor elements (MNT)					9,069.2
	Percentage of Minor elements royalty in Total royalty amount					1.55%

5.2 Net Smelter Payment

5.2.1 Assumption

ASSUMPTIONS	
Wet weight of Cu concentrate (t)	1
Moisture (%)	0.0891
Dry weight of Cu concentrate (t)	0.9109
M = Grade of dry concentrate (Cu %)	0.2241
D = Minimum unit deduction Cu (%)	0.01
PM=Payable metal (Cu): if D*P(Cu)<M*P(Cu)*(1-PM)	0.965
PP=Price Participation	na
Mongolian Government Metal Prices	
P(Cu) = Metal price (US$/t Cu)	6048.65
P(Au) = Metal price (US$/g Au)	50.17667
P(Ag) = Metal price (US$/g Ag)	0.545508
LME Metal Prices on 21/1/2020	
P(Cu) = Metal price (US$/t Cu)	6128.5
P(Au) = Metal price (US$/g Au)	49.955
P(Ag) = Metal price (US$/g Ag)	0.578
Mongolian MNT:US$ Exchange rate	2744.38
Australian A$:US$ Exchange rate on 21/1/2020	0.497
TC = Treatment charge ($/t of concentrate)	60
RC(Cu) = Refining charge (US$/lb of payable Cu)	0.06
RC(Au) = Refining charge (US$/oz of payable Au)	7
RC(Ag) = Refining charge (US$/oz of payable Ag)	0.35
CF = Conversion lb to Kg	0.4536
Western Australian Royalty Rates (Note 1)	
R(Cu) = WA Cu in concentrate FOB royalty rate (%)	5.0%
R(Ag) = WA Ag metal royalty rate (%)	2.5%
Queensland Royalty Rates for Quarter 1/2020 (Note 2)	
R(Cu) = Queensland Cu in concentrate FOB royalty rate (%)	4.70%
R(Ag) = Queensland Ag metal royalty rate (%)	5.0%
S = Sea freIght, loading and insurance (US$/wet t)	47
K = Distance mine to port (Km)	180
TR = Railing/trucking cost (US$/tKm)	0.09

5.2.2 Net Smelter Payment calculation

CALCULATION						**US$ per wet t Shipment**	**MNT per wet t Shipment**
GV = Gross value of Cu per wet t of concentrate						1251.03	3433294.00
Less:							
Unit deduction						-61.29	-168189.33
TC = Treatment charge						-54.65	-149991.34
RC = Refining charge						-28.61	-78503.97
PP = Price participation						na	na
Net value of Cu in concentrate before C and PN						1106.48	3036609.36
CREDITS	**Content g/wt**	**Content g/dt**	**Deduction g**	**Payable Metal %**	**RC US$/g**	**Credit US$ per wet t Shipment**	**Credit MNT per wet t Shipment**
Gold	0.61	0.56	1	See table		0	0
Silver	84.0	76.52	30	90.0%	-0.47	21.61	59312.40
PENALTIES	**Acceptable Limit ppm**	**Concentrate Content ppm**	**Difference ppm**	**Penalty rate US$/ppm**		**Penalty US$ per wet t Shipment**	**Penalty MNT per wet t Shipment**
As	2000	1100	< Limit	0.002		0	0
F	330	169.3	< Limit	0.01		0	0
Pb	10000	1500	< Limit	0.00015		0	0
Zn	30000	10770	< Limit	0.00015		0	0
Hg	10	0	< Limit	0.2		0	0
Bi	500	0	< Limit	0.02		0	0
Sb	1000	0	< Limit	0.005		0	0
						US$/wt	**MNT/wt**
NET SMELTER PAYMENT per WET TONNE CIF SMELTER						**1128.10**	**3095921.76**
Net Smelter Payment a % of value of metals in concentrate						**87.0%**	**87.0%**

5.3 Western Australian and Queensland Royalty Calculations

5.3.1 Value of metals in concentrate FOB port of export

ROYALTY CALCULATIONS	US$ per wet t Shipment	A$ per wet t Shipment	MNT per wet t Shipment
V3: NET SMELTER PAYMENT CIF SMELTER	**1128.10**	**2268.90**	**3095921.76**
Less:			
S = Sea freIght, loading and insurance	-47.00	-94.53	-128985.86
V2 = FOB value of concentrate at port of export:	1081.10	2174.37	2966935.90
V2(Cu) = FOB value of Cu in concentrate	1059.48	2130.90	2907623.50
V2(Ag) = FOB value of Ag in concentrate	21.61	43.47	59312.40

5.3.2 Western Australian royalty

Western Australian Royalties			
Royalty on Cu	-52.97	-106.54	-145381.17
Royalty on Ag	-0.54	-1.09	-1482.81
Total WA concentrate FOB royalty	**-53.51**	**-107.63**	**-146863.98**
Less:			
TRC = Railing/trucking cost	-32.40	-65.16	-88917.91
NSR = Net Smelter Return at mine gate	995.18	2001.57	2731154.00

5.3.3 Queensland royalty

Queensland Royalties			
Royalty on Cu	-49.80	-100.15	-136658.30
Royalty on Ag	-1.08	-2.17	-2965.62
Total Queensland concentrate FOB royalty	**-50.88**	**-102.33**	**-139623.92**
Less:			
TRC = Railing/trucking cost	-32.40	-65.16	-88917.91
NSR = Net Smelter Return at mine gate	997.82	2006.88	2738394.06

Appendix 6 Case Study 2 - Zinc Concentrate

6.1 Mongolian Royalty Calculation

6.1.1 Major and other minor non-ferrous metals

№	Elements in zinc concentrate	Date	Amount of zinc concentrate, metric ton	Moisture	Dry weight of concentrate /metric ton/ 7=5-5*6	Calculation of Sales Value				
						Content of elements by Laboratory test /Customs laboratory report/	Price reference for given month, based on International market price information /$/	Amount (net weight) of elements /ton/ 10=7*8	Exchange rate (average per given month), announced by Mongolbank (₮/$)	Sales value subject to Royalty /₮/ 12=9*10*11
0	1	3	5	6	7	8	9	10	11	12
1	Zinc (major element)	2021.01.01	1.0	8.31%	0.92	47.81%	2,707.70	0.43837	2849.82	3,382,662.7
2	Aluminum	2021.01.01	1.0	8.31%	0.92	0.39%	2,003.80	0.00358	2849.82	20,420.1
3	Molibdenum	2021.01.01	1.0	8.31%	0.92	0.001439%	22,597.91	0.00001	2849.82	849.7
4	Lead	2021.01.01	1.0	8.31%	0.92	0.85%	2,014.93	0.00779	2849.82	44,752.6
5	Copper	2021.01.01	1.0	8.31%	0.92	1.17%	7,970.50	0.01073	2849.82	243,674.9
	Total									

Calculation of Royalty				
Royalty rate		Amount of Royalty /₮/		
Base (Primary)	Additional	Base (Primary) 15=12*13	Additional 16=12*14	Total 17=15+16
13	14	15	16	17
5%	2.4%	169,133.13	81,183.90	250,317.04
5%		1,021.01		1,021.01
5%		42.49		42.49
5%	1.6%	2,237.63	716.04	2,953.67
5%	13%	12,183.75	31,677.74	43,861.49
				298,195.69

6.1.2 Minor Precious metals

№	Name of Element	Date	Weight of Product (zinc concentrate) /gram/	Calculation of Sales value					Price of 1 oz. of Silver /$/ 10=6/9*31.103
				Content gr/t /Customs laboratory report/	Price, announced by the Mongolbank /₮/	Net weight of Silver /gram/ 7=4*5	Sales value /₮/ 8=6*7	Exchange rate (₮/$)	
0	1	2	4	5	6	7	8	9	10
1	Gold	2021.01.01	916.900	0.61	170,985.89	0.56	95,633.95	2849.82	1,866.17
2	Silver	2021.01.01	916.900	262.05	2,276.87	240.27	547,071.85	2849.82	24.85

Calculation of Royalty				
Royalty rate		Amount of Royalty /₮/		
Base	Additional	Base 13=8*11	Additional 15= 14+15	Total 16=14+15
11	12	13	14	15
5%		4,781.70		4,781.70
5%		27,353.59		27,353.59

6.1.3 Minor metal: Iron

Name of elements	Date	Amount of zinc concentrate /metric ton/	Moisture	Dry weight /metric ton/ 7=5-5*6	Calculation of Sales value						
					Price reference announced (International market price information)			Content Percentage of the Elements in concentrate /Custons laboratory report/	Value per unit of the Elements /$/ 15=10*14	Monthly averaged exchange rate, announced by the Mongolbank (₮/$)	Sales value subject to Royalty /₮/ 17=7*15*16
					Content Percentage of the Elements in products, price reference of which announced	Announced average price for given month /$/	Price for 1.0 % of element's content in product /$/ 10=9/8				
1	3	5	6	7	8	9	10	14	15	16	17
Iron	2021.01.01	1.0	8.31%	0.92	60.0	154.83	2.58	10.81	27.90	2849.82	72,890.2

Calculation of Royalty				
Royalty rate		Amount of Royalty /₮/		
Base	Additional	Base 20=17*18	Additional 21=17*19	Total 22=20+21
18	19	20	21	22
5%	3.5%	3,644.51	2,551.16	6,195.66

6.1.4 Combined total royalty calculation for Zn and minor metals

№	Elements in zinc concentrate	Calculation of Royalty				
		Royalty rate		Amount of Royalty /₮/		
		Base (Primary)	Additional	Base (Primary)	Additional	Total 6=4+5
0	1	2	3	4	5	6
1	Zinc (major element)	5.0%	2.4%	169,133.1	81,183.9	250,317.0
2	Aluminum	5%	0	1,021.0		1,021.0
4	Molibdenum	5%		42.5		42.5
5	Lead	5%	1.6%	2,237.6	716.0	2,953.7
6	Copper	5%	13%	12,183.7	31,677.7	43,861.5
7	Gold	5.0%		4,781.7		4,781.7
8	Silver	5.0%		27,353.6		27,353.6
9	Iron	5.0%	3.5%	3,644.5	2,551.2	6,195.7
	TOTAL AMOUNT OF ROYALTY FOR 1 TON OF ZINC CONCENTRATE (in Mongolian currency - togrog-MNT)					336,526.6
	Amount of Royalty for Minor elements (MNT)					86,209.6
	Percentage of Minor elements royalty in Total royalty amount					25.62%
	Zinc price at LME, USD/ton					2707.70
	Zinc concentrate sales price, USD/ton					848.7
	Exchange rate, MNT/USD					2,849.8
	Zinc concentrate sales price, MNT/ton					2,418,629.4
	Percentage of Royalty amount in concentrate price					13.91%
	Percentage of Royalty for Minor elements in concentrate price					3.56%

6.2 Net Smelter Payment

6.2.1 Assumptions

ASSUMPTIONS	
Wet weight of Zn concentrate (t)	1
Moisture (%)	0.0831
Dry weight of Zn concentrate (t)	0.9169
M = Grade of dry concentrate (Zn %)	0.4781
D = Minimum Unit deduction Zn (%)	0.08
PM=Payable metal (Zn): lesser of (M-D) or PM*M.	0.85
Mongolian Government Metal Prices	
P(Zn) = Metal price (US$/t Zn)	2707.7
P(Ag) Metal Price (US$/g)	0.8
Mongolian MNT:US$ Exchange rate	2849.82
LME Metal Prices 1/02/2021	
P(Zn)	2548.3
P(Ag)	0.946
Australian A$:US$ Exchange rate	0.765
TC = Treatment charge ($/t of concentrate)	86
ET=TC escalation price threshold (US$/t Zn)	2500
E=escalation rate (US$per US$ in excess of price threshold)	0.06
DE=de-escalation rate (US$per US$ in below price threshold)	0.04
RC = Refining charge (US$/lb of metal)	0
CF = Conversion factor lb to Kg	0.4536
Western Australian Royalty Rates (Note 1)	
R(Zn) = WA Cu in concentrate FOB royalty rate (%)	5.0%
R(Ag) = WA Ag metal royalty rate (%)	2.5%
Queensland Royalty Rates for Quarter 3/2020-21 (Note 2)	
R(Zn) = Queensland Cu in concentrate FOB royalty rate (%)	4.20%
R(Ag) = Queensland Ag metal royalty rate (%)	5.0%
S = Sea frelght, loading and insurance (US$/wet t)	47
K = Distance mine to port (Km)	180
TR = Railing/trucking cost (US$/tKm)	0.09

6.2.2 Net Smelter Payment calculation

CALCULATION					**US$ per wet t Shipment**	**MNT per wet t Shipment**
GV = Gross value of Zn in concentrate					1220.86	3479231.65
Less:						
Unit deduction or 1-PM					-222.80	-634939.90
TC = Treatment charge					-78.9	-224718.00
RC = Refining charge					0.0	0.00
E or DE = TC escalation/de-escalation					-17.1	-48731.92
Value of Zn concentrate before C and PN					902.11	2570841.84
CREDITS	**Content g/t**	**Deduction g**	**Payable Metal %**	**Price US$/g**	**Credit US$ per wet t**	**Credit MNT per wet t**
Gold	0.6	1	70%		0	0.00
Silver	262.1	90	60%	0.85	80.36	229009.25
Cadmium	2456.0	3000	70%		0	0.00
PENALTIES	**Acceptable Limit %**	**Actual Content %**	**Difference %**	**Penalty US$/1%**	**Penalty US$ per wet t**	**Penalty MNT per wet t**
Fe	8.00%	10.81%	2.81%	1.50	-3.86	-11013.79
					US$ per wet t Shipment	**MNT per wet t Shipment**
NET SMELTER PAYMENT CIF SMELTER					**978.60**	**2788837.29**

6.3 Western Australian and Queensland Zn concentrate royalty calculations

6.3.1 Value of concentrate FOB port of export

ROYALTY CALCULATIONS	US$ per wet t Shipment	A$ per wet t Shipment	MNT per wet t Shipment
V3: NET SMELTER PAYMENT CIF SMELTER	**978.60**	**1270.42**	**2788837.29**
Less:			
S = Sea freIght, loading and insurance	-47.00	-61.02	**-133941.54**
V2 = FOB value of concentrate at port of export:	931.60	1209.40	**2654895.75**
V2(Zn) = FOB value of Zn in concentrate	851.24	1105.08	**2425886.51**
V2(Ag) = FOB value of Ag in concentrate	80.36	104.32	**229009.25**

6.3.2 Western Australian royalty

Western Australian Royalties			
Royalty on Zn	-42.56	-55.25	**-121294.33**
Royalty on Ag	-2.01	-2.61	**-5725.23**
Total WA concentrate FOB royalty	**-44.57**	**-57.86**	**-127019.56**
Less:			
TRC = Railing/trucking cost	-32.40	-42.06	**-92334.17**
NSR = Net Smelter Return at mine gate	854.63	1109.48	**2435542.03**

6.3.3 Queensland royalty

Queensland Royalties			
Royalty on Zn	-35.75	-46.41	**-101887.23**
Royalty on Ag	-4.02	-5.22	**-11450.46**
Total Queensland concentrate FOB royalty	**-39.77**	**-51.63**	**-113337.70**
Less:			
TRC = Railing/trucking cost	-32.40	-42.06	**-92334.17**
NSR = Net Smelter Return at mine gate	859.43	1115.71	**2449223.89**

Appendix 7. Case Study 3: Iron ore concentrate

7.1 Mongolian (Article 47)

7.1.1 Iron

Moisture	Dry weight /metric ton/ 7=5-5*6	Calculation of Sales value							Calculation of Royalty				
		Price reference announced (International market price information)			Content Percentage of the Elements in concentrate /Custons laboratory report/	Value per unit of the Elements /$/ 15=10*14	Monthly averaged exchange rate, announced by the Mongolbank (₮/$)	Sales value subject to Royalty /₮/ 17=7*15*16	Royalty rate		Amount of Royalty /₮/		
		Content Percentage of the Elements in products, price reference of which announced	Announced average price for given month /$/	Price for 1.0 % of element's content in product /$/ 10=9/8					Base	Additional	Base 20=17*18	Additional 21=17*19	Total 22=20+21
6	7	8	9	10	14	15	16	17	18	19	20	21	22
1.30%	0.987	56.0	126.7	2.26	54.84	124.08	2849.55	348,963.1	5%	3.5%	17,448.15	12,213.71	29,661.86

7.1.2 Copper, Zinc, Aluminium and Lead

№	Elements in iron concentrate	Date	Amount of iron concentrate, metric ton	Moisture	Dry weight of concentrate /metric ton/ 7=5-5*6	Calculation of Sales Value					Calculation of Royalty				
						Content of elements by Laboratory test /Customs laboratory report/	Price reference for given month, based on International market price information /$/	Amount (net weight) of elements /ton/ 10=7*8	Exchange rate (average per given month), announced by Mongolbank (₮/$)	Sales value subject to Royalty /₮/ 12=9*10*11	Royalty rate		Amount of Royalty /₮/		
											Base (Primary)	Additional	Base (Primary) 15=12*13	Additional 16=12*14	Total 17=15+16
0	1	3	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Copper	2020.12.29	1.0	1.30%	0.987	0.02729%	7,755.24	0.00027	2849.55	5,952.4	5%	12%	297.62	714.29	1,011.91
2	Zinc	2020.12.29	1.0	1.30%	0.987	0.01748%	2,782.36	0.00017	2849.55	1,367.5	5%	2.4%	68.37	32.82	101.19
3	Aluminum	2020.12.29	1.0	1.30%	0.987	1.26%	2,017.90	0.01244	2849.55	71,509.5	5%		3,575.47	-	3,575.47
4	Lead	2020.10.31	1.0	1.30%	0.987	0.00474%	1,802.82	0.00005	2849.55	240.3	5%	1.6%	12.02	3.85	15.86
	Total														4,704.44

7.1.3 Silver

№	Name of Element	Date	Weight of Product (iron concentrate) /gram/	Calculation of Sales value					Price of 1 oz. of Silver /$/ 10=6/9*31.103	Calculation of Royalty				
				Content gr/t /Customs laboratory report/	Price, announced by the Mongolbank /₮/	Net weight of Silver /gram/ 7=4*5	Sales value /₮/ 8=6*7	Exchange rate (₮/$)		Royalty rate		Amount of Royalty /₮/		
										Base	Additional	Base 13=8*11	Additional 15= 14+15	Total 16=14+15
0	1	2	4	5	6	7	8	9	10	11	12	13	14	15
1	Silver	2020.11.06	987.000	2.68	2,115.06	2.65	5,594.67	2850.04	23.08	5%		279.73		279.73

7.1.4 Combined

№	Elements in the concentrate	Calculation of Royalty				
		Royalty rate		Amount of Royalty /₮/		
		Base (Primary)	Additional	Base (Primary)	Additional	Total 6=4+5
0	1	2	3	4	5	6
1	Iron (major element)	5.0%	3.50%	17,448.15	12,213.71	29,661.86
2	Copper	5.0%	12.00%	297.62	714.29	1,011.91
3	Zinc	5.0%	2.40%	68.37	32.82	101.19
4	Aluminum	5.0%	0.00%	3,575.47	-	3,575.47
5	Lead	5.0%	1.60%	12.02	3.85	15.86
6	Silver	5.0%		279.73		279.73
	TOTAL AMOUNT OF ROYALTY FOR 1 TON OF IRON CONCENTRATE (in Mongolian currency - togrog-MNT)					34,646.03
	Amount of Royalty for Minor elements (MNT)					4,984.17
	Percentage of Minor elements royalty in Total royalty amount					14.39%

7.2 Sales Contract based

№	Elements in iron ore	Date	Wet weight of ore, tonnes	Moisture, %	Dry weight of ore, tonnes	Calculation of Sales Value										Calculation of Royalty				
						Quality contract specifications	Content of elements by Laboratory test /Customs laboratory report/	Contract quality max. limits	Min/Max	Penalty deduction $/% excess	Price reference for given month, based on International market price information, $/t	Net dry weight) of ore, tonnes	Percentage of excess ore and penalty elements, %	Exchange rate (average per given month), announced by Central Bank of Mongolia (₮/$)	Sales value of ore and penalties, ₮	Royalty rate		Amount of Royalty /₮/		
																Base (Primary)	Additional	Base (Primary)	Additional	Total
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	18	19	20	21
1	Iron (major element)	2020.12.29	1.0	1.3%	0.987	56.00%	54.84%	56.00%	Min	2.43	135.98	0.987	-1.14%	2849.55	374,625.47	5.0%	3.5%	18,731.27	13,111.89	31,843.16
2	Aluminum	2020.12.29	1.0	1.3%	0.987	1.60%	1.26%	2.70%	Max	-1.5	na	0.987	0.00%	2849.55	-	na	na	na	na	na
3	Silica	2020.12.29	1.0	1.3%	0.987	6.50%	2.43%	8.00%	Max	-1.5	na	0.987	0.00%	2849.55	-	na	na	na	na	na
4	Phosphorous	2020.12.29	1.0	1.3%	0.987	0.08%	0.018%	0.15%	Max	-4.5	na	0.987	0.00%	2849.55	-	na	na	na	na	na
5	Sulphur	2020.12.29	1.0	1.3%	0.987	0.06%	2.43%	0.10%	Max	-4.5	na	0.987	2.34%	2849.55	(29,605.44)	5.0%	3.5%	(1,480.27)	(1,036.19)	(2,516.46)
6	Size >10mm	2020.12.29	1.0	1.3%	0.987	8.00%	12.00%	15.00%	Max	na	na	na	na	na	na	na	na	na	na	na
	Total												**Total royaly value base = NSV**		**345,020.03**			**Total royalty levied**		**29,326.70**

7.3 Western Australia and Queensland

CASE 3 - Iron Ore CONCENTRATE	Net Smelter Payment CIF Smelter $/wet t	Australian Mining Laws: Value FOB port of export $/wet t	Western Australia Royalty $/wet t	Queensland Royalty $/wet t
		Note 1		Note 2
Main metal	122.46	104.07	7.81	1.65
Minor metals				
Paid for by buyer	0.00	0.00	0.00	0.00
Not paid for by buyer	na	na	na	na
Penalties	-10.39	Note 1		
Subtotal Minor metals	-10.39	0.00	0.00	0.00
TOTAL	112.07	104.07	**7.81**	**1.65**
Minor metal %	-9.3%	0.0%	0.0%	0.0%

Note 1 - Penalty and sea freight of $8/wt have been deducted from payable value of main metal to get FOB value.

Note 2 - Royalty rate is 1.25% i.e. A$125 for first A$100 in price then 2.25% of amount above it.

On 29/12/2020 the exchage rate was 0.7596 US$ per one A$. Hence the royalty rate was 1.25% up to a US$ 75.96 and 2.5% above it.

Appendix 8. Mongolian mineral royalty collection statistics for 2019 and 2020

STATISTICAL DATA OF THE ROYALTY IMPOSED ON MINERAL PRODUCTS AND THE MAJOR AND MINOR METALS / ELEMENTS CONTAINED THEREIN

	Products and metals	2019		2020	
		Million USD	Billion MNT	Million USD	Billion MNT
A	**Metal Mineral products**				
1	**Copper concentrate**				
	Copper (main metal)		468.4388		516.0967
	Minor metals		-		-
	Gold		45.8408		45.9374
	Silver		4.8534		6.6993
	Iron				-
	Molybdenum				-
2	**Iron ore concentrate**				-
	Iron (main metal)		46.4789		109.3836
	Minor metals		-		-
	Copper		0.0300		0.0265
	Gold		0.0001	1.75	0.0003
	Zinc		0.0855		0.3603
	Molybdenum		0.0584		0.0068
	Tungsten		0.0048		0.0000
	Tin		0.0131		0.2506
	Lead		0.0017		0.0053
	Silver		0.0012		0.0001
	Aluminum		0.1677		1.1049
3	**Raw, and semi processed gold**	**31.20**	**83.10**	**54.04**	**150.12**
	Gold (main metal)	30.91747	82.35	51.37625	142.71
	Minor metals				
	Silver	0.04931	0.1313	1.87447	5.207
	Copper	0.03496	0.0931	0.12255	0.340
	Gold	0.19846	0.5286	0.66941	1.859
	Zinc	0.00019	0.0005	0.00020	0.001
	Molybdenum	0.00001	0.0000	0.00003	0.000
	Iron	0.00014	0.0004	0.00067	0.002
	Tungsten	0.00000	0.0000	0.00002	0.000
	Tin	0.00002	0.0001	0.00004	0.000
	Lead	0.00002	0.0000	0.00003	0.000
4	**Zinc concentrate**	10.8770	28.9710	8.8540	24.5930
	Lead concentrate	2.3280	6.2020	1.6220	4.5040
	Minor metals				
	Gold	0.5100	1.3580	0.7850	2.1820
	Silver	1.2000	3.1950	1.7480	4.8570
	Aluminium	0.0170	0.0460	0.0290	0.0790
	Molybdenum	0.0030	0.0080	0.0100	0.0270
	Lead (in zinc concentrate)	0.0320	0.0850	0.1000	0.2780
	Copper	1.2490	3.3260	1.0270	2.8520
	Iron	0.0620	0.1640	0.1340	0.3730
	Tungsten	0.0010	0.0020	0.0310	0.0870
	Tin	0.0010	0.0020	0.0010	0.0020
	Zinc (in lead concentrate)	0.2310	0.6160	0.2540	0.7050
	Cadmium			0.0040	0.0120
	Total	**16.5110**	**43.9750**	**14.5990**	**40.5510**
5	**Molybdenum concentrate**				
	Bklnbdunum (main metal)		8.1904		7.7716
6	**Tungsten concentrate**				
	Tungsten (main metal)		0.6278		0.0211
	Non-metal mineral products				
1	**Coal**		442.35		456.40
2	**Fluorspar**	18.09	48.10	14.60	41.10
B	**Products**				
	Cathode copper		3.9975		5.9662
	Total		**1,323.40**		**1,572.47**

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