

Difference between a value estimate and an appraisal

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Abstract

The vast majority of valuations produced for mineral properties using the net present value method provide an estimate of investment value or use value. Such an estimate can be a long way from the price that the property would actually sell for if placed on the market. Indicators from the market need to be used to validate or modify the net present value calculation if market value is being appraised. The comparable sales and replacement cost methods used in the appraisal of urban buildings generally fail when used in the appraisal of mineral properties. Other methods of sales analysis are introduced. Guidelines for what a minerals appraisal report should contain are presented.

Introduction

It is common practice for minerals industry practitioners to present an estimate of mineral property value as being an appraisal of the value of the property when it does not meet the current US nationally accepted standards for an appraisal. Outside of the United States, the term *valuation* is typically used instead of *appraisal*.¹ In this paper, the term *appraisal* is mainly used. Internationally, estimates of mineral property value are often presented as representing market value estimates, but do not meet accepted international valuation standards.

This paper builds on the themes presented in some of the papers that preceded it in the Valuation I session at the 2000 SME Annual Meeting. In particular, it builds on the papers of Lawrence (2000) and Torries (2000), which address problems of the use and misuse of *net present value* (NPV) analysis. It also builds on the paper of Ellis, Abbott and Sandri (1999), presented at the 1999 SME Annual Meeting, which discusses US and international trends in the regulation of mineral-deposit valuation. The amount of overlap is kept to the minimum felt necessary for clarity and to present the author's perspective. United States appraisal practice and experience are the primary topic of discussion, but international standards are frequently referenced for comparison. This paper is directed at the market value appraisal of individual mineral properties, including mines and quarries. It is not directed at the appraisal of the *business value* of mining operations at such properties, which is a different topic. However, the difference in concept is addressed at length. Appraisal for property tax assessment is not discussed because in the United States this comes under its own set of state regulations.

In this paper, frequent reference is made to appraisal standards, regulations and methods that relate to the appraisal of *real estate*. Most minerals industry practitioners who develop value estimates for mineral properties seem not to believe that these have relevance to their work. However, in

the United States, a mineral deposit is a part of the *mineral estate*, which is a part the real estate. If a tract of real estate is owned as a fee simple estate, in theory, that real estate ownership extends to the center of the earth. Reporting the value of a mineral deposit, or an interest in a mineral deposit, is by definition reporting the value of *real property*.² Often the reporting of the value of a mineral deposit must follow appraisal standards for real property due to federal or state regulation (Ellis et al., 1999).

Also, valuation reports are often used in litigation, sometimes even when that was not the original intended use of the report. It is here that "the rubber meets the road."

In litigation situations about the value of mineral property interests, the expert testimony of a minerals industry practitioner is often opposed by that of a state certified real estate appraiser. The author has discussed such situations with colleagues who study court cases involving the value of mineral properties. These discussions indicate that in those situations the testimony of the real estate appraiser generally prevails. This poor to abysmal track record for minerals industry practitioners appears to be largely due to not following the ground rules of generally accepted appraisal practice for real property appraisal or to not following the specific appraisal ground rules for the particular jurisdiction. Some important items of US real-property appraisal case law have been developed based on cases involving mineral properties.

Common mineral property valuation practice vs standards

For advanced exploration-stage mineral properties having a delineated resource and for properties at a later stage, including those in operation, most value estimates by minerals industry practitioners are derived based on the net present-value (NPV) method. This is also commonly called the dis-

¹ Similarly, outside the United States, the terms *valuer* and *valuator* are typically used instead of the US term *appraiser*, which is mainly used in this paper.

² *Real property* is defined as: "All interests, benefits, and rights inherent in the ownership of physical real estate; the bundle of rights with which the ownership of the real estate is endowed. In some states, real property is defined by statute and is synonymous with *real estate*." (Appraisal Institute, 1993).

counted cash flow (DCF) method. Typically, the calculation is done by discounting of aftertax cash flows. A review of the papers presented in the two Valuation sessions at this 2000 SME Annual Meeting and presented in the proceedings of the VALMIN'94 convention in Australia confirms this fact (AusIMM, 1994). The author agrees that the NPV method is an important tool for minerals appraisers in estimating value when carefully and appropriately applied.

After developing only the NPV estimate, many minerals-industry practitioners wrap a property description around it and then toss the report over the wall to their client, believing or pretending that they have produced an estimate of *market value*. Even many of us who are career minerals appraisers will have done this before the development of the prevailing appraisal standards, or until becoming fully aware of their implications.

It is difficult to justify an NPV as being an estimate of market value without having tied the discount rate that was used into the prevailing market appropriate for the subject property. It is particularly difficult to justify it when being questioned by a lawyer who is determined to poke holes in your work. Sales analyses must be conducted, if possible and reasonable, to support the discount rate used.

The estimation of *market value* or *fair market value* is generally the goal of assignments that independent minerals appraisers receive. The Uniform Standards of Professional Appraisal Practice (USPAP), is published by the Appraisal Standards Board. Under authorization by the US Congress, it contains the basic appraisal standards required for transactions involving federal agencies such as the US Forest Service and federally licensed institutions such as banks.³ It provides the following definition of *market value*, which has been agreed upon by US agencies that regulate federal financial institutions:

The most probable price that 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 as of a specified date and the passing of title from seller to buyer under conditions, whereby:

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

5. *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. (USPAP, 1999, p. 139).⁴*

The key concepts in this definition are: (1) the price to be estimated is the most probable cash price (not the highest price) that the property would obtain; (2) in an arms-length, free-market transaction; (3) on the specified date of appraisal; (4) after a reasonable length of market exposure; (5) with both parties to the transaction being typically motivated. Many other definitions of market value are available with essentially the same meaning. In an appraisal report, one should include the definition that has jurisdiction in the area in which one is working, especially if ones work has a purpose in litigation.

The International Valuation Standards Committee (IVSC) has nongovernmental organization membership status in the United Nations. It is also represented on the steering committee of the International Accounting Standards Committee. The IVSC's International Valuation Standards (IVS) publication provides a relatively brief definition of market value:

The estimated amount for which an asset should exchange 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 each acted knowledgeably, prudently, and without compulsion. (IVSC, 1997, p. 7).

Courts in the United States often base their decisions on an estimate of *fair market value*. However, they often use the term interchangeably with the term *market value* within the court's decision. The term *fair market value* may have its origin in the accounting term *fair value*. "A *fair value* estimate may not meet the *market value* requirements of adequate time for orderly disposal or absence of some form of duress" (IVSC, 1997, p. IVS 2-11). One author indicated that the courts use the term *fair market value* to embody the concept that in *eminent domain* (condemnation or takings) situations, the property owner is generally not a willing seller and that a hypothetical value is generally being estimated for a partial interest being taken in the property.

The Uniform Appraisal Standards for Federal Land Acquisitions (UASFLA) provides appraisal guidelines for eminent domain situations involving federal agencies.⁵ It contains the following definition of *fair market value* taken from a US Supreme Court decision:

"Fair market value" is defined as the amount in cash, or on terms reasonably equivalent to cash, for which in all probability the property would be sold by a knowledgeable owner willing but not obligated to sell to a knowledgeable purchaser who desired but is not obligated to buy. In ascertaining that figure, consideration should be given to all matters that might be brought forward and reasonably be given substantial weight in bargaining by persons of ordinary prudence, but no consideration whatever should be given to matters not affecting market value. [Interagency Land Acquisition Conference 1992 (referenced as UASFLA), pp. 3-4].

³ USPAP is binding on most US real estate appraisers. Some minerals appraisers, including the author, are bound to abide by USPAP for appraisals, due to their state licensing or through their membership in an appraisal society which sponsors the Appraisal Foundation. The Appraisal Standards Board, which maintains and publishes USPAP, is under the Appraisal Foundation. In many states, the appraisal of mineral holdings falls under the jurisdiction of the state real estate appraisal board, since such appraisal is appraisal of real property. In these cases, abidance with USPAP is specified by regulation (Ellis, et al, 1999). The 1999 edition of USPAP contains ethics requirements and ten Standards. Standards 1 and 2 govern real property appraisal.

⁴ Originally specified in *Federal Register*, Vol. 55, No. 163, August 22, 1990, pp. 34228 and 34229.

⁵ UASFLA requires that appraisals abide by USPAP as a minimum set of standards.

The VALMIN Code of the Australasian Institute of Mining and Metallurgy (AusIMM) contains standards for valuation of mineral and petroleum properties and securities (Lawrence, 2000). It defines *value* as being identical to *fair market value*. It then provides a definition of *fair market value* that is very similar in wording to the above IVSC's definition of *market value* (AusIMM, 1998, p. 12).

From these definitions it can be seen that *market value* and *fair market value* have very similar meanings domestically and internationally, and, for most purposes, they can be viewed as synonymous. For the remainder of this paper, the term *market value* is used.

In most estimates of market value of properties that one sees produced by minerals industry practitioners, the discount rates used in NPV calculations are those considered appropriate for mining companies to use in their investment decision making. The resultant NPV in theory represents the amount that companies should be willing to pay to buy the subject property while still meeting their hurdle rate of return requirement on the investment.

However, this estimate of *investment value* may not be a good representation of market value. For example, in Denver in the mid-1980s, if one had purchased a downtown office building at an NPV derived by this theory and then immediately put it back on the market, one would likely have lost much more than half of what was paid. In the severely depressed real estate market at that time, office buildings sold at a small fraction of prices of only a few years before, and foreclosures were common. The scarce buyers were only willing to consider investing when offered exceptional deals.

Similar times have frequently prevailed in the international mining industry, as many have experienced. In the early 1970s, nickel properties sold at giveaway prices or were relinquished. In the mid-1980s, coal, uranium and oil shale properties were meeting similar fates. In 1990, it was the turn for silver properties, and now much the same is happening for gold properties. In such depressed markets, an *investment value* estimate will typically be much greater than the realities attained in the market.

Investment value is defined as: The specific value of an investment to a particular investor or class of investors based on individual investment requirements; distinguished from market value, which is impersonal and detached. (Appraisal Institute, 1993, p. 190).

The VALMIN Code recognizes a similar value concept to investment value, which it terms *technical value*. It provides the following definition:

“Technical Value” is an assessment of a mineral or petroleum asset’s future net economic benefit at the valuation date under a set of assumptions deemed most appropriate by an expert or specialist, excluding any premium or discount to account for market, strategic or other considerations. (AusIMM, 1998, p. 12).

In depressed market situations, such as the above examples, there are many adjustments that one can do to their NPV model. One can adjust the method of determining the appropriate discount rate, use a more pessimistic selling price forecast for the commodity, adjust or remove the inflation factor, apply a higher risk factor and delay production. Through these corrections, it may be possible to estimate an “appropriate” value for the property in the depressed market. In this

circumstance though, one could be accused of having adjusted the method to provide an answer, which fits one’s perception of the market value.

If one used the Capital Asset Pricing Model (CAPM) for determining the discount rate from stock market data, or the Weighted Average Cost of Capital (WACC) method for deriving the discount rate from the financial markets, one can be criticized as using data appropriate for corporate level valuation but not directly related to the individual property market appropriate for the subject property. One could conduct or obtain a survey of discount rates used in investment analysis by companies active in exploring or mining the particular mineral commodity of the subject property. This can be useful in giving us a feel for how companies are evaluating potential investments in that industry sector. However, by applying the mean discount rate derived from the survey, one has determined an average industry investment value. This is an indicator of market value, but it again can be a long way from market value. Indicators of market value can be quite useful in guiding one in developing an estimate of market value. Sometimes due to lack of other data sources, one can’t do much better than this. Nonetheless, such indicators should not be taken to be any more than indicators of market value.

In contrast to the above depressed market situations, the mining industry sometimes experiences very strong property market situations. During the late 1960s, almost anything containing an ultramafic rock could be pushed as being a nickel prospect. During the mid-1970s, anything that provided some good clicks on a Geiger counter was being taken up as a uranium prospect. Around 1980, even coal properties with only seams of lignite about 300 m (1,000 ft) below the surface were being acquired. At the same time, oil shale properties in Colorado and Utah were trading at \$4 per recoverable metric ton of oil (50¢ per barrel). Then, many experienced the excitement of the mid-1980s through the mid-1990s when good gold properties were fetching a significant percentage of the retail value of their contained gold.

Within the period of high gold-property prices, those properties with advanced-stage exploration were often selling for substantially more than the value indicated by conventional NPV analysis. During that time, Ross Bhappu and Jaime Guzman of Newmont Mining conducted a questionnaire survey of mining company investment decision-making practices (Bhappu and Guzman, 1994, 1995). Responding companies with gold as their primary commodity had an average minimum required real discount rate of 11.5%/year with a standard deviation of 3.6%/year. However, analysis of gold property sales from this period by analysts often found abstracted internal rates of return (derived discount rates) of only a few percent to negative annual rates. Bhappu and Guzman state, “One disturbing result of this study, however, is the inability to explain the high premia that market values command over DCF valuations.”⁶

In these high market-price situations, it may be beneficial to apply some more advanced analysis of the subject property’s potential earnings stream to yield a value closer to what one believes should be the market value. Graham Davis (1995) of the Colorado School of Mines, and other authors, found promise in the use of the option-pricing methodology promoted by Dixit and Pindyck (1993) to remove some of the difference. This provides a way of modeling benefits derived from managerial flexibility. An update on the status of the

⁶ The term *DCF valuations* means *discounted cashflow valuations*. For the purpose of this paper, it can be taken to be synonymous in meaning to *NPV valuations*.

option-pricing methodology is provided in the Valuation I session by Hammond and Lee (2000). Also, the subject property could have potential for continual finding of additional resources through exploration concurrent with mining of its known *reserve* base. The additional *resources* could be developed into reserves as needed to replace reserves consumed during mining (Hammond, 1999). Modeling of this potential is another example of an aspect that could bring the NPV up to the perceived market value.

These examples show methods that may be used to model how valid positive perceptions by companies come into play in the market for a particular mineral property. Such perceptions could well cause company management to be willing to pay a higher price than otherwise. Evaluating these aspects may be useful to obtain a better indication of market value. However, a number of problem issues can be seen arising here.

These techniques lead one into even more hypothetical and complex modeling than relying on the conventional NPV of a regular production stream and cash flow forecast. It can be quite difficult to explain the theory and application of the conventional NPV method of valuation to a judge or jury drawn from a rural area of Montana. Adding layers of complexity could make this task nearly impossible. Also, the opposing lawyer now has additional material upon which to accuse one of speculation due to the anticipated income basis. Consider a court scene of the opposing expert presenting three sales for deposits of the subject commodity that the expert has analyzed on a dollar per unit basis of resource or reserve. If one has not analyzed those or some better sales, court history shows that one generally loses the argument, even if one considers the experts three sales to be “off the wall.” Sales are *market* data. Judges and juries generally feel they can understand sales, whereas they generally don’t feel comfortable with NPVs. That is especially so in rural areas, where many mining industry cases are held.

In modeling added value derived from management flexibility in modifying production rates to fit changing markets, improving plant and equipment efficiencies with time, merging production units, etc., one could be accused of developing a *use value*.⁷ This would be true if anything included in the cash-flow model was specific to the current owner or to a specific potential buyer. Analysts have been known to base their value estimate on product use unique to a company or on unique financing or tax treatment. These are fine if the task at hand is to develop the *use value* under that scenario, but not for estimation of *market value*. A definition of *use value* is:

The value a property has for a specific use. (Appraisal Institute, 1993).

As can be seen from this discussion, a key to a defensible appraisal of market value is the correct application of appropriate methods of determining that value. A second important factor is that all of the necessary ingredients of an appraisal are considered and then addressed in the report. The discussion below expands on these factors for appraisal of market value.

Estimation of market value

Highest and best use. The market value of a property is determined on its *highest and best use*. In doing an appraisal of market value, the first, and also possibly the last consideration, should be *highest and best use*. USPAP provides the

⁷ *Use value* is also termed *value in use*. The term *value to owner* has similar meaning.

following definition of *highest and best use* when appraising real property:

The reasonably probable and legal use of property, that is physically possible, appropriately supported, and financially feasible, and that results in the highest value. (USPAP, 1999, p. 138).

For a very simplified example, assume the subject property has a mineral deposit under an orchard. One needs to determine whether the value of the property as an orchard exceeds its value as a mineral property. There may yet be other uses to consider, such as subdivision into housing lots if the property adjoins an expanding urban area. The determination of market value should be based on which ever use provides the highest value.

IVSC provides a very similar definition for international use in the IVS (p. 8). Lack of adequate highest and best use analysis is the source of the greatest number of complaints against the work of real property appraisers in the United States. In eminent-domain situations, the courts have determined that the decision must be based on the highest and best use of the subject property (UASFLA, p. 8).

If the subject property is held as US federal unpatented mining claims or a federal mineral lease, then an alternative use to mineral development is not legally possible. Such is generally the situation throughout Australia, because the Crown owns the vast majority of the land. This could be why the VALMIN Code does not address highest and best use. However, even in these situations, the use that provides the maximum value should be selected. That may be through sublease with an advanced royalty followed by annual payments.

Date of valuation, or effective date. Market value is determined as of a specific *date of valuation* or *effective date*.⁸ This is not necessarily the date the property was inspected by the appraiser. It may be specified by a lender, by litigation or it may be the date of effect of the most recent critical data. The value determination is generally based on the assumption that the property will have had adequate exposure to the market prior to the specified effective date for market value to be attained. USPAP requires that an appraiser “develop an opinion of reasonable exposure time” (SR 1-2(c)).

The three approaches to estimation of market value. The methods for determining the market value of a property fall into three categories, called approaches. The *sales comparison approach* is based primarily on the principle of substitution. The *cost approach* is based mainly on the principle of contribution to value. The *income approach* is based on the principle of anticipation of benefits. The three approaches should not be viewed as being independent of each other. Generally they draw mainly from the same sources of data, but that data is analyzed using different methods. The underlying philosophy is that the three approaches should substantiate the findings of each other.

USPAP requires that all three approaches be considered in conducting a complete appraisal. If an approach is then excluded, the reason should be provided. IVS lists the three approaches, but leaves the valuer to determine which ap-

⁸ These terms are essentially synonymous. The term *date of valuation* is used in the IVS, *valuation date* in VALMIN, and *effective date* in USPAP.

proaches to use based on the nature of the subject property and the basis of likely trade in the market. The VALMIN Code does not describe any approaches and leaves the method of determination of value up to the "expert" responsible for the report.

The analysis of sales draws one into studying the actual market place. The derivation of market value as specified in USPAP and applied in the courts, requires the appraiser to base his or her analysis as closely as possible on market data. That is, if possible, sales analysis should be used as the primary determinant of the market value of the subject property. NPV analysis is considered to only weakly draw on market data, if at all.

This author considers that the minerals appraiser should attempt to base his or her conclusion of value on as many indicators of market value as can reasonably be obtained. This is especially true if the appraisal is to be used in litigation. All the methods of value estimation that the minerals appraiser has available are subject to a high level of uncertainty and are open to criticism. The more methods that can be applied, the more support that we develop for our conclusion of value.

In some cases, even to obtain a modest amount of sales data may require casting one's net more broadly than is generally considered. It may require including sales from a number of different mineral commodities to that of the subject, but with similar economic characteristics. For example, for a crushed stone quarry, one may need to consider analysis of other construction material property sales, such as sand and gravel. For a particular industrial mineral, one may need to consider other industrial minerals with somewhat similar market characteristics. In doing so, though, the appraiser must assure as always that only appropriate methods of value estimation are used with the resultant data. For exploration-stage properties, the advanced royalty payment terms on a lease, or the farm-in terms on a joint venture, may also be analyzed to develop indications of value that can help support one's conclusions, because these are generally arms-length transactions (Apleyard, 1994).

Each property sale selected is usually analyzed on an individual basis to extract as much sales data as possible from it. The limited scope of this paper prevents significant discussion of the specific methods, problems and issues involved in conducting sales analysis. However, a key element is to get the data into common units across mineral types to allow comparison on a common basis. Methods of estimating the value of the subject property are then applied using the data from the sales analysis.

The three approaches to value are individually addressed below. Methods of market value estimation are discussed within each approach. The discussion includes various ways in which sales data can be utilized by each method. Also addressed is the level of confidence perceived in each approach, particularly by the court system.

Sales comparison approach: This approach is well recognized as presenting many difficult problems in application for the minerals appraiser when working with all but a few types of mineral properties (Loucks, 1991; Hoover, 1997; Paschall, 1998, 1999; Ellis et al., 1999). Difficulties include few sales for deposits of most commodities; lack of adequate data for many of those sales; and the uniqueness of each deposit in geology, tonnage and grade or quality, size, location and stage of exploration or development. Locating and obtaining sales data can prove difficult, time consuming and expensive. As Grant (1994) observes, "There is far more comment on the

limitations of the *comparable sales* method than its merits."

However, this author takes the view that one should always attempt to use sales comparison in an appraisal. It generally provides the best indication of the market value of the property, because of the three approaches it draws the most directly on sales data. In US federal and state courts, any expert's mineral property appraisal that relies solely on the income approach will have a high probability of losing to the opposing expert's appraisal when that is based on simple sales comparison. For example, in reference to court attitudes, Robert Paschall indicates that east of the Rocky Mountains there is a general rejection of the income approach when valuing construction rock properties (Paschall, 1999). At the least, sales comparison should be used as a validity or "sanity check" against an estimate derived by the NPV method (Grant, 1994).

The *sales comparison approach* has to some extent received a bad rap due to the extensive use of the term "comparable sales," as used in residential real estate appraisal. The approach can use analysis methods that do not require "comparable sales" in any strict sense of the term. Appraisers of difficult-to-value real property, such as farms, timber and water rights, face somewhat similar problems to minerals appraisers, with scarce and noncomparable sales. They have long ago pushed the sales comparison approach down to working with common units of measure. That is, the adjustment grid to bring the sales data to the subject property is worked through at the level of \$/unit, such as \$/hectare (\$/acre) or \$/m³ (\$/acre-ft) (ASFMRA, 1995, Ch. 6). Ratio analysis on property components is used extensively in this process.

Some every day measurements derived from sales analysis, which can be used in the sales comparison approach, are the in situ price of the subject commodity in terms of dollars per unit measurement: \$/g (\$/oz), \$/t (\$/st), \$/m³ (\$/yd³), \$/hectare (\$/acre), etc. It may be possible to rank the unit price paid based on the stage of the development of the property. However, the US Securities and Exchange Commission (SEC) handicaps the analysis of mineral properties in the United States in this regard by generally limiting quantitative reporting of mineral data to only reserves (SEC, 1992).

To increase the amount of data available for analysis, it can prove beneficial to utilize sales from many years ago to many decades ago. In this case, trend analysis can be used. For example, the price paid per in situ or recoverable unit of the commodity can be plotted as a percentage of the prevailing commodity price. The author partnered on one appraisal project for which no property sales of the subject commodity had taken place in the United States in recent years. Property sales for the commodity covering 65 years were analyzed and then plotted. This provided valuable insight into how prices changed with market sentiment swinging through cycles, from bullish to bearish to somewhat neutral.

In the final analysis, adjustments for time, location, property components and qualitative factors will need to be made to bring the data to the subject property. It would be preferable if adequate breadth and depth of sales analysis allowed for the adjustments to be derived arithmetically from the data. However, because one is normally working with a paucity of data, subjective adjustments will generally be drawn from the data.

Geoscience rating systems, such as that of Kilburn (1998, 1990), provide a valuation template or framework for early through late exploration phase properties. These in a sense are a subset of the sales comparison approach, adjusting from the base sale price of an exploration tenement or claim. The application of such a rating system for industrial minerals was

discussed by Sandri and Abbott (2000). Some of the property value relationships suggested in these rating systems can help guide adjustments to sales in the sales comparison approach.

Cost approach: The cost approach to determining market value is generally rejected outright by minerals appraisers as not being applicable to mineral deposits. Some, such as Paschall, use it only for valuing the plant and equipment on the property (Paschall, 1998, p. 4). The concept of estimating the “replacement cost less accrued depreciation” for a unique mineral deposit, or for improvements, such as a mill built at the site of such a deposit, is generally ridiculed. Evans of the Bureau of Land Management states, “A final, and almost always inappropriate approach, is the cost approach to value.” (Evans, 1998, p. 16).

The courts in the United States have been largely in agreement with this negative sentiment to the cost approach in real property appraisal in general. UASFLA states:

The cost approach is generally recognized as the least reliable method of valuation. The Courts have made clear that this approach should never be used “when no one would think of reproducing the property,” or when no prudent investor would reproduce it for the figure or amount given as replacement or reproduction cost (UASFLA, 1992, p. 17).

However, the situation is not at all as clear as that statement suggests. J.D. Eaton, Assistant Chief Appraiser for the US Department of Justice, coauthored the UASFLA, which was issued in 1992. In a more recent book, *Real Estate Valuation in Litigation* (Eaton, 1995), Eaton shows that the reasons for courts rejecting the cost approach have been quite varied. Often, it has been due to the lack of understanding of appraisal concepts by the court. Eaton goes on to make clear that the main cause of the courts’ lack of confidence in the cost approach has been “flagrant misuse of the approach by appraisers” (p. 159). The case history involved spans many decades. Eaton states:

Most courts do not seem to understand that each of the three approaches to value is an integral part of the valuation process. Many court rulings appear to be based on the assumption that the three approaches to value are totally independent of one another and that only the most applicable approach is used in the appraisal of a specific property. (Eaton, 1995, p. 158).

Despite these problems, Eaton advises that “most courts allow the cost approach into evidence as long as the improvements enhance the value of the land for its highest and best use and proper deductions are made for depreciation of the improvements.” Eaton states that even if the court rejects it, that does not stop the appraiser from using it in arriving at his final estimate of value. Eaton goes on to warn:

The appraiser has an ethical and professional obligation to develop a cost approach to value whenever the results of the approach will assist in estimating the value of the property. (Eaton, 1995, p. 160).

The writings of minerals appraisers and others about the valuation of mineral properties show that they believe that the cost approach can only be based on depreciated replacement-cost analysis for improvements and/or historic cost analysis of investments in a property. The recommended use and treat-

ment of the results by those authors varies too widely to summarize here. Examples of two often referenced publications regarding these methods of analysis are, respectively, Gentry and O’Neil (1984, pp. 12-13) and Loucks (1991, ch 11, pp. 8, 17-18).⁹

However, the cost approach is based on the principle of contribution to value. For difficult-to-appraise real estate properties, a broader interpretation of the cost approach is now being applied based on the estimation of the contributory value of each component of the property being appraised. Appraisers of rural real estate in the United States face similar issues to minerals appraisers when appraising farm and other land, water and timber. Since about 1990, the American Society of Farm Managers and Rural Appraisers (ASFMRA) has been teaching in its real property appraisal courses a method for deriving from sales analysis the contributory value to the subject property of various land classes and the improvements (ASFMRA, 1995, ch. 12). The method is based on sales analysis, but it does not require the use of so-called comparable sales. The contribution of each component of the land mix of the property is determined using ratio analysis of land classes within sales.

Application of a similar contribution method to the analysis of mineral property sales data should provide similar contributory values for categories of mineralization or other property attributes. The SEC’s restriction limiting the reporting of quantitative data to only reserves makes it difficult to obtain adequate data on the categories of mineralization at the subject property, let alone at other properties that have been sold (SEC, 1992). However, diligent research could provide a very useful third approach for determining the value of the property.

If enough sales data are available to do a sales-comparison approach, there will likely be enough to do a cost approach, because the same sales can be used in both analyses. What may be the most important difference between the sales-comparison approach and the cost approach is the presentation of the results of the analyses. Presentation of the sales-comparison approach results focuses on the adjustments necessary to get the average dollar per unit bases of the selected sales to that of the subject property. That is, a grid showing the adjustments for each sale is presented, with the resultant value for the subject property. The presentation of the results of the cost approach focuses on the contributory value of each component of the subject property. No sales are shown in this table. The contributory values are summed to provide the property value.

In litigation situations, having a cost approach to submit into evidence is particularly important. Because each approach is under attack, having this third approach helps validate the other two. It also shows that the appraiser has been conscientious in performing a complete appraisal.

There may also prove to be a more important function in litigation. In the United States, the mining company frequently does not own the surface at a mineral property, and

⁹ As a variant of the historic cost method, the *multiples of exploration expenditure* (MEE) method, also falls under the cost approach. This method, as described by Peter Onley (1994), “... is applicable to exploration properties from the earliest stage of exploration to a moderately advanced stage, but, for which no resources have been delineated.” For this method, a prospective enhancement multiplier (PEM) is applied, typically to the relevant and effective exploration expenditures on the property. The PEM factor is determined by a review of the enhancement to the prospectivity of the property by the exploration. Lawrence (1994) indicates that PEM would usually range between 0.5 and 3, but could be as low as zero or as high as 5.

often the mining company leases the mineral estate from the land owner. The land owner may be the federal or state government. In such situations it is very difficult for the mining company to demonstrate that it developed an interest of significant value in the real property, as a leasehold interest. A component cost approach could be used by the appraiser to support his opinion of the division of value between the land owner and mining company.

Income approach: Considerable discussion of the net-present-value (NPV) method, also commonly called the discounted-cash-flow (DCF) method, was presented above. In that discussion, it was illustrated that an *investment value* or *use value* is often the end result rather than the desired estimate of *market value*.

Within the income approach, a number of variants of NPV analysis can be applied. Some are discussed below. There are also a few other income-based valuation methods available that are commonly used by real-property appraisers. All methods within the income approach have their individual pros and cons, and all are subject to a high level of criticism. Despite their well-recognized individual problems, this author recommends that, when possible, a number of methods should be applied. Doing so will aid the appraiser in developing an understanding of the subject property within the context of the market.

The NPV method is in the category of value estimation methods called *yield capitalization*. In applying the NPV method to estimate mineral property value, most minerals industry practitioners use projected annual aftertax cash flows as the basis of their analysis. On the other hand, US real estate appraisers generally use annual net operating income as the amount to be discounted to present value. Some minerals appraisers, such as Paschall (1998, p. 6) do the same, especially those who have done work for government agencies or are state licensed. Net operating income (NOI) for this purpose is generally calculated as

$$\text{NOI} = (\text{net sales}) - (\text{operating income}) - (\text{capital costs}) \quad (1)$$

Generally not subtracted in calculating NOI are financing payments, income taxes and noncash deductions (depreciation, depletion and amortization). NOI is used because of the need to analyze sales on the same basis as the subject property. Less information needs to be obtained (or assumed) to calculate an NOI than to calculate after tax cash flows. It is also argued that assumptions on the financing and income taxes arrangements that the buyer brings to the subject property should not be made. Some argue that income taxes are levied against the owner and/or operator of the property, not against the property itself.

Most buyers of mineral properties, however, do their analyses of potential acquisitions on an aftertax cash flow basis. In evaluating the market, it can be helpful to attempt to analyze the subject property and sales from the buyer's perspective. Therefore, the author often uses both the NOI and aftertax cash flows as the basis for discounting to get a better understanding of the property.

Appraisal theory holds that the discount rate applied must reflect the market, and, if at all possible, it must be determined from the market.¹⁰ There is considerable controversy over how this should best be done. This controversy occurs among real property appraisers in general and appraisers of mineral properties in particular.

The American Society of Farm Managers and Rural Appraisers (ASFMRA) teaches its members that the discount rate should be abstracted from sales analysis, particularly for the appraisal of mineral deposits (ASFMRA, 1995, Ch. 13, p. 4; 1999, Ch. 10, p. 11). This was the method used by John Widdoss, Hall-Widdoss & Co., in a 1998 appraisal report for the US Forest Service, of Crown Butte's infamous New World gold property, Montana, near Yellowstone National Park. If suitable sales are not available for analysis for the subject commodity, one can consider using sales from another mineral commodity with similar economic characteristics, e.g., other construction rocks and other base metals. A floor on the discount rate may be derived from properties serving relatively stable markets. Needless to say, the results may have quite a distribution range, even when derived from sales involving just one commodity. In this case, analysis of the motivation and other factors of the each sale become particularly important. At the very least, the results provide a reality check relative to other discount rate data under consideration. This could be extremely important for support of one's selection if the appraisal is to be used to support expert testimony in a litigation situation.

Other sources of discount rates are numerous. Many are discussed by other authors in papers of the Valuation I session. The rate selected should reflect the market for the property on the effective date of the appraisal, rather than be an *investment* rate. As discussed earlier, this is most important in a bull or bear market for the subject commodity. The rate should also be appropriate for the NOI or cash flow being discounted, such as being a before or after tax discount rate, with or without inflation incorporated.

In litigation situations, the *capitalized royalty income method* is typically used by an appraisal expert for at least one side. This method is used to value the subject mineral deposit from the standpoint of an owner who is leasing to an operator (whether or not this be the case in reality). The projected royalty stream of income is discounted to a present value. The resultant present value is represented as being the value of the deposit, or at least the value of the owner's interest in the deposit.

The royalty-income method is based on the assumption that a royalty in the minerals industry is synonymous with rent in the real estate market. As part of the income approach for a "Complete Appraisal," USPAP requires the appraiser to, "analyze such comparable rental data as are available to estimate the market rental of the property" (USPAP, 1999, Standard Rule 1-4 (c)(i)). This implies that the appraiser of a mineral property must abstract an appropriate royalty rate and associated discount rate (or capitalization rate) from the market. This should then be used as a basis for valuation of the mineral estate as if leased fee, even if the property is owner-operated.

UASFLA (1992) also requires the same approach for appraisals of mineral properties performed for Federal agencies, such as in land acquisitions and eminent domain situations. It bases this on court case history. UASFLA states: "The income that may be capitalized is the royalty income, and not the income, or profit, generated by the business of mining and selling the mineral" (p. 24).

In this regard, the 1989 case decision in *Whitney Benefits, Inc. v. United States* is sometimes referenced by minerals appraisers as a benchmark situation in which the capitalized royalty income method lost to valuation by standard NPV

¹⁰ United States real estate appraisers often call the *discount rate* the *yield rate* (Appraisal Institute, 1996, p. 532).

¹¹ 18 US Claims Court 394-417 (1989)

based on projected net cash flows.¹¹ The case is the subject of Richard Bate's paper in the Valuation II session (Bate, 2000). The court awarded \$60 million plus interest for the inverse condemnation by regulatory taking of an undeveloped coal deposit in the Powder River Basin, Wyoming. However, before drawing strong conclusions, one needs to look at the presentation of the defense in the context of the property, and compare to other similar cases.

For example, in the 1983 case, *Foster v. United States*, the expert testimony on behalf of the government prevailed regarding the value of a taking by inverse condemnation of a dolomite deposit in California.¹² The court awarded \$28,000 to the plaintiff based on the value estimated by capitalized royalty income and sales comparison methods presented by the government's experts. The plaintiff's renowned minerals appraiser had appraised the value of the taking at more than \$5 million, based on NPV of projected annual NOI.

The author believes that the capitalized royalty income method, if correctly applied, can be used to aid in separating the value of various real property interests in a mineral property. The method relies heavily on appropriate estimation of the royalty income and selection of an appropriate discount rate. The discount rate applied to the royalty should usually be significantly lower than that applied to the NOI or cash flows generated by the operator. That is because the royalty holder is in a lower risk position than the mine operator.

In applying the capitalized royalty-income method, one needs to be clear in one's mind as to the particular real property interest being estimated here, in relation to the purpose of the appraisal assignment. The resulting present value is an estimate of the value of the interest in the mineral estate held by the royalty holder, this generally being the land owner. This is often presented as representing the market value of the mineral estate being appraised. There may be a very big difference between this value estimate and that developed from NPV of annual NOI or annual cash flows. Appraisers (for the government) may argue that the difference represents the *business value* developed in the (potential) operation of the property by the mining company. Business value is over and above the market value of real property and is not subject to *just compensation* in eminent domain takings.¹³ However, the mining company in the operator (lessee) position, may have developed a very substantial value in its *leasehold* interest in the real property, through exploration and development of the deposit. The appraiser may need to determine the division of the market value of the mineral estate between *leased fee* and *leasehold value*. An estimate of the *business value* developed on the property may also help in supporting one's case for the value of the leasehold. In this

¹² 2 US Claims Court 426-456 (1983).

¹³ Amendment XIV of the US Constitution states, "... nor shall any State deprive any person of life, liberty, or property, without due process of law ...". For eminent domain (condemnation) situations, the US Supreme Court interprets this to mean that property, but not business, is protected under the constitution. For example, assume that Pete operates a very successful restaurant, *Pete's Fantastic Steakhouse*, in a leased restaurant building. His monthly rent payment is typical for such a property in the area. The property is condemned under eminent domain for expansion of the adjacent Interstate highway. The court would award *just compensation* to Pete's landlord for the value of the land and the building. The court would not award compensation to Pete for any loss of business value suffered by *Pete's Fantastic Steakhouse* which operated as a business within the building. Pete may receive compensation for physical improvements he made to the building.

case of an operator lessee, the NPV of the annual NOI should equal the sum of the *leasehold value* plus the *business value*.

When the courts have rejected expert testimony on mineral estate market value by minerals industry practitioners based on NPV estimation, it appears to have been primarily for three reasons. First, the discount rate has not been adequately anchored into the market. Second, project risk has not been adequately factored into the calculation. Third, business value has not been shown to be excluded from the resulting estimate of real property market value.

The *bulk sale discount* method is also a method within the income approach. This has been promoted by Widdoss when teaching mineral property appraisal (ASFMRA, 1999, ch. 11, p. 19). Widdoss applied this method effectively in his appraisal of the New World gold property. The method benefits from its simplicity in conducting analysis of sales data. Widdoss describes this as "a miniature discounted cash flow with very few variables." It is determined by calculating the relationship of the potential "cumulative retail price" of the extracted reserves to their actual sale price in situ. The factor is determined from sales data, then the selected factor is applied to the reserves of the subject property. Application of the factor is based on the concept that, for properties of the same mineral commodity at the same stage of development, the factor should remain relatively constant within the one country, despite changes in selling price of the commodity. As with any such "rule-of-thumb" approach, caution is required in its application. The bulk discount factor is determined as follows:

$$\text{Bulk discount factor} = \frac{\text{product retail price} - \text{product in situ price}}{\text{product retail price}} \quad (2)$$

If the subject property has developed to a "full" or long-term production rate, with production projected to continue for many years, there is potential to apply some of the standard real estate appraisal ratios used for income producing properties. These *direct capitalization* ratios are derived from sales analysis of properties also at their full or long-term production rate, with production projected to continue for many years. Some appraisers also apply these ratios to construction material quarries and smaller mining properties for which a positive feasibility study has been completed. It appears to be mainly appraisers with a real estate appraisal background who apply these ratios to mines and quarries.

The most popular direct capitalization ratios follow. These are based on the relationships of the property sale price (SP) to annual gross income (GI) and annual net operating income (NOI).

$$\text{Gross income multiplier} = \text{SP} \div \text{GI} \quad (3)$$

$$\text{Net income multiplier} = \text{SP} \div \text{NOI} \quad (4)$$

$$\text{Overall rate (capitalization rate)} = \text{NOI} \div \text{SP} \quad (5)$$

The potential to use simple indicators of value such as these should not be ignored. Arguments against them can certainly be made based on their potential for inaccuracy. However, similar arguments can be made against all methods of estimating the value of mineral properties. The minerals appraiser's task is to develop an opinion of value based upon imperfect information. These ratios could aid the appraiser in developing his opinion of value, and also provide a "reality check" on other methods such as NPV, and provide support for his conclusion in his report.

When possible, the sales comparison approach and/or the cost approach should be used to support estimates developed

by the income approach. That will generally provide the user with a higher level of confidence, because estimates developed by the income approach are often viewed with some suspicion.

The courts accept the income approach into testimony with apparent reluctance. The methods can be difficult and time-consuming to explain. The UASFLA warns that presenting the income approach consumes a disproportionate amount of time, frequently to the detriment of sales evidence (UASFLA, 1992, p. 20). Eaton writes that the NPV method is so complex compared to other methods of analysis, that neither the attorneys nor the courts understand it (Eaton, 1995, p. 192). He goes on to state, “The courts have historically favored the sales-comparison approach to value, often to the exclusion of the cost and income-capitalization approaches, and preferred valuation opinions that can be supported by solid market data” (p. 193). The UASFLA provides the following extract from a 1982 court decision involving a sand and gravel deposit. The comment pertains to NPV based valuation.

*Great care must be taken, or such valuations can reach wonderland proportions. It is necessary to take into consideration manifold and varied factors like future supply and demand, economic conditions, estimates of mineral recoverability, the value of currency, changes in the marketplace, and technological advances. Many of these factors are impossible to predict with reasonable accuracy.*¹⁴ (UASFLA, 1992, p. 24)

Appraisal report content

The following summarizes the main components and requirements that relate to a mineral property appraisal report as specified by USPAP (real property Standards 1 and 2), VALMIN, and IVS (primarily Standard 1). The specifying standards are in parentheses.

- Identify the client and intended users by name or type (USPAP).
- State the intended use of the appraisal (USPAP, IVS).
- Specify the property and the interest in the property being appraised (USPAP, IVS).
- State the purpose of the appraisal, including defining the value being appraised (USPAP, VALMIN, IVS).
- Specify whether the appraisal is Complete or Limited, and whether the report is Self-Contained or a Summary (USPAP).
- If defining market value, include an estimate of exposure time to market prior to the effective date of appraisal (USPAP; in IVS the need for consideration only is specified).
- State the effective date (date of value) of the appraisal (USPAP, VALMIN, IVS).
- State the date of the report (USPAP, IVS).
- Describe the property, including relevant physical and economic and legal characteristics (USPAP, VALMIN; for IVS includes only “clearly describe the property”).
- Include sufficient maps, plans, and other graphic information to illustrate the location, geology and pertinent features (VALMIN).
- Report all mineralization, resources and reserves, in accordance with reserve-resource reporting Code (VALMIN).
- Report on the availability, obstacles and costs of obtaining services and infrastructure (VALMIN; also USPAP in a broader statement).
- Report on environmental, land access and rehabilitation issues (VALMIN; also USPAP in a broader statement).
- Report on any special employee relation or work practice factors (VALMIN).
- State that the Commissioning Entity has certified in writing to its full disclosure of relevant information (VALMIN).
- Clearly and accurately set forth the appraisal in a manner which is not misleading (USPAP, VALMIN, IVS).
- Provide sufficient information to enable the intended users of the appraisal to understand the report properly (USPAP, VALMIN, IVS).
- Consider all three approaches to value, sales comparison, cost, and income (USPAP).
- State the reasons for selecting each valuation methodology used (VALMIN, IVS).
- When relied upon, provide actual and forecast capital and operating costs, and rates of escalation and currency exchange (VALMIN).
- Properly account for the amount and timing of any taxes and royalties (VALMIN).
- Specify any timing or other risks involved in the project (VALMIN).
- Reconcile the proposed production rate and product quality with the market (VALMIN).
- Disclose and clearly describe any extraordinary assumption, hypothetical condition, or limiting condition that directly affects the appraisal (USPAP, IVS).
- Describe the scope of work used to develop the appraisal (USPAP, IVS).
- List all sources of information (VALMIN).
- Specify any restrictions that time or cost placed on investigations (VALMIN).
- Describe steps taken by the appraiser to compensate for any lack of knowledge and/or experience (USPAP).
- Describe the information analyzed, procedures followed, and reasoning used in developing the opinion of value (USPAP, VALMIN; not as specific in IVS).
- Summarize the reconciliation of the approaches used in estimating value (USPAP; for VALMIN comment only required on differences).
- If a premium is determined above investment/technical value, state how determined (VALMIN).
- When appropriate, determine a range of values and provide a sensitivity analysis (VALMIN).
- Describe and support the appraiser’s opinion of highest and best use (USPAP, IVS).
- Specify whether a personal inspection was made of the property (USPAP, VALMIN; personal inspection not specified in IVS).
- If an inspection was not made, specify why not (VALMIN).
- Include a concise summary of the report (VALMIN).
- Include a signed certification by the appraiser as to his independence and lack of bias in developing and reporting his opinion (USPAP, VALMIN, IVS).
- State whether the appraiser is a member of a recognized professional body with an enforceable code of ethics (VALMIN).

From the above, it can be seen that USPAP and VALMIN are the more comprehensive of the three standards in specifying

¹⁴ United States v. 47.14 Acres of Land, 8th Cir. 1982, p. 726

ing items required for the development of a mineral property appraisal report. Because VALMIN was specifically developed for minerals, it addresses many items specifically, which are addressed only in generalities, if at all, in the other two. USPAP provides a more-structured approach than VALMIN to the development of the overall appraisal process and the associated report, while VALMIN is more directed at the individual items that must be addressed. USPAP and IVS address the three approaches to value, and highest and best use, while VALMIN does not.

A complexity in VALMIN is that it blends the valuation of properties (assets) with the valuation of securities. USPAP splits such valuations out into a separate set of business appraisal standards (Standards 9 and 10). IVS provides some business valuation standards in a separate section (APG 1), which are designed to supplement those for property.

Many items that one must address when applying VALMIN to a property under development or operating will lead the appraisal to a valuation of the property in its current business use. Those items relate to the operation of the mine and income generated by it. The result will be that the business value of the operation within the property will be counted with the value of the real property. For an operating mine, the resultant appraised value is termed *going concern value* [IVSC, 1997, p. IVS 2-5, APG 1-1 - 1-3; USPAP, 1999, Standards Rule 9-2(b)(ii)(2)]. *Going concern value* is defined as:

The value created by a proven property operation; considered as a separate entity to be valued with a specific business establishment; also called "going value" (Appraisal Institute, 1993, p. 160).

In the United States, as discussed above, the courts have distinguished between the value of the property and the value of the business operating in the property. The author provides further discussion comparing the requirements of USPAP with VALMIN in his paper for presentation in the Valuation II session of the 2000 SME Annual Meeting (Ellis, 2000).

Conclusions

In developing an appraisal report of market value for a mineral property, there is much more that needs to be done than presenting a report of net present value wrapped in a property description. The net present value developed by minerals industry practitioners is generally an investment value or use value. This can be substantially different from market value.

Analysis of sales data should be used as much as possible to aid the appraiser in formulating an opinion of market value. Results derived from sales data analysis are the best evidence of market value.

The real property appraisal standards of the Uniform Standards of Professional Appraisal Practice (USPAP), provide functional standards to guide the development of a complete and defensible, independent appraisal. USPAP should be followed for mineral property appraisals in the United States because it is the nationally accepted set of appraisal standards. The International Valuation Standards (IVS) of the International Valuation Standards Committee is a less rigorous set of standards, but it is still a useful set of requirements to follow, with very similar focus and intent.

USPAP requires that the appraiser develop an opinion of highest and best use of the property. It also requires that the three approaches to value be considered, these being the sales comparison, cost and income approaches. If the appraisal is to

be used in litigation in the United States, it is essential to follow these requirements for the appraisal to be defensible. The courts generally consider a value estimate developed by the sales comparison approach to be the most reliable estimate of market value.

A broader range of analysis can be conducted under the sales comparison approach and cost approach than generally perceived by appraisers. Application of the cost approach is best based on the concept of contributory value, which has use in valuing a mineral deposit, not just buildings.

Ways to cast a broader net to obtain more property sales for analysis have been suggested. Methods of analysis utilizing sales data to support all three approaches to value have also been suggested.

The Australasian VALMIN Code does not require addressing highest and best use. Nor does it require that the three approaches to value be considered. It describes many items that it requires be addressed that are specific to mineral properties and mineral securities. Following these will provide a useful guideline for United States and other minerals appraisers. However, some items required under VALMIN are relevant to business valuation and not real property valuation. Inclusion of those in a market value appraisal of a mineral property as real property, would violate the USPAP and IVS standards for real property appraisals.

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