

# **An Outline of Market-Based Approaches for Mineral Asset Valuation Best Practice**

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## **BACKGROUND ON SPEAKER**

Mike Lawrence is a geologist who graduated from the School of Applied Geology, University of New South Wales (Australia) in 1966. He also gained a Graduate Diploma (Distinction) in Public Sector Management in 1985, from the University of Technology Sydney; and a Professional Certificate in Arbitration & Mediation in 2001. He has held an Investment Advisers Licence since 1991.

He has been a consultant for almost all of his over 35 years of professional experience, working mostly for major international resource consultancies (eg BRGM France and the UK Robertson Group). In 1991 he set up Minval Associates Pty Limited, based in Sydney, together with two colleagues. MINVAL specialises in independent technical audits and resource asset/securities valuations, as well as the provision of expert witness and litigation support services. He consults to MINVAL through MJ Lawrence Holdings Pty Limited and Mineral Industry Services.

He has been a Fellow of the UK's Institution of Mining and Metallurgy since 1975, being a Chartered Engineer (CEng) since 1972 and Australasian Councillor since 1999. He has been a Fellow of the Australasian Institute of Geoscientists since 1987. He joined the Mineral Industry Consultant's Association (MICA) in 1989 and he has served on its Board of Management since 1992. He joined AusIMM in 1966 as a student and became a Fellow in 1976, being granted Chartered Professional Status in Geology in July 1997.

He has been an AusIMM Councillor since 1991, a Vice President since 1994, and he was its President for 1999. Mike made a significant contribution to the AusIMM Mineral Valuation Committee's original *VALMIN Code (1995)* and the revised *VALMIN Code (1998)* and he is now the Chairman of AusIMM's VALMIN Committee. As well, he is Chairman of its Alternative Dispute Resolution Taskforce, as well as having served on its Ethics, Policy, and Awards Committees. Mike is well known internationally for his writings and addresses on professional ethics, due diligence and mineral property assessment and valuation best practice.

## **ABSTRACT**

Taking the conventional tripartite classification of valuation approaches (ie, those that are market-based, income-based and cost-based), this paper outlines the various methods that fall into the Market Approach as they are applied to the valuation of Mineral Assets. The Comparable Sales, Yardstick (Transactional/Rules of Thumb) and Joint Venture Terms Methods are described.

The concept of Fair Market Value is explored from the Australasian point of view and in the context of the *VALMIN Code (1998)*. A Glossary has been included to facilitate debate over what constitutes Market Value and other important valuation terms and concepts are also examined. Some definitions (eg, Real Property, Value-in-Use, Highest-and-Best-Use) are described using the existing International Valuation Standards (IVS) as a basis; and the USA's Uniform Standards of Professional Appraisal Practice are introduced. It is clear that the greatest challenges today facing the globalisation of a VALMIN-type Code for the international Minerals Industry are the influence of Real Estate Valuers and the US jurisdictional idiosyncrasies. This is mainly due to their fixation on real property rights and a preference for using comparative sales techniques (to the exclusion of Income-based approaches); and a regulatory reluctance in the US to accept the principle that Resources have considerable value. The influence that the US has with the International Accounting Standards Board (and to a lesser degree with the IVS Committee) must be countered.

Because of the diversity of situations in which a Valuation might be required, no simple formulas (or recipes) can be used in Mineral Asset Valuations. It also explains why the competence, judgement and repute of the Valuer is the critical factor in valuation practice, since all Valuations are time and circumstance specific. Hence, it is the author's view that it is best practice to use as many of the three basic valuation approaches as possible and as many methods as reasonable in the particular circumstances (given the quantity and quality of the data available on the Mineral Asset). Since the data position depends upon the state of development of the Mineral Property, the three fundamental types of Mineral Properties (Exploration Areas; Development Projects; and

Operating Mines) are described. Whatever valuation approach is used, the selection of the specific valuation method(s) to be used should be always left up to the discretion of the Valuer. The use of specific methods must satisfy the basic considerations of logic and reasonableness, having regard to the development status of the Mineral Asset and the purpose of the Valuation.

The author concludes that whilst there are many supporters of the Market Approach (especially in North America and in the Courts) he can see no rational reason for believing it to be superior to and less subjective than the Income and Cost Approaches when valuing Mineral Assets. This paper attempts to establish that this is because it is very difficult to obtain truly comparable transactional market data to use.

## INTRODUCTION SEMANTICS AND COMMUNICATION

Before embarking upon the substance of the topic, it is critical that the various terms and concepts involved are clearly understood. Thus, the author refers readers to the Glossary at the end of the paper, where various terms and concepts are defined, hopefully to reduce the need for semantic arguments and to improve communications.

There is no doubt that various jurisdictions have slightly different meanings for the various concepts and valuation methods available, but the Glossary attempts to set out the various terms used in this paper to clarify the author's position. This will hopefully allow readers to concentrate on the concepts presented rather than bog them down in definitional issues (important as they are ultimately). It also has the potential to create an internationally accepted nomenclature that will aid understanding of 'Mineral Asset' (see Glossary) 'Valuation' (see Glossary) at the international level.

The first problem is to identify which of the four general property types are being valued: 'Real Property'; 'Personal Property'; businesses; or financial interests (see Glossary). Mineral Assets do not easily fit the International Valuation Standards (IVS) categorisation, since one might use Guidance Note (GN) 1 (for Real Property) or GN6 (for businesses), depending upon if one is valuing exploration prospects, projects or mines (IVSC, 2000). In fact, the IVS Committee (IVSC) is contemplating the creation of a sub-committee to examine the creation of a specific GN for the 'Minerals' (extractive) Industry (see Glossary).

At first glance, the conventional tripartite classification of valuation approaches (into those that are **market-based**, **income-based** and **cost-based**) is a reasonable and useful one. However, the allocation of valuation methods into these

convenient categories is seen as rather arbitrary upon closer analysis. These classification attempts have also caused some confusion over the meaning of the widely used term 'Market Value' (see below and Glossary). Nevertheless, it is best valuation practice for the 'Valuer' (see Glossary; also for 'Expert' and 'Specialist') to use as many of the three basic valuation approaches as possible and as many methods as reasonable in the particular circumstances and given the quantity and quality of the data available.

However, the selection of the specific valuation method(s) to be used should be always left up to the discretion of the 'Valuer' ('Valuator' in Canada and 'Appraiser' in USA; see Glossary). The use of specific methods must satisfy the basic considerations of logic and reasonableness, having regard to the development status of the Mineral Asset and the purpose of the Valuation.

Because of the diversity of situations in which a Valuation could be required, no simple standard formulas can be used in Mineral Asset Valuations. In particular, the market is not as efficient nor as open and unrestricted as many assume. The competence and judgement of the Valuer is the critical factor, since all Valuations (especially market-based ones) are time and circumstance specific and there is no best method.

As a result of the introduction of the *VALMIN Code*<sup>1</sup> in 1995 and its revision in 1998 (released with its accompanying *Aide Memoire*; Lawrence, 1998), technical assessment Reports and Valuations of Mineral Assets and securities prepared in conformity with it are now much more comprehensible than before. This is mainly because of the Code's key requirements of 'Transparency' and 'Materiality', and 'Independence' when required (see Glossary), within an overall context of reasonableness. The main focus has been on more complete and non-misleading disclosure (ie, providing investors with all the necessary (relevant and material) information that they reasonably require so that they can make an informed decision). See Lawrence (1995, 1998b, 1998d, 1999a, 1999b, 2000b, 2000c and 2000d) for a fuller discussion of the basis and usefulness of the *VALMIN Code*; and its development history (Lawrence, 2000e).

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<sup>1</sup> VALMIN Code (1998). Code and Guidelines for Technical Assessment and/or Valuation of Mineral and Petroleum Assets and Mineral and Petroleum Securities for Independent Expert Reports, February, 23p (Australasian Institute of Mining and Metallurgy: Melbourne); incorporating Lawrence, M, 1998. The revised VALMIN Code and Guidelines (1998): an Aide Memoire to assist its interpretation, The AusIMM Bulletin, 3:80-83.

The Conference Volumes from *MINVAL '89* and *VALMIN '94*, organised by The Australasian Institute of Mining and Metallurgy (AusIMM) and the Mineral Industry Consultants Association (MICA), are a collection of relevant valuation papers. As part of *VALMIN'94*, Lawrence and Sorentino (1994) compiled a useful bibliography of other valuation papers to then. Additional papers by internationally respected valuers were produced for valuation seminars held in 1999 by The Prospectors and Developers Association of Canada (PDAC); in 2000 by PDAC and the Canadian Institute of Mining, Metallurgy and Petroleum (CIM); and in 2000 and 2001 by the Society for Mining, Metallurgy and Exploration (SME) in the US.

### WHAT VALUE IS BEING ESTIMATED?

Valuers in Australasia are primarily asked to determine the 'Fair Market Value' (or 'Market Value') of a Mineral Asset at a certain 'Valuation Date' (see Glossary). Readers must understand that this term is not simply referring to the value determined by use of the Market Approach. It is a more generic term for current worth of an asset in the marketplace derived by any valid methodology consistent with the principles set out below.

Also, 'Value' does not always equal 'Price' (see Glossary). The latter represents the historical reality of what was paid for an asset, not the future estimate of what is likely to be paid for it (after considering the financial motives, capabilities or special interests of the purchaser; and the state of the market at the time).

Then there is the issue of whether an asset is to be valued as a stand-alone item or within a corporate structure. Market Approach Methods that rely upon market transactions involving market capitalisation data (or transactions for entities rather than projects) must take these factors into account by adjusting the transaction values used in order to obtain comparable data. Note that for brevity this paper does not specifically deal in detail with the more complex subject of Valuation of company shares and securities and the use of financial multiples (price/earnings or price/cash flows ratios, on various criteria). For further information see Lonergan (1992).

The main Australasian authority for Fair Market Value principles is the High Court Appeal case *Spencer v Commonwealth of Australia (1907-08) 5 CLR 418*. This case dealt with the determination of fair and just compensation to be paid following the Federal Government's resumption (compulsory

purchase)<sup>2</sup> of land in 1905 for a fort at Fremantle, WA). The Court said that the value was to be at the Valuation Date according only to the facts existing then and claimed that "*all circumstances subsequently arising are to be ignored. Whether the land becomes more valuable or less valuable afterwards is immaterial*" (*Spencer* at 440). It also made the important point that the value paid should be such that it "*will place the dispossessed man in a position as nearly similar as possible to that he was in before*" (*Spencer* at 435).<sup>3</sup> Also, it was to be the unencumbered value.

The High Court pointed out that the value was "*what it is worth to a man of ordinary prudence and foresight, not holding his land for merely speculative purposes, nor, on the other hand, anxious to sell for any compelling or private reason*" (*Spencer* at 437). It stressed that the hypothetical seller, in the process of voluntary bargaining, must be "*willing to sell as a business man would be to another such person, both of them alike uninfluenced by any consideration of sentiment or need*" (*Spencer* at 437).

Note that the general principle is that one seeks the 'Value-in-Exchange'<sup>4</sup> (or value in the market place) not 'Value-in-Use' (or value to the owner). The latter term implies higher value to a specific purchaser for the asset's specific use in the purchaser's business (see below and Glossary for a fuller discussion and definitions of the terms). Nevertheless, the High Court did allow consideration of the reasonable future use of the asset (*Spencer* at 436)<sup>5</sup> by a hypothetical buyer, since it did not require that the willing purchaser be actually available on the Valuation Date to buy it. (*Spencer* at 432). This is the 'Highest-and-Best-Use' concept (see Glossary).

The High Court went on to say (*Spencer* at 440-441) that the fair price of the land was that "*which a hypothetical prudent purchaser would entertain, if he desired to purchase it for the most advantageous purpose for which it was adapted.*"<sup>6</sup> It was to be sold "*not by means of a forced sale, but by voluntary bargaining between the plaintiff*

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<sup>2</sup> Also termed a 'condemnation', 'eminent domain' or 'taking' in other jurisdictions.

<sup>3</sup> This is a quotation by Barton J in 1908 taken from the prior Supreme Court of New Zealand case of *Russell v The Minister of Lands*, 17 NZLR 241 (at 253).

<sup>4</sup> See *Peko Wallsend Operations v Commissioner of State Taxation (WA)* 89 ATC 4569 (at 4587) applying the principle first outlined in *Spencer v Commonwealth of Australia (1907-08) 5 CLR 418*.

<sup>5</sup> Barton J believed that "*special advantages*" of the land and "*all reasonably fair contingencies*" should be taken into consideration.

<sup>6</sup> This is the Highest-and-Best-Use concept again.

*and a purchaser, willing to trade, but neither of them so anxious to do so that he would overlook any ordinary business consideration.” It was to be supposed that both parties were “perfectly acquainted with the land, and cognisant of all circumstances which might affect its value, either advantageously or prejudicially.” These factors included its “situation, character, quality, proximity to conveniences or inconveniences, its surrounding features and the then present demand for land.” Finally, there was to be included consideration (by appropriate experts) of the likelihood “of a rise or fall for what reason soever in the amount which one would otherwise be willing to fix as the value of the property.”*

Unfortunately for Mineral Asset Valuers, many legal precedents (here and overseas) have fixated on the comparable sale approach (that forms the basis of ‘Real Estate’ property transactions; see Glossary) as the only determiner of true value for supposedly similar assets, such as mines. This has been at the expense of better estimation methods in certain circumstances (eg Discounted Cash Flow [DCF]/Net Present Value [NPV] analysis) because the Courts were convinced all these other methods were too subjective. Courts also seem to be generally unaware of the unique characteristics of Mineral Assets when compared with Real Estate properties. Also, most are purchased because of what they contain (Resources of the commodity to be mined and sold), rather than for their use (the basis of Real Estate transactions). Unfortunately, this is why it is still commonly argued in Courts that “*where there are no anomalies affecting a market, the price at which property changes hands in the ordinary course of business and the market, is usually its true value*”.<sup>7</sup>

The matter of Value is clouded somewhat because accountants have defined ‘Fair Value’ and ‘Market Value’ as separate terms (see below and Glossary). Although they can be the same numerically in practice (perhaps this is the origin of the term ‘Fair Market Value’ used in the securities/Minerals Industry and in the VALMIN Code) a distinction is maintained between them by the IVS. This potential confusion is exacerbated by the Uniform Standards of Professional Appraisal Practice (USPAP), recommended for use in the US. It, too, recognised the subtle differences between them.

In essence, Fair Value (IVS Definition) is the service value of an asset determined in conditions other than those prevailing in a normal market, by means other than by using market sales comparison data (eg, by DCF/NPV Method). Fair

Value is not the value realised from a forced sale or liquidation of the assets (‘Forced Sale Value’; see Glossary).

Market Value’ (IVS Definition), simply put, is the result of an objective Valuation of specific identified ownership rights to a specific asset as at a given date. It is similar to the VALMIN Code’s definition (based upon the *Spencer Case* above and given below and in the Glossary), but it emphasises a need for adequate marketing time (and favours use of comparable market data).

In Australasia, Fair Market Value (VALMIN Definition) is the estimated amount of money (or the cash equivalent of some other consideration) for which the Mineral Asset should change hands on the Valuation Date. It must be between a willing buyer and a willing seller in an arm’s length transaction in which each party has acted knowledgeably, prudently and without compulsion.

In Canada, Fair Market Value is “*the highest price available in an open and unrestricted market between informed and prudent parties, acting at arms length and under no compulsion to act, expressed in terms of money or money’s worth*” (according to Ross Lawrence, 2000).

The US definition of Market Value<sup>8</sup> is very much linked to the Real Property concept. It is “*the most probable price that a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale at a specified date and the passing of title from seller to buyer under conditions whereby:*

- *buyer and seller are typically motivated;*
- *both parties are well informed or well advised, and acting in what they consider are their best interests;*
- *a reasonable time is allowed for exposure in the open market;*
- *payment is made in terms of cash in United States dollars or in terms of financial arrangements comparable thereto; and*

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<sup>7</sup> See Malcolm CJ in *Commissioner of State Taxation (WA) v Nischu Pty Ltd* 91 ATC 4371 (at 4376) who also listed a Federal Court case and a SA Supreme Court case in support of this view.

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<sup>8</sup> USPAP (1998) Glossary, page 163.

- *the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale."*

Unfortunately, many of the strict requirements specified above do not apply in the real world. For example, equal willingness to deal and equal negotiating power; existence of a total arms length relationship; equality of knowledge about the asset; equal levels of prudence; openness and equilibrium of the market; and non-tangible components being involved.

Also, there are numerous circumstances in which a Valuation is required, but for which the Market Value (in the strict sense) is not derived. For example, forced sales and liquidations; corporate reconstructions or mergers; taxation and rating purposes; settlement of legal and insurance claims; joint venture buy-outs; inheritance distributions; various accountancy uses, etc. This is probably why accountants have clung to the Fair Value concept to impart a more practical, market-based flavour to the values reported.

In fact, one could argue that even in those cases where it is supposedly provided, there is no guarantee that it is the real Market Value. Requiring the Valuation to be 'Independent' (see Glossary) should provide some measure of guarantee, but even this is doubtful after an objective review of some typical hostile takeover documentation.

## **DEVELOPMENT STATUS OF MINERAL ASSETS**

The choice of the valuation method in a particular circumstance will depend mainly upon the quantity and quality of the available information for the relevant Mineral Assets. This, in turn is dependent upon their development status. Thus, there are three fundamental types of Mineral Properties: '**Exploration Areas**'; '**Development Projects**'; and '**Operating Mines**' (see Glossary).

However, a more detailed subdivision is more useful, because it reflects that there are both "grass roots" exploration areas and advanced exploration prospects; pre-development projects and developing mines (even including those under some form of retention title); and operating and expanding (and even re-opened) mines, or moth-balled ones. The nature of the Resources or Reserves established, in conjunction with other Feasibility Study criteria, can be used to determine the change over points from one Mineral Property category to another in terms of their development status. Although the Glossary contains the VALMIN Code Definitions, outlined below is an expanded categorisation of Mineral Property status first

published in Lawrence (1993) and refined in Lawrence (1998a).

**"Grass Roots" Exploration Areas** range from areas for which there are only a geological concept and a granted tenement (or an application whose tenure is soon to be secured), through to ones for which conceptual targets have been generated and an exploration programme designed. On-site reconnaissance by geological, geophysical and geochemical means may have commenced and there may have been some drilling, trenching and sampling; and remote sensor techniques (like airborne geophysics, Landsat satellite imagery and photogeology) may have been used. Evidence of a Mineral occurrence may exist, whose size, quality and value are as yet unknown, but the results are encouraging and suggest that the area is prospective. However, nothing has been found that would qualify even as Inferred Resources. Included here are those for which there are prospecting results (ie, low budget and small scale exploration, which uses non-surface disturbance methods and which is mainly undertaken by individuals and syndicates, rather than companies).

To be **Advanced Exploration Prospects**, a Mineral occurrence must have been discovered on them. Drilling and sampling will have delineated its dimensions (volume/tonnage) and geometry (orientation). There will exist preliminary estimates of its grade distribution and the occurrence can now be regarded as containing Inferred Resources, possibly with some limited pockets of higher confidence Resources, but no Reserves. Early environmental, metallurgical, geotechnical and engineering data may have been obtained and some economic parameters indicated, but it is still not known if it is economic to exploit the Prospect.

**Pre-Development Projects** have enough data on them to confirm that the discovered Mineral occurrence is now a Mineral deposit. Whether or not it is an economic deposit still depends on the delineation of adequate Reserves and obtaining favourable results from the final Feasibility Study. The drilling spacing has closed up and sampling has established considerable Indicated and Measured Resources, but no Reserves of any consequence. Investigations will focus less on geology and tonnage/grade and more on geotechnical, metallurgical and environmental data collection and study. Applications for the necessary governmental approvals and permits have been submitted. Pre-feasibility studies are in progress to clarify the Project's optimum production capacity. They involve Resource audits; metallurgical testing for process and mill design; mine planning and design optimisation studies; marketing reviews; and preliminary sales contract negotiations. This category extends until a decision to go ahead with the Project (ie, it is economic) has been taken, based upon the results of the Feasibility Study.

Projects that can be shown to contain an economic Mineral deposit with adequate Reserves and Resources to support an operation are **Developing Mines**. Resource/Reserves work continues on them, but it is of lesser importance as the focus is on options to exploit the deposit for maximum profitability (ie, firming up of engineering design and construction criteria, the environmental management plan, and on further components of the final Feasibility Studies). When the Feasibility Study has been completed, a decision to develop can be taken, since there will be now adequate Reserves (ie Resources that are technically feasible and economically viable to mine) for a realistic mine life. In some cases (eg alluvial or coal projects), Project owners may commence mining before Proved Reserves are delineated (ie, the spatial uncertainty may still justify only Indicated Resources and/or Probable Reserves). Finance arrangements are being fine tuned; sales contracts completed; the mine-mill-infrastructure construction tender process begins; as well as the negotiation of labour agreements and finalisation of all necessary governmental approvals and permits/licences.

At **Operating Mines** the mine-mill complex and necessary infrastructure have been constructed and commissioned, and all required government approvals and permits/licences are in place. Hence, the major component of risk, in both socio-political (including environmental) and cash flow timing terms, has been removed (or quantified). This category also includes expanding operations and re-opened mines. The mine is in production, shipping product to fulfil its sales contracts or market demand. There is continuing exploration to upgrade Resources to Reserves depleted by mining and to locate additional mineralisation to replace Resources.

At the end of the day, if the Reserve/Resource assessment is faulty, a Project is unlikely to be developed or to survive. The tonnage (or volume) and grade (or quality) of a Mineral deposit provide the critical core value of any Mineral Asset. This estimate requires particular verification.

However, this does not mean that material agreements and contracts, tenement status, geographical constraints, environmental considerations, aboriginal land rights and other socio-political issues are not important. In fact, such matters affect all Mineral Properties, (irrespective of their development status) and they make up the geoscientific databases that are completely different for each Mineral deposit.

Hence, at each stage of Mineral Property development, there are unique problems to assess and solve, but a common thread in their evaluation is to establish that all the base data are reliable and representative. Emerging projects often pose the

greatest problems (eg, the Bre-X<sup>9</sup> debacle). Hence, one must first ensure that a project's development has minimum risk of failure through negligence, incompetence or even deliberate misrepresentation or falsification of data.

The next step is to match the methodology to the amount of data available. Clearly, an Income-based approach, like DCF/NPV modelling, is a rational choice only if the project is at the development or operating stage, when reliable feasibility data are available; or for valuing royalty streams. For exploration mining assets, other methodologies are more appropriate, like those categorised as Market or Cost Approaches. See Lawrence (1994) for a summary of valuation methodology considered suitable for exploration properties.

### **EQUITABLE INTEREST IN THE MINERAL ASSET BEING VALUED**

The simplest case would be where a party already appears to own 100% interest in a Mineral Asset. However, even then, one should be cognisant of the impact of various government royalties (say 4%) or of third party interests that may be identified only if the DCF/NPV Method is used. Their effect is that less than 100% of the estimated value should be attributed to the owner, since such royalties represent some loss of equity in a project.

Related to this issue is the possible existence of other non-governmental royalty owners or those with free carried (or limited contribution) interests, who may be hidden away in the material agreements and tenement transfer dealing documents. It is critical that a thorough due diligence is performed in this area, since it affects the allocation of the estimated total value amongst the parties.

In addition, where a tenement is being valued subject to an option-to-purchase agreement (unless that agreement is irrevocable and funds are realistically available; or it will be exercised and full payment will be effected imminently), the tenement generally has only a nominal or no value to the option holder, in a pre-transactional context. However, it could have a value to the option holder in a post-transactional sense, but it must be smaller than if the interest had been already acquired. Otherwise, you have the illogical situation where the owner of an actual interest in a tenement has the same value as that assigned by the Valuer to one who may purchase or will earn that right in the future with its

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<sup>9</sup> For a detailed account of the Busang/Bre-X fraud see Lawrence (1997a, 1997b) and Lawrence (1998c).

attendant risk. In this latter case, some discount must be applied to the normal value to account for the probability that the deal might not be finalised, no matter how small that risk might be estimated to be by the Valuer. It is not a debate about quantum, but about logic.

In the author's opinion, the values of Mineral Assets subject to Aboriginal land rights (Native Title) claims should be also discounted by a probability factor to distinguish those that are affected by this constraint from those that are not. This is because of the real increased delay in any Project's development on them; and the significant associated costs involved, particularly the likely high additional legal/administrative costs and payments/royalties or concessions involved. If a mining project is affected by Native Title legislation, Lonergan (1997) has estimated that the normal market value should be discounted by at least 20%, even if amendments proposed at the time were passed.

Similarly, the author believes that tenements under application (especially exploration tenements) must be also discounted to some degree. This takes account of the possibility that they may not be granted in a timely way (or even granted at all); and the fact that no one, as yet at the Valuation Date, holds any real equitable interest in the right to mine under known conditions. If there is no discount, then there is the absurdity that there is no difference in the value of a mining asset, whether or not one holds a granted tenement with known conditions and enforceable financial commitments over it.

## VALUATION METHODOLOGY FUNDAMENTALS

The author is mindful of the limitations of Mineral Asset valuation methodology, admitting that many elements are undeniably subjective, but maintains that the values obtained are by no means guesswork. In any event, an honest, subjective experiential Valuation is often more realistic than a sophisticated one out of a computer.

To achieve a persuasive result, there must be some demonstrably rational basis to the chosen valuation method, else it becomes nothing more than financial engineering of the "*What-number-did-you-have-in-mind?*" school. Whether or not inappropriate methodology is used, too often one sees blatant abuse of logic in the choice of inputs or the way the chosen method is interpreted. See Lawrence and Dewar (1999) and Lawrence (2000a), for details and examples.

Hence, the author believes that the choice of a specific valuation method (within the broad approaches based upon Market, Cost or Income) depends more on the jurisdiction and a Valuer's familiarity with it, rather than on a method's merit.

Note, at the outset, that the Multiple of Exploration Expenditure (MEE) Method and the DCF/NPV Method of valuing Mineral Assets generate only a 'Technical Value' (some call it Fundamental Value; see Glossary), which excludes any premium or discount to account for market, strategic or other considerations. Inevitably, Technical Values obtained using these methods appear low in an optimistic (bull) market, but high in a pessimistic (bear) market. Hence, these Valuations must be converted to Fair Market Values by considering the current market premium/discount applicable to the underlying Technical Value.

Prior Valuations and any recent comparative market sales (or appropriate share market indicators) will be useful in this context. However, despite current market sentiment being clearly relevant, caution must be exercised in the application of any market premium/discount because its relevance can be both transient and highly subjective. In the current economic climate, the use of any such premium must be fully explained and justified on reasonable grounds. Discounts are rarely seen, except in bank-lending transactions where the real value is critical, or when the predator in a hostile takeover attempts to minimise the value of the target.

Note that market sentiment is already part of values derived by the **JV Terms Method**, the **Comparable Market Value/Recent Transactions (Comparable Sales) Method**, and the **Yardstick/Transactional Rules-of-Thumb (Yardstick) Method** of valuing Mineral Assets. This is noted here because some Valuers forget that they must "*compare apples with apples*", with many missing this distinction between the different values obtained by the various valuation methods.

Generally, the older the data on which such Valuations are based, the more likely it is that this built-in market sentiment must be very carefully reconsidered for its continued applicability in the current market.

The author always recommends using valuation method(s) that are appropriate for the stage of development of the Mineral Property being valued, because the keys to any Valuation are the amount and reliability of the data used in the valuation process. However, only if the available valuation methods are handled logically and the relevant input factors are appropriate, can a realistic value be derived.

For retrospective Valuations, any intervening events must not be taken into account. For example, in the classic case of resumptions by the Crown, the fair value of what was taken is the only value required. Consequential damages due to the resumption are not to be included. The relevant and important valuation principle is that

only reasonably foreseeable events at the Valuation Date may be considered. Courts do, however, allow hindsight to operate when establishing the reasonableness of past predictions, etc.

Since a reliable and acceptable Valuation of a Mineral Asset largely depends on the results of a prior technical review and assessment of these assets, only professionals who are appropriately technically qualified, suitably experienced and highly reputable should undertake them.

However, the reader is again reminded of the considerable subjectivity of the valuation process, depending as it does upon individual professional judgement. Remember, too, that all value estimates are time dependent and are particularly influenced by the market conditions existing at the Valuation Date.

Note, too, that any attempt to quantify the chance of achieving exploration success is clearly speculative. Also, any predicted profitable returns from mining development scenarios are not guaranteed to occur. When coming to a conclusion as to the value of a Mineral Property, the author relies upon reasonable and considered assumptions based on his knowledge of the owner's past and present experience (reputation and competence) and exploration success to date, including the current quality and status of its technical database and its exploration or development team and management; the financial and staff/time resources provided to that team. Similar assumptions are made about future events, particularly commodity prices and the ability of the owner to produce and market product of the required quality to achieve budgeted profit levels.

General economic factors and changing societal requirements have to be considered as part of the risks in a Valuation. Factors which affect a proposed mining development include inflation, currency fluctuations and interest rates; industrial unrest; land access (and within Australia, the Aboriginal land rights/Native Title process); environmental controls and standards; and taxation and royalties. They all affect the owner's ability to fund a project's development and to raise additional working capital (either as debt or equity) for exploration, development and mining operations during the mine's life. Lack of certainty about the future actions of any government (at local, State and Federal levels) is also important in this context.

Valuers must incorporate appropriate probability factors in their valuation methodology (and fully explain their selection) to address all relevant risks. The use of a single discount factor to address unspecified, numerous probability factors is unacceptable to the author.

When valuing a Mineral Property, the author attempts to use as many valuation approaches (Market, Income and Cost) and methods as are appropriate for its development status and the purpose of the Valuation, though there have been instances where only one technique has been considered suitable. The values generated by each approach (usually based upon the average of the methods used) are compared to identify if there is any consensus of results (ie, a grouping of values that cluster around a particular level). This clustering suggests the most rational level at which the Mineral Asset should be valued and gives some comfort as to the reliability of the Valuation.

Most commonly, the author accepts a specific value generated by a particular approach as his Preferred Case Value (most likely scenario) for the Mineral Asset, rather than use the average of the values obtained by the various approaches employed. However, the range of values attributed to a Mineral Asset, which extends from a Low Case (pessimistic scenario) Value to a High Case (optimistic scenario) Value, should encompass the two extremes obtained by all methods used. Hence, it is only very rarely that the Preferred Value is the simple arithmetic average of the Low Case Value and the High Case Value. The author urges caution in accepting simple arithmetic means as the Preferred Value since there is rarely any logical justification for doing so.

On some occasions, when the data permit, the author has averaged the average values obtained by each valuation approach (Income, Cost or Market-based), to derive the Preferred Value.

Use of the DCF/NPV Method (part of the Income Approach) is still not permitted in many jurisdictions in US, particularly in Valuations for litigation purposes (Limb, 2000; and Ellis, 2000c), with preference being given to the Market Approach. However, most transactions involving developing and operating mines tend to have as their fundamental basis a DCF/NPV analysis. Few would feel comfortable claiming that the best way to value such mines would be to simply average the NPVs for some individual supposedly similar developed or operating projects and then apply the result. Also, many Valuers see no problem in deriving average transactional values/unit for use in a current Valuation, even though acquisition prices are commonly based on NPVs.

The author believes that the NPV method should never be applied to the Valuation of a Mineral Property that is only at an exploration stage, based on the hypothetical cash flows from a postulated exploitation scenario. However, the author concurs with Ellis (2000) that it is appropriate to calculate the conceptual NPV of

the income stream which might be generated by leasing the project or obtaining a royalty stream from it; by grazing livestock or crop-farming the surface; or by considering a non-Mineral Highest-and-Best use of the property (eg residential development).

At this point, it is worthwhile to reflect upon exactly what value is being determined by DCF/NPV analysis. Valuers tend to consider before or after tax values only in the context of the DCF/NPV Method, with a general preference for determinations of after-tax value. It is the author's view that other valuation methods implicitly derive after-tax values, although taxation issues do not feature in most of them. This means that such values can be averaged to obtain a market value (provided the NPV is adjusted for the market premium/discount; otherwise, the data would not be comparable).

Of course, some owners can use tax losses and structure their affairs to minimise the impact of corporate taxes, but others cannot do so. Hence, it should be clearly stated on what taxation basis the fair market value is determined. This is another reason why care must be taken when using project sales data as a comparable basis for assessing value. The 'comparable' projects may be in different places subject to different taxation regimes, in any event.

Note that even the supposedly rigorous DCF/NPV Method, based upon computer modelling of future cash flows, can be financially engineered for a particular desired result, if one wishes to do so (see Lawrence, 2000a).

## **OUTLINE OF THE MARKET APPROACH TO VALUATION**

An advantage of a market-based approach is that it can be applied to Mineral Properties across the whole development spectrum. Also, it is well understood by investors who are comfortable with a valuation approach that is related to the familiar concept of Real Estate transactions. Its underlying assumption is that purchasers will not pay any more for an asset than they would pay for property of similar utility, so that comparable sales data are a reasonable guide to value.

The Market Approach is much favoured in the US, mainly because the Mineral title system there heavily favours private Mineral rights ownership and a Real Estate approach. In contrast, in Commonwealth countries like Australia, Canada and South Africa, the State generally owns the Mineral rights and grants fixed term leases to those wishing to look for and develop Mineral deposits. There is usually very limited private ownership of Mineral rights. Ellis (2000b) provided a useful insight into the problems to be encountered when applying both the Australasian

VALMIN Code and the USPAP to Mineral Asset Valuation in the USA.

Nevertheless, the US Court system (particularly at the Federal level) is becoming a little more willing today to regard valuation of Mineral Assets as being distinct from Real Estate valuation. Hence, it is now more likely that a Valuer in the US does not have to hold qualifications/certification as a Real Estate Valuer to be an acceptable expert witness in litigation over Mineral Asset value (Limb, 2001). Fortunately, this is not an issue in the Australasian Court system. See Lawrence (2000) for an account of the latest requirements of the Australian Federal Court to ensure the Independence of expert witnesses and to ensure that their obligation is to the Court and their profession rather than primarily to their client (ie, no "hired guns")

Proponents of the Market Approach methods argue that they are superior to others because they are reliable proxies for the Valuation in question in that they represent what has been paid for 'comparable' properties. However, market-based valuation approaches are not intrinsically superior to those based upon income or cost. The key question is "*How comparable can unique Mineral deposits be?*" See more details below.

These proponents also argue that the Valuer has little subjective intervention in the method, save the selection of the pool of 'comparable' sales upon which to base the Valuation. In the author's experience, this selection process makes it just as subjective as any other method; maybe more so, because finding a significant number of truly comparable Mineral Property sales in the highly cyclical Minerals Industry is almost impossible.

For example, one commonly sees Valuations based upon A\$20/oz gold (Au) contained in Resources (the Transactional Value/Unit Method) for Mineral Properties with Resources. This figure was probably derived from gold Mineral Property sales data, making it part of the Market Approach. However, the transaction price was most certainly derived from analysis of the likely cash flows from these deposits, normalised over their relevant Resource base. Thus, one might argue that since the Valuation had its roots in income analysis, it should be considered an income-based approach, rather than a market-based one.

Similar arguments could be made for the JV Terms Method, if the Valuation was to be from the viewpoint of the party farming out. It saves exploration costs by assigning an equitable interest to the farming-in party, who in return undertakes the next phase of exploration. Another view is that it is a Market Approach because it reflects the value an arms-length,

incoming party is willing to pay in the marketplace for an equitable interest.

Thus, whilst each valuation method can be placed into one of the three categories or approaches above, careful reflection reveals that it is a rather arbitrary allocation. Grant (1994) produced a useful summary of the Market Approach, but also see Ross Lawrence (2000) for a recent, specific account of its use in the valuation of Exploration Areas; and Roberts (2000) its use in the valuation of Developing Prospects and Operating Mines. Commonly, international Minerals Industry Valuers place the following valuation methods under the Market Approach:

- **Comparable Sales Methods** (also called Comparable Market, Sales Comparison or Real Estate Methods);
- **Yardstick Methods** (including Transactional/Rules of Thumb Methods); and
- **JV Terms Methods** (also called Farm-in Commitment Analysis and it includes Synthetic/Conceptual JV Terms Method).

## COMPARABLE SALES METHODS

This is the most easily understood valuation mechanism, probably because of its close links with the familiar Real Estate concept of value that everyone can understand. However, in relation to Mineral deposits, it is the author's contention that rational analysis shows it to be no better than other valuation methods. Value has always been in the eye of the beholder and Mineral deposit sales bear little resemblance to the Real Estate market, particularly in volume and uniqueness.

In its simplest form, the Comparable Sales Method regards the consideration (particularly if in cash) passed at an arms' length sale of a specific interest in the Mineral Asset being valued as being a highly persuasive guide to the asset's value at the time. There may be a need to inflate/deflate the value to the relevant time by a suitable factor (eg, Consumer Price Index [CPI] or preferably by other means; see below).

This Method needs detailed attention if it is to be realistically used as the primary method of valuing an asset because it is clearly influenced by bull/bear market conditions. The value it implies may be distorted if an offered price is inexplicably high or inadequate research has been undertaken. Grant (1994) says that the practical limitations of the Method are self-evident (limitation on number of transactions, comparability and inadequate data), but that "The

*real value of the comparable sales method is in its use as a validity check" (on other valuation methods).*

USPAP (1998), in order to make the Comparable Sales Method more reliable, requires (in considerable detail with supporting evidence) that the market area be defined and delineated; that the current supply and demand conditions be identified and reviewed; that anticipated development, changes and future supply be identified, measured and forecast; and that the effect of anticipated economic or other changes and future demand be quantified. Cartwright (2001), drawing on US experience (particularly in the Real Estate domain<sup>10</sup>) gives considerable detail of the issues to address to ensure that the Market Value is being determined. However, he contended that in the US "...seldom is a mineral property purchased for cash.....Most commonly, the seller is paid through a mineral production royalty...a form of instalment sale." The author, whilst appreciating that this may be yet another difference between the US valuation environment and that operating in Australasia, still has difficulty understanding why this apparently introduces almost insurmountable problems for the Valuer.

However, it is always very difficult to find 'comparable' properties, particularly in a shallow market like that of sales of Mineral projects (which is not the case with the Real Estate market). For examples, see Agnerian (1996) for an account of comparable Canadian transactions in the period 1994 to 1996. The more one tries to identify the similarities to allow comparisons to be made, the more one realises that there are significant differences between projects to be valued on this proxy/substitution basis. Like all methods, it could be easily manipulated to derive a desired value.

## YARDSTICK (TRANSACTIONAL/RULES-OF-THUMB) METHODS

A Mineral Property where some data on tonnage and grade exist may be valued by methods that employ the concept of an arbitrarily ascribed current *in situ net* value to any Reserves (or Resources) outlined within the tenement. Note that the author opposes use of the simple gross value in the ground<sup>11</sup>, especially if only Resources

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<sup>10</sup> Cartwright (2001) quotes extensively from US texts like Eaton, J, 1995. *Real Estate Valuation in Litigation* (2<sup>nd</sup> Edition).

<sup>11</sup> For example, if a property has Reserves of 1.2MozAu and the gold price is A\$475/ozAu, the value is not simply the product (A\$570M). The cost of extraction and processing (A\$342/ozAu) and the capital cost to develop the mine have not been considered (as well as the time value of money and risk, among other things).

(not Reserves) have been delineated. Even use of small percentages of the gross *in situ* value is discouraged, especially without adequate explanation and justification.

These methods derive a subjective value (usually based upon the Valuer's experience and judgement) per tonne of ore (or ounce of gold) in the ground to value the deposit, depending upon its development status. The value derived is commonly an average market-based figure obtained from an analysis of recent transactions (Transactional Value) in A\$ per ozAu or tonne. It may be modified to accommodate the quality of Resource/Reserve category involved and the time, effort and expenditure involved in bringing the project to fruition. In other cases, it more a Rule-of-Thumb Value, in A\$ per ozAu or tonne, which could be the actual or typical/long-term average discovery cost; or a value that is chosen simply on the basis of experience by the Valuer as being indicative of the market value of the tenements on that occasion. Sometimes, particularly in the US, it is possible to use typical royalty payments per tonne of product as a variant of this Method. For convenience, all these variations are generally referred to as the Yardstick Method.

Valuation by the Yardstick Method will generally reflect the optimism/pessimism of the market at that time, even though it tends to take a longer-term view than other methods because the creation of a mine on the Mineral Property is normally some time ahead. Obviously, the more rigorous and rational the basis for the derivation of the value used, the more reasonable, realistic and acceptable will be the resultant Valuation.

Taking gold as an example, the following data (drawn from a variety of Australian and overseas sources) are quoted to illustrate typical Yardstick Values/ozAu used today.

In the US, valuation guidelines are published by various government authorities, mainly in connection with the levying of property tax (eg, Arizona Department of Revenue; ADR<sup>12</sup>) on mines and other natural resource properties. These guidelines specify the values in US\$/ozAu (based on mineable, recoverable ounces in published Reserves) to be used in the preparation of valuations for the taxation of operating gold

mines. They change in accordance with likely varying operating costs (which are defined as being cash operating costs before income tax and capital charges, less by-product credits). In 1999/2000, ADR recommended that if a project's anticipated operating cost were A\$246/ozAu, A\$410/ozAu and A\$574/ozAu<sup>13</sup>, the deposit should be valued at around A\$47/ozAu, A\$31/ozAu and A\$15/ozAu for Reserves, respectively.<sup>14</sup> Logically, the Yardstick values used to value exploration and development Mineral Assets with Resources would be lower.

The Mineral-in-place Yardstick values to be used by ADR for the 2000/2001 tax year were released in January 2000 and they are comparatively slightly lower than the 1999/2000 figures. The Reserve Yardstick values are A\$38.30/ozAu<sup>15</sup> for Properties likely to have a cash cost of production of US\$150/ozAu; A\$25.53/ozAu for Properties likely to have a cash cost of production of US\$250/ozAu; and A\$12.77/ozAu for those Properties likely to have a cash cost of production of US\$350/ozAu.

The same ADR document lists 19 selected published Mineral-in-Place Valuations of gold Properties (or companies) at dates ranging from 1990 (when the average realised gold price was about US\$380/ozAu) to 1999 (when it was about US\$300/ozAu). Valuers had used Reserve multiples that ranged from as high as A\$82/ozAu<sup>16</sup> (US\$50/ozAu) to as low as A\$15/ozAu (US\$11/ozAu), with an average of A\$49/ozAu (US\$30/ozAu) in dollars of the day. Exceptions can be assumed to be due to variations in sovereign risk and development status as well as likely operating costs and market hype. Also, as might be expected, there is a clear tendency for the higher values to be determined at the beginning of the period and the lower ones towards the end, reflecting the falling gold price. Also, the higher values were attributed to acquisitions of operating mines having higher quality ozAu, rather than exploration ground or development projects.

It should be noted that the resultant value/ozAu in A\$ obviously varies with the foreign exchange rate

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<sup>12</sup> See Arizona Department of Revenue, Division of Property Valuation and Equalization, 1998. Valuation guidelines for mines and other natural resource property (effective 1 January 1999); Table 11 (Selected published Mineral-in Place Valuations for copper and gold deposits); Table 12 (Commodity valuation factors for copper deposits, 2000 tax year, Mineral-in-Place value); and Table 13 (Commodity valuation factors for gold deposits, 2000 tax year, Mineral-in-Place value).

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<sup>13</sup> Based upon US\$150/ozAu, US\$250/ozAu and US\$350/ozAu, respectively, and a foreign exchange conversion of A\$1.00 = US\$0.61.

<sup>14</sup> Based upon US\$29/ozAu, US\$19/ozAu and US\$9/ozAu, respectively, and a foreign exchange conversion of A\$1.00 = US\$0.61.

<sup>15</sup> Based upon US\$27/ozAu, US\$18/ozAu and US\$9/ozAu, respectively, and a foreign exchange conversion of A\$1.00 = US\$0.705.

<sup>16</sup> Based on a foreign exchange conversion of A\$1.00 = US\$0.61.

for A\$:US\$. However, the author suspects that short-term irregularities or volatility in the foreign exchange market might distort this type of methodology unless judgement is applied, since from time to time a currency will be over or under valued. Also, the gold price in US\$ terms varies more in response to supply and demand like a commodity than it did in the past. Hence, it seems more appropriate when converting US\$ values/ozAu into A\$, not to simply input the exchange rate of the day, unless it is a realistic long-term estimate. This is because acquisition of gold prospects/projects to turn them into mines has a longer time frame (of at least ten years) than short-term currency fluctuations. In this regard, the author is currently influenced by the consensus long-term estimate of A\$1.00=US\$0.667, published by Access Economics<sup>17</sup>, when deriving the A\$value/ozAu to use from US data. As an example, the US\$9/ozAu quoted above becomes A\$13.50/ozAu (using an exchange rate of 0.667), A\$15.00/ozAu (if 0.600 is used) and A\$12.40/ozAu (if 0.725 is used).

Loucks and Dempsey (1997) proposed that Reserves on Mineral Properties could be valued at the exploration stage at US\$7/ozAu; at the pre-feasibility stage at US\$15/ozAu; at the feasibility stage at US\$30/ozAu; and at the production stage (say, 0.1MozAu to 0.5MozAu/year) at US\$150/ozAu. For operating mines, they suggested US\$200/ozAu for annual production at around 0.5MozAu to 1MozAu/year and US\$250/ozAu for those producing at >1MozAu/year. Rightly, these authors pointed out that the best Yardstick value to use in the case of operating mines is the profit margin per ozAu in Reserves, since it better reflects the impact of the price of gold on a Valuation.

The Part B Statement and Advice to Shareholders of Homestake Gold of Australia Limited (dated 24 October 1995), issued in relation to a takeover offer by Homestake Mining Company, contained an Independent Expert's Report that valued residual Resources considered likely to remain at the end of a mining operation. It valued them at "between A\$10 and A\$15 per ounce (1995 dollars)".

The Ross Mining NL Part B Document (issued on 3 March 2000), recommending acceptance of the takeover offer by Delta Gold Limited, indicated

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<sup>17</sup> Its latest (May 2001) issue of *Economics Monitor on Australia and the World*, uses the consensus estimates of 12 experts (including banks like Deutsche and Macquarie; and stockbrokers like ABN Amro, JP Morgan, CIBC World Markets, Merrill Lynch, Salomon, Smith Barney and Credit Suisse First Boston) to predict the long term (5 - year estimate) for the A\$:US\$ rate of 0.667 (within a range of 0.600 to 0.725).

that the 3.78MozAu Resources in Golden Ridge/Wirralie were valued at A\$28.31/ozAu. The Resources there were valued only moderately for Operating Mines, but they both had unfavourable aspects.

Australian Mining Consultants Pty Limited (AMC) authored a Specialist Report to Ernst & Young Corporate Finance Pty Limited/KPMG Corporate Finance (Australia) Pty Limited in relation to an offer by Centaur Mining & Exploration Limited for Australian Gold Resources Limited (dated 3 December 1999). It researched prior relevant market transactions in order to determine transactional/rule-of-thumb multiples for its gold Valuations. AMC listed a transaction in 1997 at Yerilla at A\$37.50/ozAu for a medium sized area containing a small 30,000ozAu Resource and another in 1996 at Pinjin at A\$11.50/ozAu for a large prospective area containing 70,000ozAu Resources. In AMC's Specialist Report in the Part B (issued in September 1999) in connection with an offer by DRD Australia ApS, it listed value/ozAu Resources of A\$23/ozAu for 0.30MozAu at Dalgaranga (1996); A\$10/ozAu for 0.26MozAu at Trojan (1997); A\$26/ozAu for 0.67MozAu at Cuddingwarra (1998); A\$17.50/ozAu for 1.2MozAu (including a plant) at Mt McClure; A\$10/ozAu for 0.9MozAu at Mt Rawdon (1998); A\$22/ozAu for 1.21MozAu at Rosemont (1998); A\$11.50/ozAu for 1.2MozAu at Carosue Dam (1999); and A\$30/ozAu for 0.39MozAu at Red October (1999). The weighted average value for Resources in these examples is some A\$18/ozAu (but the range is A\$10/ozAu to A\$37.50/ozAu, depending upon the circumstances).

The Independent Valuation by Snowden Corporate Services Pty Limited (Snowden) in an Explanatory Statement (dated October 1998) that recommended the proposed merger of Highlake Resources NL and Ballarat Goldfields NL contained another basis for generating Values/ozAu for Resources depending upon their assessed "quality". This "quality" was related to the gold grade; the proximity of infrastructure (eg, existing mill, roads, power, water, skilled work force, equipment etc); the level of likely operating and capital costs; the amount of prestrip (for open pits) or development (for underground mines) likely to be required; the likely ore:waste ratio; and the overall confidence in the Resource quantity. Snowden suggested that a "high quality" developed project would be valued at A\$30/ozAu to A\$80/ozAu; an "average quality" exploration project would be valued at A\$15/ozAu to A\$30/ozAu; and a "low quality" exploration project would be valued at A\$5/ozAu to A\$15/ozAu.

The Target Statement issued by North Limited (North) on 24 July 2000, in response to the takeover offer of Rio Tinto Limited (Rio Tinto), contained particularly relevant data in its

Independent Expert Report (prepared by Grant Samuel & Associates Pty Limited [Grant Samuel]/AMC). It proposed only A\$8/ozAu to A\$10/ozAu as reasonable Yardstick Values to value the Lake Cowal (NSW) Resource base of 4.31MozAu (within which were defined Reserves of 2.41MozAu).

Finally, in respect of gold Mineral Assets, AMC authored another Specialist Report on 27 February 2001 to KPMG Corporate Finance (Australia) Pty Limited, which formed part of the New Hampton Goldfields Limited's Target Statement in response to the Bidder's Statement by Harmony Gold Australia Pty Limited. In it, AMC claimed that appropriate Yardstick values<sup>18</sup> to use were <A\$10/ozAu (usually A\$3/ozAu to A\$5/ozAu) for sub-economic resources (low-grade Resources beyond the present economic limits of an open pit); A\$10/ozAu to A\$30/ozAu for reasonably defined Resources within which AMC judges that there is a reasonable expectation that Reserves will be established; and >A\$30/ozAu for Resources for which there is a good likelihood of a high conversion rate to Reserves and/or proximity to an existing plant.

The author would suggest that whatever value one chooses on technical grounds, like those described above, sovereign risk must be factored into the selection of the final A\$value/ozAu used. There is a reluctance to pay as much for a gold Mineral Asset located in a region with socio-political problems compared with one where the fiscal and security regime is benign. Similarly, tenements located in proximity to environmentally sensitive National Parks or where there are as yet unresolved Native Title or Aboriginal sacred site conflicts, have less value than ones without such problems to address (see comments above on Native Title issues that are based on the work of Lonergan, 1997).

The author most commonly uses the Yardstick Method as a sanity check to confirm Valuations of gold Mineral Assets derived using other methods or for tenements where limited exploration expenditure has discovered a Resource base of significant size. Currently used Preferred Values are around A\$50/ozAu for gold in Reserves in operating mines, within a range of A\$40/ozAu to A\$75/ozAu; and from A\$5/ozAu to A\$10/ozAu, up to A\$20/ozAu to A\$25/ozAu, for gold in Resources, depending upon their quality and the circumstances surrounding each Mineral Asset valued. Low Values and High Values, where required, are typically generated by using values that are typically A\$5/ozAu to A\$10/ozAu above

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<sup>18</sup> Based upon a future spot gold price in 2001 of US\$290/ozAu (A\$483/ozAu at A\$=US\$0.60), when it was actually US\$257 (A\$485/ozAu and A\$=US\$0.53).

and below the Preferred Yardstick value/ozAu, although the spread could be more asymmetric in some cases. Also, the author always reduces the estimated size of the Resource base to be used in the computation if part of it is based upon unrealistically optimistic assumptions.

Another commodity example, using iron ore, takes project valuation data from Rio Tinto's acquisition of North's 53% interest in Robe River Iron Associates (in August 2000). A transactional value/tonne for North's West Angelas Marra Mamba ore can be derived. The initial Rio Tinto bid was A\$3.80/share, but it had to be raised to A\$4.75/share to thwart the counter bid of A\$4.20/share by Anglo American plc (and to be accepted by North's shareholders). Although this was a valid market transaction, the author contends that it had to include a generous takeover premium to ensure its bid's success, in the particular circumstances. It is seen as a validation of the mid-point value/share of A\$4.72 ascribed by Grant Samuel and for its mid-point Valuation of A\$400M for 53% of the West Angelas Project.<sup>19</sup> Using this data implies a total value for 100% of the West Angelas of A\$759.52M<sup>20</sup> (equivalent to US\$436.57M, using the exchange rate at the time). Since the West Angelas deposit contained 910Mt (Probable Reserves and Indicated Resources) of Marra Mamba ore (as at June 2000), this transaction yields a Yardstick value of US\$0.4797/tonne for Marra Mamba ore.

A final commodity-based example involves lateritic nickel deposits, using nine recent transactions. These transactions were used to derive an average transactional value of A\$23/t of nickel (Ni) equivalent in Resources (within a range of A\$11/t Ni equivalent to A\$39/t Ni-equivalent). The Ni-equivalent is the sum of the nickel content and the nickel-equivalent value of the cobalt content, using the relevant prevailing prices at the time of the various transactions (ie, 1998 to 1999).

Related to this approach are Rules-of-Thumb. They also utilise averages of market transaction data, but tend to be less time specific and use more generic units, such as nameplate (or actual) annual production or sales of product (usually tonnes); Resource or Reserves reported (ozAu or tonnes); or units of area (hectare [ha] or square kilometre [km<sup>2</sup>]). Sometimes, too, the stock

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<sup>19</sup> The valuation range was A\$4.34/share and A\$5.09/share, with a midpoint of \$4.72/share (*North Target Statement*, Chairman's Letter to Shareholders, 24 July, p1 and also p3; and *North Target Statement*, Grant Samuel Report, 24 July, p48).

<sup>20</sup> Based upon the mid-point value, but factored upwards by the actual bid price (A\$4.75/share actual successful bid divided by A\$4.72/share mid-point valuation basis).

markets market capitalisation (at the specific time of the Valuation) may be the numerator when determining comparative data to use in this derivative comparative valuation technique. It can be readily seen how Rules-of-Thumb must be used with considerable care and only by experienced Valuers else the results will be unconvincing due to their very subjective basis.

Generally, such a Valuation hopes to deal with steady state conditions, basing value on representative data for comparative purposes. Hence, some problems can arise when using production or sales figures as a basis when such conditions do not apply.

As a final example of the use of this technique, taking coal as the commodity this time, one can use comparative coal transactional data quoted in Grant (1994). He gave detailed coal transaction data (from the 1989 to 1991 period in Australia) that supported a value per annual saleable tonne range of A\$65/t to A\$85/t for operating coal mines with a long economic life and relatively low operating costs.

There have been a number of more recent coal interest acquisitions that give further indications of the general transactional value/tonne of saleable coal production to apply in the case of a particular level of production for a given coal mine. For example, the MetCoal takeover for QCT Resources Limited (QCT) in October 2000 (*QCT Target Statement*) listed comparable sales data from nine coal mine sales in the February 1996 to May 2000 period. The value/annual saleable tonne ranged from A\$32/t to A\$171/t (averaging A\$89/t), implying a value of A\$356M for a hypothetical 4Mtpy saleable coal project (4Mtpy x A\$89/t).

But it is obviously inappropriate to include the largest producers in this Valuation scenario. Hence, if only the smaller producers (4Mtpy to 6Mtpy) were counted (five transactions), the weighted average is A\$53/annual saleable tonne (within a range of A\$32/t to A\$74/annual saleable tonne). This produces a value of A\$212M for the example mine (4Mtpy x A\$53/t).

The *QCT Target Statement* quoted a value of A\$43/annual saleable tonne for the South Blackwater (5Mtpy bord and pillar/longwall) operation. On this basis, a 4Mtpy underground coal mine could be valued at A\$172M (4Mtpy x A\$43/t).

The value range (A\$172M to A\$356M) reflects the individual character of each transaction used. It generally reflects revenue and cost differentials for the different coals mined (by open cut and underground methods) and the scale of the operations.

This again illustrates the difficulties involved in applying aggregated 'comparable' sales data from different times, even if reduced to an A\$ per production or saleable tonne basis (Rules-of-Thumb Method). The US\$ coal price, at the time of the various transactions (which were mainly in A\$), was also a significant factor. One approach to minimise this effect is to convert all the relevant Australian transaction prices to US\$ at the relevant dates before determining an average value per annual saleable tonne. Then, the value determined in US\$ can be converted back to A\$, at the exchange rate applicable at the Valuation Date. A variation to this approach is to escalate/deflate the transactional values/tonne from when they occurred to the Valuation Date by the movement over the relevant period in the US\$ coal price, before converting to A\$. Iron ore valuation, too, is amenable to this approach since it is also a commodity traded in US\$.

Another type of Rule-of-Thumb is the one based upon conversion of comparable sales data to a unit area (per km<sup>2</sup> or per ha) for valuing Mineral Assets without identified Resources. It is probably the most difficult comparative tool to justify. This Method has found greater acceptance in North America, where tenement sizes appear to be smaller and where there are many more transactions forming a deep and liquid market than elsewhere. In addition, dealing in tenements is not discouraged by the mining legislation there, especially in the US with its historic focus on property rights. It is used in Canada and Australia, though to a much lesser extent.

In Australia, many State jurisdictions grant large exploration tenements (say 300km<sup>2</sup> maximum) on a graticular block system. This means a tenement is usually larger than geometrically necessary to cover the specific geologically prospective terrane. Also, most jurisdictions here require periodic significant reductions in the tenement's size, so it is common to apply for more area than is actually needed to provide for this obligatory reduction. The sale of exploration tenements to third parties is discouraged (although sales, particularly if interests, certainly occur) because the basis of grant is that the applicants will carry out the granted tenement's exploration obligations themselves. The State sees itself as the centralised, timely distributor of exploration rights, not the free market.

That said, Valuers still attempt to use this Rule-of-Thumb (based upon area) in Australia. For its use in valuing WA gold exploration areas over greenstone terranes, see the 27 February 2001, AMC-authored Specialist Report noted above (in relation to Harmony Gold Australia Pty Limited's takeover offer for New Hampton Goldfields Limited). Here, total values of A\$0.01 to A\$0.05 were suggested for small mining and exploration

titles that had good exploration results or a particular strategic value. For those medium sized areas, total values of A\$0.05M to A\$0.50M were recommended, depending upon exploration results and their prospectivity and/or degree of strategic value. Finally, AMC claimed that total values of A\$0.5M to A\$2M could be used for large areas. These total values were derived from AMC's knowledge of numerous transactions at A\$2,000/km<sup>2</sup> to A\$10,000/km<sup>2</sup> (depending upon the security of tenure of the type of title involved, its size, its prospectivity, proximity to other successful exploration results, etc).

## JOINT VENTURE TERMS METHODS

The JV Terms Method, which takes into account existing JV agreements on the Mineral Property being valued, is another way of valuing Mineral Assets, particularly those at the exploration stage. Less commonly, the JV terms already agreed for nearby and/or similar Mineral Properties are taken into consideration.

In such cases, only arm's length JV agreements that involve firmly committed expenditure should be considered. That is why one should be very reluctant to use more than the first or second tranche of future expenditure to earning an interest. Hence, it is considered poor valuation practice by the author to adopt the maximum interest to be earned to value a Mineral Asset (or an interest in one), even if there are no earning stages, especially if no probability factors are applied.

Unless the required funds appear in a formally approved Budget of a company or JV, they can be hardly regarded rationally as being firmly committed. Similarly, the author takes issue with Valuers that claim funds as firmly committed, simply because the expenditure is stated in a Prospectus and the funds have not yet been acquired by a successful float and listing on the relevant Exchange. If expenditure is counted that is not firmly committed, then the calculation must include realistically small probability factors for each tranche considered, in order to reflect this fact.<sup>21</sup> It is also important to recognise the time value of money in these cases and to discount

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<sup>21</sup> Such probability factors are multiplicative. If an interest can be earned in three stages, with the odds of making the expenditure estimated at 95% for the first, 70% for the second and 45% for the last stage, the overall probability (excluding the time value of money deduction) is only 30% (0.95x0.70x0.45). Since the overall probabilities encountered in such cases in Prospectuses and Target Statements are commonly >60%, one can only imagine the unrealistically high individual probabilities having to be assumed for this final result.

future expenditure to present value by the appropriate deflator. The author suggests the Weighted Average Cost of Capital to the party farming in or an industry benchmark rate like 10%pa, rather than simply using the relevant CPI data.

The author has found that overall discounts are more likely to be 25% to 50% of the total expenditure commitment over the time to earn the maximum interest, rather than the +50% (up to 80%) commonly claimed.

The Valuer should read the JV agreement carefully to determine its exact terms, especially the minimum expenditure commitment to acquire an initial interest, since that expenditure may provide a basis for the Preferred Case Value. If the JV agreement provides that the farm-in party retains no interest if it walks away at any time, then the Valuer may consider that the Low Case Value is zero. However, it is usual for the farm-in party to be required to expend a minimum amount before being allowed to withdraw. In this case, that minimum amount (appropriately deflated) is the Low Value of the party's potential equity and the Low Value of the Mineral Asset can be based on it.

Especially where there is evidence to suggest real commitment by the incoming party, the Preferred Case Value may be derived by risk-weighting the value of a proposed staged-interest acquisition by applying realistic probabilities to progressing through each stage.

Generally, the High Case Value would be based on the farm-in party spending the whole amount required for it to acquire the maximum interest allowed by the agreement (again appropriately deflated). A premium may be applied for being the operator.

See Appleyard (1994) for an overview of the method. Unfortunately, there was an error (or a misleading ambiguity) in the formula proposed in Appleyard (1994) on page 167 (see Lawrence and Dewar, 1999) from which the following is quoted:

*"In the simplest and most common case, party A agrees to spend \$E to earn an interest of I%. ... If A always expended, or was legally bound to expend, the full amount of \$E, the value of the property V at the time of the deal, would be calculated as follows:*

$$\$V = \$E \times (100 - I) / I" \quad (1)$$

In fact, Equation (1) derives the value of the interest retained by the party farming out. The

value  $V_{100\%}$  of the entire Mineral Asset at the time of the described deal would be:

$$\$V_{100\%} = (\$E / I\%) \times 100\% \quad (2)$$

The Valuation in a resource company's Prospectus (issued in July 1996), taken from Lawrence and Dewar (1999) and set out below, illustrates the erroneous use of Appleyard's formula:

*"the incoming party has agreed to earn a 60% interest in the project for the expenditure on exploration of \$2 million over a maximum period of four years. We may assess the value of the project at the time of that agreement as follows:*

$$\begin{aligned} &40/60 \times \$2 \text{ million} \times 1/1.2 \text{ (time discount)} \times \\ &0.4 \text{ to } 0.7 \text{ (probability factor)} \\ &= \$440,000 \text{ to } \$770,000. \end{aligned}$$

The A\$440,000 to A\$770,000 is, in fact, an estimation of the value of the 40% interest retained by the party farming out, not the  $V_{100\%}$  implied.

Lawrence and Dewar (1999) also provided several other examples of the mis-use of the JV Terms Method.

Some practitioners believe that the creation of a hypothetical JV scenario (Synthetic/Conceptual JV Terms method) is a reasonable valuation approach. The author disagrees, because it is far too subjective a method to produce reliable and realistic Valuations.

Although residual royalties often feature in the detail of the material agreement, they are often unreasonably ignored in Mineral Asset Valuations, especially when using the JV Terms Method.

Note that Valuations using these methods are particularly sensitive to bullish/bearish market sentiment existing at the time the JV was negotiated, which may not continue to exist at the Valuation Date. Thus, they already contain a market sensitivity factor. The time value of money should be considered in such Valuations and expenditures should be inflated (or deflated) appropriately to obtain a constant dollar Valuation if this is the basis for other valuation methods used (eg, if using real discount rates in the DCF/NPV Method).

## ACTUAL COMPARABILITY OF SALES

Most valuation papers that support use of the comparable sales concept always point out that the historical sales have to be comparable (and relatively recent) for its use to be justified. However, this pre-condition is often ignored in

practice because the 'comparable' sales being used are clearly not comparable to the Valuation in progress, upon close examination.

As Cartwright (2001) pointed out, Mineral Property sales mainly take place in the sporadic, least organised and least efficient of markets viz, Direct Search Markets and, to a lesser extent, Broker Markets. The real role of the Broker Market (eg, Real Estate transactions) is often unknown due to the confidentiality surrounding many Mineral Asset transactions, which limits the availability of such detailed information. In addition, Mineral Asset buyers have specialised needs and operate in a geographically dispersed and commodity diverse environment, reducing the interest and role of brokers. Auction Markets and Dealer Markets are not often applicable, although the Stock Market (involving the sales or mergers of companies generating this type of market trading sales information) is an example of an Auction Market. Dealer Markets, in this context, produce commodity sales information having only an indirect link with Mineral Asset sales information. Note, too, that some transactions (especially in the US) are not true complete sales because they involve retention of royalty interests that have to be converted into a cash-equivalent value.

Thus, the author's thesis is that Mineral Asset sales are rarely comparable, making them an unsuitable basis for a primary valuation tool. As Grant (1994) pointed out in his summary of the Market Approach, *"The practical limitations of the comparative sales method are well known and self evident..."*. However, he properly observed that its real use *"is as a sanity check"*.

An obvious exception to the above view is the case where there have been transactions involving the Mineral Asset itself (preferably recently and where they were at arms length). Sales of interests in the subject asset, or the grant of options to acquire an interest, are obviously very useful and direct indications of value. However, only rarely are there any directly comparable sales and this is the fatal flaw in the use of this approach, in the author's view.

A Mineral Asset's main worth lies in the quality and quantity of its mineralisation, but orebodies are intrinsically unique in their Mineral assemblage, structural setting, depth and mode of emplacement, among a hoist of other things discussed below. This makes simple comparisons difficult. Whilst, Resource/Reserve category estimates also appear to be indisputable facts, different Competent Persons making the estimations may have legitimately different views on their categorisation and quantity/quality. This is because they have reasonably used different grade cutoffs, dilution, mining loss and bulk densities. Again, direct comparison is hazardous.

The individual geotechnical and hydro-geological characteristics, since they affect mining practices or the safety of tailings dams and structures, are likely to be different for each Mineral Asset sold, too. Each will have different minor constituents in the ore that are likely to influence viable exploitation of the deposit because of metallurgical or environmental concerns. Each will also have different assumptions regarding cut-off grades, dilution, recovery and tonnage/grade estimation methods and parameters and process plant recovery. These differences compromise any claim of comparability.

Mineral deposits are found in different geographical situations with attendant different topography, access, vegetation, climate, rainfall, etc. Even if the mineralisation could be assumed to be exactly the same, in two different locations, one would find widely different logistics to be overcome when developing them; and differences in specific geographical constraints, particularly water supply and the impact of the weather on proposed operations. Any so-called 'comparable' deposits will have different levels of existing infrastructure; variable quality, state of repair and appropriateness of existing equipment; and jurisdictional differences all of which affect the project development costs, too. This must impact on their respective sale prices and likely values.

In fact, projects always develop at different times in response to perceived supply/demand, but this system is not always economically efficient. This is why one cannot value Mineral Properties as if all of them will be in production at once, as do many tax authorities in the US. Nevertheless, projects likely to be in production now will be valued higher than those whose development is some time in the future. This simply reflects the time value of money and their greater risk profile, emphasising again the non-comparability of simple sales data.

Inevitably, even supposedly 'comparable' sales of Mineral Assets at the same stage of development will have occurred at different times, in different markets, in different countries or jurisdictions. Some areas of difference are discussed in more detail below.

**Valuation Dates and Premium/Discounts** – Valuations are made at various times in the economic cycle (boom/bust or bull/bear market involving a premium/discount), so is important to consider if this has had an undue influence on the particular Valuation. For example, sometimes a premium has been paid for Mineral Assets, relative to their underlying value (Technical Value), because of market demand. This can be beyond any variations due to changes in commodity price. It may be for the level of control of the entity obtained; for perceived synergies in operating or marketing or to unlock other

potential; for management strengths; for belief in untested Resource/Reserve upside; for new processing technology; for diversification of risk; for the large size of the entity and its credit rating/access to capital or institutional grade; or for other special advantages that will accrue to the purchaser/seller. Even when transactional Valuations appear comparable, they will have been mostly made at dates different to the required Valuation Date. In such cases, the selection of the most appropriate inflator/deflator to bring them to the required date becomes an issue (see below).

**What was Bought in the Transaction?** – Often, important information about a commercial transaction is kept confidential or only sketchy details are released in the public domain. For example, were comparable interests acquired? Free carried interests or royalties may not be publicly disclosed; there may be other rights and interests (eg, timber rights, improvements and plant/equipment, or existing sales contracts) or encumbrances/obligations (eg, JV financial commitments, environmental restoration, debt, unresolved lawsuits or taxes) retained by the purchaser that have to be stripped out for sales data for them to be useful; commercial-in-confidence information may have been provided to the purchaser, but not to the market, that influenced the final price; there may be trade-offs or concessions in respect of other tenement/projects that could be even in other jurisdictions; and a premium or a discount may be involved that is not obvious, but which may (or may not) be justified in the valuer's opinion. These matters exacerbate the difficulties of determining 'comparability' of sales data by a valuer. Also, a transaction may be for a specific project that may be inside or outside a corporate structure. This means that the financial envelope (eg, hedge book, working capital, value of any other assets/investments, with all adjusted for liabilities) surrounding the project value must be determined as part of the valuation process. These are other complexities to be considered when trying to compare market sales, especially when a Valuation is by Rules-of-Thumb that utilise market capitalisation data from the stock market at a particular time.

**Geographical and Geo-political Location** – Climate and rainfall/water supply all have an impact on a project's technical feasibility and economic viability, particularly equipment productivity. These parameters will mainly impact on a Mineral project's capital and operating costs. Also, prospective buyers' perceptions of political risk will always affect a project's value. The location's political stability, degree of labour unrest and general level of personal and property security; its political stability and corruptibility index; its social and environmental agenda; and the permanence and/or nature of its

financial/taxation regime are key risk factors that attract a premium (or discount) for relatively similar projects in different locations and jurisdictions. Similarly, different locations have different amounts of infrastructure of variable quality in place. Thus, it will be always very difficult to ensure that sales comparisons are realistic and reasonable.

**Mining Method** – certain deposit types enable particular mining methods to be used to exploit them. Historically, those that could be mined by bulk open pit methods have enjoyed a preference over those that could be exploited only by more expensive and difficult, selective underground methods. Hence, for the same Mineral and similar deposit geometry, those lying at shallow depths are generally more highly valued by the market than deeper ones. For shallow deposits being mined as an open pit, those with the lowest overburden stripping ratios are more valued. Similarly, deposits with the least mining dilution are also favoured. Whilst cost is the obvious reason (eg, shallow open pits enjoy capital and operating cost advantages) the relative ease of management and the associated inherent flexibility of mining operations are other non-financial considerations. High margin projects can better withstand commodity price cycles than others, so they command a premium. Thus, one really can only compare sales of projects having similar mining methods and, even then, only those located fairly close together on the cost curve, having similar revenue projections.

**Deposit Size** - the market seems to prefer large, high-grade world-class deposits for reasons other than their obvious commercial advantages. Perhaps it is the comfort in having a Resource/Reserve buffer and the time to resolve any emergent, unexpected problems that is the cause of this effect. Also, management time spent in developing small or big projects is often not markedly different. Hence, for otherwise similar projects, there is a premium for larger deposits, even over smaller, but higher grade ones.

**Deposit Complexity** – the market prefers mineralogical and metallurgical simplicity whenever possible, with minimal product contaminants. Hence, the known preference for say gold deposits over base metal deposits and free-milling gold deposits over refractory ones. Also, those deposits that are structurally complex and ones with geotechnical problems are penalised by the market, since they are more difficult and more costly to mine. Comparisons between apparently 'comparable' projects must include comparable metallurgical treatment, plant design, recovery and final product quality.

**Marketability** – those Mineral deposits whose products have stringent quality specifications and

consequently specialised markets (most industrial Minerals); and/or whose buyers are very well organised (eg diamonds and to a lesser extent coal and iron ore) do not have as deep and as free a market as other Mineral commodities (like gold and base metals). They tend to suffer a discount in the market place. Even when trying to compare like-with-like, it is critical to ensure this is exactly what one is doing.

As noted above, the time the transaction took place is difficult to accommodate in market-based approaches. One has the overall bull/bear market influence to consider. It is also difficult to filter out the overall cyclical nature of metal prices and the foreign exchange relativities. They provide part of the economic envelope around the technical characteristics of a Mineral Asset Valuation and they are not constant, further reducing the comparability of Mineral Asset sales data. The author has indicated his lack of confidence in the CPI as the best inflator/deflator to bring transaction sale prices to the Valuation Date for comparative use. It seems, when trying to standardise past transactional values at different times for comparative use, that the change in US\$ commodity unit price is the best way to adjust sale price data to the Valuation Date.

Hence, the Yardstick Method also suffers from lack of real comparability of data, since its values/unit are derived from sales transactions whose comparability must be regarded as suspect from the above discussion.

JV Terms are mostly specific to a particular project and so they cannot be realistically used for the Valuation of other Mineral Assets. Knowledge of them may enable the construction of relatively realistic synthetic JVs for comparative use in Valuation in some restricted cases, mainly as a sanity check. But, the author fears that the use of conceptual JV terms as a primary valuation tool is inappropriate since it is too open to manipulation and abuse, with a Valuer asking at the outset "*What number do you have in mind, then?*"

## THE INTERNATIONAL CHALLENGE

Each jurisdiction has its own rules and requirements that must be respected. However, the increasing globalisation of the Minerals Industry makes it essential that international standards of project assessment and valuation, as well as reporting standards, be as similar as possible from the viewpoints of the relevant national regulatory and national professional bodies. The same applies to the terms used. Even though the IVS terminology is well developed (mainly for Real Estate), the well accepted, historical terminology of the Minerals Industry cannot be totally disregarded.

Also, professionals must be able to practice across international and inter-state boundaries. Hence, the accreditation (registration) and the maintenance of continuing professional development of the authors of Valuation Reports, as well as the ability to effectively discipline them (Ethics Codes), be similar between international jurisdictions to facilitate the overseas mobility of these Minerals Industry professionals. The US still appears to have a particular problem in this regard and there is evidence that it is becoming worse (see Ellis, 2000a and 2000c). Canada, however, is to be applauded for its initiatives to reduce this problem (Spence, 2000).

See Lawrence (2001a, 2001b) for further discussion of these issues and a discussion of the need to ensure that the developing international accountancy and valuation standards are suitable for the Minerals Industry world-wide.

In the Glossary below, unless otherwise stated, the definitions closely follow those preferred by the IVSC.

## GLOSSARY OF TERMS

**'Real Property'** – it is a non-physical, legal concept and it includes all the rights, interests and benefits related to the ownership of **'Real Estate'** and normally recorded in a formal document (eg, deed or lease). The rights are to sell, lease, enter, bequeath, gift, etc. There may be absolute single or partial ownership (subject to limitations imposed by Government, like taxation, planning powers, appropriation, etc). These rights may be affected by restrictive covenants or easements affecting title; or by security or financial interests, say conveyed by mortgages.

**'Real Estate'** – it is a physical concept, including land and all things that are a natural part of the land (eg, trees and Minerals). In addition it includes all things effectively permanently attached by people (eg, buildings, site improvements, and permanent physical attachments, like cooling systems and lifts) on, above or below the ground.

**Personal Property** – it covers all items other than **'Real Estate'** and may be tangible (like a chattel or goods) or intangible (like a patent or debt). It has a moveable character.

**'Mineral(s)'** – it is any naturally occurring material found in or on the Earth's crust, that is useful to and/or has a value placed on it by mankind. The term specifically includes coal, shale and materials used in building and construction, but excludes crude oil and natural gas (VALMIN Code, Definition D23).

**'Minerals Industry'** (also Extractive Industry) – it is defined as encompassing those engaged in exploring for, extracting, processing and marketing **'Minerals'**.

**'Mineral Asset(s)'** (Resource Assets or Mineral Properties) - means all property including, but not limited to **'Real Property'**, intellectual property, mining and exploration tenements held or acquired in connection with the exploration, the development of and the production from those tenements; together

with all plant, equipment and infrastructure owned or acquired for the development, extraction and processing of Minerals in connection with those tenements. Most can be classified as **'Exploration Areas'**, **'Advanced Exploration Areas'**, **'Pre-Development Projects'**, **'Development Projects'** or **'Operating Mines'** (VALMIN Code, Definition D24).

**'Operating Mines'** – it means Mineral Properties, particularly mines and processing plants, which have been fully commissioned and are in production (VALMIN Code, Definition D28).

**'Development Projects'** – it means Mineral Properties which have been committed to production, but which are not yet commissioned or not operating at design levels (VALMIN Code, Definition D15).

**'Advanced Exploration Areas'** and **'Pre-development Projects'** – it means Mineral Properties where Mineral Resources have been identified and their extent estimated (possibly incompletely) but where a positive development decision has not been made. Mineral Properties at the early assessment stage, those for which a development decision has been negative, those on care and maintenance and those held on retention titles are all included in this category if Mineral Resources have been identified. This is even if no further valuation or technical assessment work, delineation or advanced exploration is being undertaken (VALMIN Code, Definition D14).

**'Exploration Areas'** – it means Mineral Properties where mineralisation may or may not have been identified, but where a Mineral Resource has not been identified (VALMIN Code, Definition D13).

**'Price'** – it is the amount paid for a good or service and it is a historical fact. It has no real relationship with **'Value'**, because of the financial motives, capabilities or special interests of the purchaser; and the state of the market at the time.

**'Value'** (also Valuation which is the result of determining **'Value'**) - in simple terms it is the estimated likely future **'Price'** of a good or service at a specific time, but it depends upon the particular qualified type of value (eg **'Market Value'**, **'Salvage Value'**, **'Scrap Value'**, **'Special Value'**, etc). There is also a particular value for tax and rating, or insurance purposes.

**'Fair Market Value'** (Market Value or Value) – it is the object and result of the Valuation. It is the estimated amount of money (or the cash equivalent of some other consideration) for which the **'Mineral Asset'** should change hands on the **'Valuation Date'**. It must be between a willing buyer and a willing seller in an 'arm's length' transaction in which each party has acted knowledgeably, prudently and without compulsion. It is usually comprised of two components, the underlying or **'Technical Value'** and a premium or discount, relating to market, strategic or other considerations (VALMIN Code, Definition D41).

**'Market Value'** (IVS Definition) – it is the result of an objective Valuation of specific identified ownership rights to a specific asset as at a given date. It is the value in exchange not **'Value-in-Use'** set by the market place. It is the "estimated amount for which a property should be exchanged on the date of valuation between a willing buyer and a willing seller in an

*arm's length transaction after proper marketing wherein the parties had acted knowledgeably, prudently, and without compulsion".*

**'Fair Value'** (IVS definition) – it is an accountancy term used for values envisaged to be derived under any and all conditions, not just those prevailing in an open market for the normal orderly disposal of assets. Being a transaction price it reflects both existing and alternative uses, too. It is also a legal term for values involved in dispute settlements which may not also meet the strict **'Market Value'** definition. Commonly, it reflects the service potential of an asset ie, value derived by DCF/NPV analysis, not merely the result of comparable sales analysis. It is still the *"amount for which an asset could be exchanged, or a liability settled, between knowledgeable willing parties in an arm's length transaction"*.

**'Technical Value'** – it is an assessment of a **'Mineral Asset's'** future net economic benefit at the **'Valuation Date'** under a set of assumptions deemed most appropriate by the **'Valuer'**, excluding any premium or discount to account for market, strategic or other considerations (*VALMIN Code, Definition D41*).

**'Highest-and-Best-Use'** – for physical property, it is the reasonably probable and legal use of property, which is physically possible, appropriately supported and financially feasible, that results in the highest value. In the case of personal property, it is the same with the additional qualification that the highest value must be in the appropriate market place, consistent with the purpose of the appraisal. It may be, in volatile markets, the holding for a future use.

**'Value-in-Use'** – in contrast to **'Highest-and-Best-Use'**, it is the specific value of a specific tangible asset that has a specific use to a specific user. It is not market-related. The focus is on the value that a specific property contributes to the enterprise of which it is a part (being part of a **'Going Concern Valuation'**). It measures the contributory value of a specified asset(s) used within that specific enterprise, although it is not the **'Market Value'** for that individual asset. It is the Value-to-the-Owner/Entity/Business in accountancy terms and may be the lower of net current replacement cost and its recoverable amount. It is also the net present value of the expected future net cash flows from the continued use of that asset, plus its disposal value at the end of its useful life (**'Scrap Value'**). At the **'Valuation Date'**, there must be recognition of its existing use by a particular user. This is in contrast to the alternative reasonable use to which an asset might be put by unspecified owner(s).

**'Going Concern Value'** – it is a business valuation concept rather than one relating to individual property valuation. It is the value of an operating business/enterprise (ie one that is expected to continue operating) as a whole and it includes goodwill, special rights, unique patents or licences, special reserves, etc. Apportionment of this total value may be made to constituent parts, but none of these components constitute a basis for **'Market Value'**.

**'Investment Value' (Worth)** – this is the value of a specific asset to a specific investor(s) for identified investment objectives or criteria. It may be higher or

lower than **'Market Value'** and is associated with **'Special Value'**.

**'Property-with-Trading-Potential'** – refers to the valuation of specialised property (eg, hotel, petrol station, restaurant, etc) that is sold on an operating or going concern basis. It recognises that assets other than land and buildings are to be included in the **'Market Value'** and it is often difficult to separate the component values for land and property.

**'Special Value'** – an extraordinary premium over and above the **'Market Value'**, related to the specific circumstances that a particular prospective owner or user of the property attributes to the asset. It may be a physical, functional or economic aspect or interest that attracts this premium. It is associated with elements of **'Going Concern Value'** or **'Investment Value'** since it also represents synergistic benefits. In a strict sense it could apply to very specialised or special purpose assets which are rarely sold on the open market, except as part of a business, because their utility is restricted to particular users. In some circumstances, it may be the lower value given by **'Value-in-Use'**.

**'Salvage Value'** – it is the expected value of an asset at the end of its economic life (ie, being valued for salvage disposal purposes rather than for its originally intended purpose). Hence, it is the value of property, excluding land, as if disposed of for the materials it contains, rather than for its continued use, without special repairs or adaptation.

**'Scrap Value'** (Residual Value) – it is the remaining value (usually a net value after disposal costs) of a wasting asset at the end of a prescribed or predictable period of time (usually the end of its effective life) that was ascertained upon acquisition.

**'Forced Sale Value' (Liquidated Value)** – it is the amount reasonably expected to be received from the sale of an asset within a short time frame for completion that is too short to meet the **'Market Value'** definition. This definition requires a reasonable marketing time, having taken into account the asset's nature, location and the state of the market). Usually it also involves an unwilling seller and buyers who have knowledge to the disadvantage of the seller.

**'Valuation Date'** - it means the reference date to which a Valuation applies. Depending on the circumstances, it could be different to the date of completion or signing of the Valuation Report or the cut-off date of the available data (*VALMIN Code, Definition D24*).

**'Valuer'** (also Valuator [Canada] or Appraiser [USA] – it is either the **'Expert'** or **'Specialist'** (Qualified Person in Canada) who is the natural person responsible for the Valuation to determine the **'Fair Market Value'** after consideration of the technical assessment of the **'Mineral Asset'** and other relevant issues. They must have demonstrable **'Competence'** (and **'Independence'**, when required).

**'Expert'** – it means a **'Competent'** (and **'Independent'**, where relevant) natural person who prepares and has overall responsibility for the Valuation Report. He/she must have at least 10 years of relevant **'Minerals Industry'** experience, using a relevant **'Specialist'** for specific tasks in which he/she is not

**'Competent'**. An **'Expert'** must be a corporate member of an appropriate, recognised professional association having an enforceable Code of Ethics, or explain why not (VALMIN Code, Definition D12).

**'Specialist'** – it means a **'Competent'** (and **'Independent'**, where relevant) natural person who is retained by the 'Expert' to provide subsidiary reports (or sections of the Valuation Report) on matters on which the 'Expert' is not personally expert. He/she must have at least 5 years of suitable and preferably recent **'Minerals Industry'** experience relevant to the subject matter on which he/she contributes. A **'Specialist'** must be corporate member of appropriate, recognised professional association having an enforceable Code of Ethics, or explain why not (VALMIN Code, Definition D34).

**'Material/Materiality'** - with respect to the contents and conclusions of a relevant Report, it means data and information of such importance that the inclusion or omission of the data or information concerned might result in a reader of the Report reaching a different conclusion than might otherwise be the case. **'Material'** data (or information) is that which would reasonably be required in order to make an informed assessment of the subject of the Report. The Australian Society of Accountants' Standard AAS5 indicates that **'Material'** data (or information) is such that the omission or inclusion of it could lead to changes in total value of greater than 10% (between 5% and 10% it is discretionary). Also the Supreme Court of New South Wales has stated that something is **'Material'** if it is significant in formulating a decision about whether or not to make an investment or accept an offer (VALMIN Code, Definition D22).

**'Transparent/Transparency'** - as applied to a valuation it means, as in the Concise Oxford Dictionary, "easily seen through, of motive, quality, etc". It applies to the factual information used, the assumptions made and the methodologies applied, all of which must be made plain in the Report (VALMIN Code, Definition D37).

**'Competence'** – it means having relevant expertise, qualifications and experience (technical or commercial), as well as, by implication, the professional reputation so as to give authority to statements made in relation to particular matters. See Definitions D12 and D34, and Paragraphs C15, C16, C18 and C19 (VALMIN Code, Definition D10).

**'Independent/Independence'** – it means that the person(s) making the Valuation have no **'Material'** pecuniary or beneficial (present or contingent) interest in any of the **'Mineral Assets'** being assessed or valued, other than professional fees and reimbursement of disbursements paid in connection with the assessment or Valuation concerned; or any association with the commissioning entity, or with the owners or promoters (or parties associated with them) likely to create an apprehension of bias. Hence, they must have no beneficial interest in the outcome of the transaction or purpose of the technical assessment/Valuation of the **'Mineral Asset'** (VALMIN Code, Definition D19 and Clause C22). ASIC Practice Note 42, which deals with the Independence of Expert Reports, provides more detail on this concept.

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