An Overview of Mineral Property Appraising

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Introduction

This article provides an overview of the appraisal process in relation to mineral properties and mining operations or businesses. Appraisals of mineral property or mining businesses are expressions of judgment predicated on knowledge and experience which rely on the same basic approaches, methods, and procedures as conventional real estate. Most articles concerning mineral property values presume that some form of investment value is the only value that can be, or needs to be, estimated and concern themselves with the minutiae of estimating some level of net operating income and determining its resultant present worth by using some conveniently available discount rate. What these articles tend to ignore are the far more important steps in the appraisal process that precede this rather straight forward calculation. This article intends to draw some attention to, and hopefully discussion of, these earlier steps of the appraisal process that form the foundation for the final value estimate.

This article will also attempt to draw analogies between appraising mineral properties and mining business to the appraisal of more conventional real estate properties and businesses in order to show that the basic concepts, approaches, methods, and procedures are the same. The primary differences being the types of data that are relevant and the different competencies that are required by appraisers in this discipline. Decisions made in the course of a mineral property appraisal remain a matter of professional judgment based on knowledge, experience and industry practice.

The relative importance of any geologic, engineering, or economic criteria used in making a mineral property appraisal will vary with the particular property, the purpose and intended use of the appraisal and the legal and economic conditions existing at the time of the appraisal. When mineral property information is publicly reported, it should be understandable to an intelligent layman so that he or she can make a reasonable and balanced assessment of the significance of this information. The information contained in an appraisal report should be comprehensible to those who have a reasonable understanding of the business and economic activities associated with mining properties and of the various types of ownership and are willing to study the information with reasonable diligence.

What is a Mineral Property

Because minerals are naturally occurring chemical elements or compounds which are the basic building blocks of rocks and soils, all land is mineral property by definition. A more appropriate and intuitively simple definition of a mineral property is a parcel of land which is more valuable for what it contains than for what can be constructed upon it. The mineral substance contained in the land that makes the property valuable may be the rock itself, as in crushed stone, dimension stone or limestone for cement, or its erosion products, as in the case of sand and gravel, placer gold or heavy mineral deposits. The substance of value may also be some element or mineral that comprises a relatively small part of the enclosing material such as copper, gold or diamonds which may only occur in some small percentage or parts per million in comparison to the total rock mass.

One commonly used operational definition of a mineral property that is not quite so demanding as highest and best use is that of land that is mineral-in-character. To be considered as land that is mineral-in-character, requires that the land contain mineralization which would cause a prudent person to expend further time and money on the development of the property's mineral potential. Facts that will support a mineral-in-character determination may not be sufficient to support the actual presence of a valuable mineral deposit because a determination that the land is mineral-in-character can be based entirely upon geologic inference or other observable surface conditions upon which a prudent and experienced person would rely. The mineral-in-character concept allows a tract of land to be deemed mineral-in-character even though it contains no actual exposure of valuable mineral. If the known geologic conditions are such as to engender the belief that the land contains a mineral deposit of such quantity and quality as would render its extraction profitable and justify expenditures to that end, the land is mineral-in-character (1). This definition is most applicable to properties that are not yet fully explored, developed, nor in actual production.

An operational definition for the concept of a valuable mineral deposit requires the actual exposure, on the surface or underground, of a mass of rock that, either in itself or its contained minerals, occurs in such quantity with such physical and/or chemical quality that an actual quantitatively derived physically identifiable resource can be determined. In addition, this definition requires that this physically identifiable resource contain sufficient mineralized material that there is a demonstrable and reasonable probability, as a present fact, that the rock or mineral can be extracted, processed and marketed at a profit. A valuable mineral deposit cannot be based on mere speculation that at some time in the future some social, economic or legal change or untested technological advance will render the mineral deposit valuable (1, 2, 3).

The application of highest and best use analysis is a more exacting test of the viability of the property as a mine in that it must now not just be profitable but must be more profitable than other competing uses (4, 5). The planned mining operation must be physically possible, which means that a sufficient quantity of specified quality of contained rock or other valuable mineral must be present, not just suspected to exist, and it must be able to be extracted from the property and processed into a saleable product. It must also be legally permissible to conduct mining and mineral processing on the land. A mineral right, in and of itself, does not necessarily confer upon the owner, or lessee, a full legal right to extract the rock or mineral. A mining and processing operation is basically a zoning decision, and many permits are usually required prior to the commencement of actual mining.

In order to meet the financially feasible part of highest and best use the owner, or lessee, must demonstrate a capability to arrange financing for the rather large capital investment required to develop and operate the mineral property. Lenders for mineral property development are often few and far between. In rural areas, a mineral property may have little difficulty meeting a test of maximally productive use of the land unless there are questions concerning environmental esthetics and/or other environmental mitigation measures. In urban and suburban areas a test of maximum productivity could become problematical as a result of the assumptions and limiting conditions that were used in the analysis.

A relatively common misconception among conventional real estate appraisers when attempting to perform a minerals appraisal is that a mineral deposit adds an increment of value to a tract of land and that the total property value is simply the sum of this increment of value added to whatever other value had been estimated. In a case where a given tract of land can fully support two contemporaneous legal uses and the mineral rights are owned by the same entity that owns the surface rights this assumption may be partially correct.

An open pit mine will preclude any other contemporaneous use of the land. In an underground mining situation, the location of the hoisting, processing and storage facilities, or the topographic relief of the land itself, will limit any other contemporaneous land uses. The terms and conditions contained in the mining lease may also prohibit any other uses.

Mineral Properties are Income Producing, Limited Market, Location Specific Properties

An income-producing property is one for which the primary purpose of ownership is the production of income from the real estate and the real property rights associated with the real estate. A location-specific property is income-producing real estate which cannot be relocated because its production of income is directly tied to specific physical conditions of the land and/or for which site-specific licenses, permits, regulatory, and legal approvals are required. A limited-market property is one that would be expected to have relatively few potential buyers at a particular point in time. Because of the presence of mineable and marketable quantities of minerals, the segment of buyers potentially interested in purchasing the typical mineral property would be limited to those who primarily engage in investment and/or operation of mineral properties.

Mineral Resources and Reserves

For the purposes of mineral property appraisal, a mineral *resource* is properly considered to be the physical quantity of mineral material of a certain level of quality contained in the ground without consideration of its physical extractability, costs of production or quantity and price for which the mineral can be sold (3). A mineral *reserve* is the proper term to use when describing that portion of a resource that is also capable of being legally and physically extracted, and processed, recovered, transported and sold at a profit (2, 3). It should be noted that both resources and reserves are estimates based on geologic, engineering and/or economic assumptions and are therefore subject to error. The mineral reserve is the essence and lifeblood of a mining operation.

It would not be unusual for a minerals appraiser to be confronted with different definitions of resources and reserves in various jurisdictions depending upon the purpose and intended use of the appraisal. The SEC does not recognize the term ‘resource’ and only allows the use of the term ‘reserve’ for mining companies that come under its jurisdiction (2). The Society of Mining Engineers (SME) is the main technical body concerned with mining in the United States and it recognizes the term resource (3). Because the Uniform Standards of Professional Appraisal Practice (USPAP) is mainly concerned with conventional real estate it is silent as to the use of either term but, its prohibition against misleading appraisals would at least require an appraiser to carefully and fully define any specialized terminology such as ‘resource’ or ‘reserve’ (6). The distinction between *resources* and *reserves* is very important in a minerals

appraisal related to obtaining financing, to the federal mineral land validity examination process and in eminent domain or condemnation actions.

Many mineral property operators have not actually conducted a thorough geological examination and have not taken the necessary steps to adequately test the property and properly estimate a mineral reserve. Some authors suggest that reserves of construction materials can be determined simply by performing a volumetric calculation using an appropriate density factor (7, 8). Rock quality factors and chemical composition have been known to change suddenly and unexpectedly and with increasing quality standards being demanded by mineral product buyers this situation can suddenly cause a mineral property operator to lose the market for that product. Without an adequately defined mineral reserve, in terms of quantity and quality, it is not possible to estimate the life of the mine. The minerals appraiser should only use a reserve estimation for which sufficient and reliable data exist. This is the only way which allows the value conclusions to be logically derived and fully supported from the available information.

If the minerals appraiser is also properly trained in the geological and mining sciences, he or she may be able to assist the property owner or mining operator in estimating a mineral reserve that meets the necessary requirements for the purpose and intended use of the minerals appraisal. Many times this mineral reserve estimation can be performed by collecting and examining data that was gathered by other mining companies that previously owned or leased the property and by carefully examining any records of historical production that occurred on the property. Sometimes the state geological survey or minerals department may be of assistance due their collections of basic geologic and production data.

A mineral resource is further qualified by the terms, measured, indicated and inferred. These qualifiers are used only to reflect the level of geologic confidence in the resource estimate. A mineral reserve can be further qualified by the terms, proven, probable and possible which reflect on the level of engineering, economic and legal confidence in addition to the geologic confidence. The term economic implies that profitable extraction, processing and sales, under defined and documented economic assumptions, has been established or analytically demonstrated. The assumptions used in the estimation of a mineral reserve must be reasonable, including any assumptions concerning the prices and costs that will prevail during the life of the project (3). While USPAP may be silent as to any definite requirements for appraising mineral properties, Standards Rule 1-4 appears to require the mineral appraiser to exercise the requisite amount of care and diligence when preparing and using resource or reserve statements in appraisals (6). USPAP Statement 2 requires an appraiser to clearly state the assumptions on which a discounted cash flow analysis is based and to set forth the relevant data used in the analysis. No minerals appraiser should simply take the property owner’s or mining operator’s word for the amount of resource or reserve without, at the very least, verifying that the requisite type and quality of work was performed to provide a reasonable basis for accepting the resulting mineral reserve estimates.

Categories of Mineral Properties

Mineral properties can be separated into various categories depending on the use to made of this categorization. The categories range from a simple division into metals and nonmetals

through those that rely solely upon a mineral deposit's mode of geologic occurrence and structure to the type of mining operation or the market for the mineral product. A convenient categorization for mineral appraisal purposes may be one that relies more on the mineral product uses or markets than on other physical or operational characteristics since these uses and markets play such a large role in the overall economics of the extractive industries.

An additional type of categorization of mineral properties of interest to minerals appraisers is concerned with the level of development of the property. A mineral property may pass through seven levels of development during its life: prospecting, exploration, resource definition, reserve estimation, development, production, and reclamation. Two significant differences between mineral properties and conventional real estate are that the location of a mineral deposit is beyond man's control and that the mineral reserve is finite in quantity and will become exhausted (depleted) as it is mined. A mineral deposit must be mined where it is discovered while a building site may be selected after analyzing the availability and utility of various parcels along with appropriate demographic, transportation and economic studies. Only after a mineral resource has been defined can the economic feasibility study commence. The mining feasibility study is the process that determines whether or not there is simply an interesting but uneconomic occurrence of minerals or if there is a reasonable probability that a profitable mining operation can be conducted on the property. It is not unusual for the prospecting through commencement of production stages to require upwards of ten years with over one hundred million dollars of investment prior to the first sale of a mineral product.

Prospecting and exploration are very speculative activities which serve to separate lands that are mineral-in-character from those that are not. Existing research indicates that the prospecting stage may show that only one in one thousand properties that appear to have the potential to be mineral-in-character has sufficient geologic evidence to justify a detailed exploration stage. This research also indicates that about one in one hundred properties that are explored will actually contain a mineral reserve (9). The resource definition and reserve determination stages are the make-or-break stage of a potential mine. If the operator cannot find a large enough resource of sufficient physical and/or chemical quality the property will be rejected. If an adequate reserve can be determined to exist on the property, the development stage will begin. Development is the process of sufficiently exposing the mineralization to allow extraction by open pit (quarry), underground or solution mining techniques and the construction of all necessary improvements to the property to facilitate access, processing, maintenance and administration. While the property improvements that are constructed or installed in the development phase of a mineral property are of a different kind than found in the development of a subdivision, industrial park or shopping center they serve the same purpose; to convert the property from raw land to an income producing property.

The production stage of a mineral property is the time period from commencement of mining to depletion of reserves or other reason for shutdown. This is the time frame in which the mining operator actually has an income stream and hopes to be able to recover all the previous expenses in addition to earning an adequate return on his investment. Existing research has indicated that one-quarter to one-third of mines that commenced production were forced to shut down prior to reserve depletion due to economic, managerial or political reasons (9). From the

minerals appraiser's point of view the final stage of a mineral property is that of reclamation and reuse in some other activity. When mineral resource development, production and mining are properly conducted mining is as temporary a land use as other more conventional real estate activities (10).

Mineral Rights and Mining Leases

A mineral right is only one of the rights contained in the bundle of rights that comprise fee simple ownership. The mineral right is normally severable from the other rights and it is normally presumed, if not contractually defined, that the owner of the mineral right also has rights of ingress, egress and extraction, processing and storage. It is also commonly assumed that all minerals belong to the mineral rights holder and that the surface estate retains no mineral rights but, this distinction may depend upon the legal jurisdiction that the property is located in or upon some other legal, regulatory or administrative rule that is further dependent upon the mineral in question or the type of mining method used to extract it. A mineral right can be further defined to include only specific minerals, or kinds of minerals, as well as specific depths or geologic formations.

Many mineral properties are commonly operated by someone other than the owner of the land containing the mineral deposit under some form of mining lease. Mining leases are common between private parties as well as between governmental agencies and private parties. In the western United States, a possessory interest in the land and its contained minerals can be obtained by meeting the federal and state requirements under the 1872 Mining Law and its revisions for staking a claim on a class of minerals known as locatable.

In most respects a mining lease is very much like any other kind of lease in that it details the rights and responsibilities of the parties. A mining lease is different from other leases in respect to the method of payment by the lessee to the lessor for the right to mine. Many older mining leases do not contain any provision for payment for what would be considered ground rent. More modern mining leases do contain a clause requiring a ground rent. Instead, the payments for the right to mine are referred to as a royalty, or some other form of mineral interest in the actual production or sale of mineral product from the property. Mining leases have been constructed with provisions for annual, quarterly or monthly payments and with payment based on production or sales. A royalty is generally considered to be payable on a defined gross revenue, or net smelter return, basis while a mineral interest is generally some form of profit-sharing that is based on some defined net income value. Whether the payments are royalties or mineral interests the details of their determination should be contained within the body of the lease.

Some mining leases contain provisions for payment of advance royalties which are payments to the lessor that occur prior to the production and sale of mineral product. Advance royalties are typically recoverable by the lessee once production and sales have commenced. A mining lease may or may not contain a minimum annual payment which is required to be made whether or not any production or sales have occurred. Minimum annual payments are typically not recoverable by the lessee. Mining leases may or may not allow the lessor to participate in any hedging, futures or forward sales that the operator may engage in order to protect or enhance his

selling price. Some mining leases may contain provisions for the lessor to receive the royalty or mineral interest payment as payment-in-kind, which is some amount of the actual production from the mineral deposit.

Mineral Product and Mineral Property Markets

Both the mineral property and mineral product markets are characterized by a relatively small number of transactions generally occurring between highly specialized and sophisticated buyers and sellers. Both of these markets may also be characterized by their geographical extent, which ranges from local for most construction materials through regional and global markets for the majority of the metals, fuels and industrial minerals.

Many sales of mineral concentrates and smelted or refined mineral products are intracompany sales at transfer, or allocated, prices. Intercompany sales of mineral products are usually handled by contracts that contain negotiated prices, quantities and levels of quality. Gold and diamond transactions often occur within a regime of administered prices controlled by marketing associations or monopolies. Existing research would tend to support the idea that very few, if any, mineral products are actually traded in a market that approaches the requirements of an open, competitive and efficient market (active, free and open).

In comparison to more conventional real estate markets, mineral properties are seldom bought and sold and have fewer changes in lessor-lessee relationships. The primary reason for this lower level of transactions is the overall relative scarcity of all types of mineral properties and the relatively long time frames and large capital investments that are required to bring a new property into production. Another concern for the minerals appraiser is whether or not any of the known mineral property sales or lease changes actually occurred under arms-length conditions.

Appraisal Process and Approaches to Value

The appraisal of mineral properties follows the same basic appraisal process described in appraisal text books and in USPAP and individual engagements may require specialized sections that document the details of the mineral specific items of regional and local geology; mineral deposit geologic controls; mineral resource and/or reserve; mining methods and costs, and; specific characteristics of the mineral product market (4, 5). Since the 1 July 1994 changes to USPAP concerning the concepts of complete and limited appraisals and self-contained, summary and restricted reports, the minerals appraiser may be unable to truly meet the requirements of a complete appraisal and a self-contained report within any reasonable time and money constraints (6).

The planning step of the appraisal process may assume more importance in minerals appraisals than in conventional real estate appraisals simply due to the diversity and quantity of information that is normally required for credible minerals appraisals. The purpose and intended use of the minerals appraisal will serve to establish the minimum set of data that will be required. The level of analysis and its supporting documentation and explanation may require considerable discussion with the client and other intended users of the minerals appraisal in order to ensure that the conclusions, as well as the reasoning that supports them, are truly understandable to individuals that may not be familiar with some of the peculiarities of specific mineral properties.

An exact definition of the value being sought is very important, due to the often complex forms of ownership of the property, type of business structure of the operator and the mineral products. Seldom is the Financial Institutions Reform Recovery and Enforcement Act (FIRREA) definition of market value (11) valid in the appraisal of mineral property because of its hypothetical market conditions, its implicit assumption of a consummated sale, and the tacit assumption that the total property can be treated as a single integrated unit. More common definitions of value are often based on fair market value concepts of judicial and tax authorities or the concept of value-in-use as part of an assemblage of assets which, on the effective date of valuation, may or may not be producing income (11). Many minerals appraisals may not involve an actual, or even contemplated, sale of the property under appraisal.

The so-called traditional three approaches to value are useful in a minerals appraisal but, it would have more to do with coincidence than reconciliation if these interdependent methods tended to produce similar value estimations.

Cost Approach

The cost approach to value does appear to have limited applicability to mineral properties that are still in the prospecting or exploration stages, or the early phases of resource definition. There is a limited amount of research that suggests that buyers or lessee's of mineral properties in these early stages of development are willing to consider the seller's or lessor's costs of relevant prospecting, exploration and resource definition as well as permitting and holding costs when purchasing or leasing mineral properties (12). The structure of most mineral property transactions does not usually consist of a single cash down payment and a mortgage, but is structured such that these relevant property holding and development costs become a one-time payment with the remainder of any negotiated final price to be paid as a production royalty or some other form of mineral interest or shares of stock in the operating mining company. Many purchases involving a production royalty or other mineral interest do not include a final price for the mineral property. In these cases a total price cannot be reliably known beforehand and will only be known when mining has ceased or the royalty or mineral interest holder has been bought out at some later date.

The cost approach to value is not applicable to the valuation of mineral containing land because the main contributor to value of such a property is the natural occurrence of a geologically controlled mineral substance or rock. The geographic location and type of rocks, or any valuable constituents they may contain, are beyond the control of man, and these naturally occurring properties cannot be reproduced nor replaced by the actions of man.

The costs associated with the exploration for and development of a valuable rock or mineral deposit may be quite substantial but usually bear little, if any, relationship to the actual value of a deposit. Exploration work is done in order to discover the location, physical and chemical properties of the deposit, and the quantity of reserves the deposit contains. The value of a given deposit is not a function of a low discovery cost due to a serendipitous find nor to a high discovery cost resulting from an intensive exploration program. Development work is done to render the valuable minerals or the entire rock itself available for extraction and further

processing. The development costs associated with a surface, or open pit, mine are typically much lower than development costs associated with an equivalent size underground operation, but these costs are not what makes the deposit valuable.

The value of a given mineral property is dependent upon the mineral products it is capable of producing and by what the marketplace will pay for those mineral products. The sales price of the mineral commodity is the basis for recovering the capitalized exploration and development costs, the operating costs associated with its removal from the earth, any further processing that may be required, any selling and transportation costs required to get it to the customer as well as required reclamation costs. While development costs may be carried in the company accounts as the book value of the mineral deposit, it should be understood that this value is not the same value that an owner could obtain by selling the deposit (3).

It should be obvious from this brief discussion that the value of a mineral deposit must materially exceed the discovery and development costs if the mineral deposit is to be considered profitable. Because the discovery and development costs usually bear no relationship to mineral property value the cost approach is an inappropriate method to use for estimating the value of a known mineral deposit. The cost approach is typically only applicable for estimating the depreciated replacement cost new value of the real, trade and/or personal property improvements contained on the subject mineral property and without a mineral reserve, this value will usually be some level of liquidation value.

Sales Comparison Approach

The sales comparison approach usually constitutes the most reliable indicator of value for any type of property, providing the transactions satisfy all of the requirements noted in USPAP and that the marketplace in which the sales occur meets a minimum set of economic and information conditions in order to qualify as an active open, competitive and efficient market.

Each and every mineral deposit of a given commodity is a truly unique occurrence in relation to its particular geological controls, its inherent physical and chemical properties, the quantity of valuable mineral or rock that it contains, its applicable extraction and processing methods, and its geographic location with respect to the markets for its products. In order to utilize the sales comparison approach to value, the sales of properties being compared must take place in a relatively large and active market in which there is a relatively constant level of actual arms-length sales transactions which occur in comparable time frames and economic conditions. The mineral properties being bought and sold in this market place also must have an abundance of directly comparable qualities for which relatively simple adjustments can be made in order to take minor property differences into account.

There is no active open or brokered marketplace for mineral properties of any kind anywhere in the world. The reason for this is that each and every mineral property is a very specialized property that has very few fungible (substitution and replacement) and truly comparable characteristics beyond the fact that it is naturally occurring and contains a specific mineral commodity. What market does exist is a direct market, which is characterized by individual buyers and sellers with very specialized mineral property interests and mineral product

requirements, that limits their search for acceptable transactions to a very limited number of potential properties.

For the reasons outlined in this brief discussion it can be seen that the sales comparison approach to value is generally an inapplicable method to use in estimating the value of a property that is primarily valuable because of what it contains rather than what it can be used for.

Income Approach

The income approach to value is the procedure in the appraisal process which converts anticipated future benefits (net operating income) to be derived from the ownership of property into a value estimate. This approach is predicated on the assumption that value is typically viewed and measured as the present worth of anticipated future income forecast to be derived from the possession of ownership rights in real property. The income approach is the primary method used in the mineral industry to estimate value because rational mining operators only engage in mining in anticipation of receiving income.

The income approach for mineral property valuation is conceptually similar to that of conventional real estate valuation. A simplified and generalized income approach for conventional real estate begins with an estimation of the annual projected gross income from the property. Effective gross income is then estimated by subtracting a vacancy and collection loss from potential gross income. Net operating income is estimated by subtracting current operating expenses and replacement reserves from effective gross income. The annual net operating income is appropriately discounted and added to any discounted reversion value to obtain the appraised value of the property (13, 14).

In the income approach to the appraisal of a mineral property the first step is to determine the general supply and demand conditions of the market for the mineral product to be produced. The second step is to estimate the quantity and quality of mineral reserves available to be extracted, processed and sold.

Only after the quantity and quality of mineral reserves have been estimated and the reasonably probable rate of production that the market can absorb from these reserves has been determined, can the reasonably probable expected gross income estimate be calculated. The annual gross income which the subject mineral property can reasonably be expected to produce can be estimated through an analysis of the quantities of different mineral products that can be produced and sold from the subject mineral property and the general market or negotiated contract prices that can be obtained for these mineral products.

As was previously indicated market prices may not exist for the mineral(s) in question because all sales are by negotiated contract or there is only a single buyer for the mineral product, as in coal mine mouth electric generating facilities or intracompany sales. If this is the case, the proper value to use is typically the contract price. A distinction must be made between a value that represents a fact and a value that reflects a future estimate (4). To use any other price would be contrary to fact and make the appraisal hypothetical as opposed to the reality of the situation.

If there is a reasonably probable chance that the existing contractual relationship may change, the minerals appraiser should analyze what the probable effects on quantity and pricing would be.

In the case of mineral properties that are capable of producing more than one mineral product, coproducts or byproducts, the revenues and costs associated with each product should be used, instead of an average product quantity and price, because it would be unwise to assume that each product has the same economics and markets. In some cases the royalties, or other mineral interests, may be based on the actual units of each mineral product produced and its associated revenues and costs. This method of accounting for different mineral products also allows the minerals appraiser to better understand the contribution to net operating income and the individual mining and marketing risks that are provided by each mineral product. Some authors suggest using an average price or revenue per unit of sales in order to simplify the calculations (8). Since the mine does not produce and sell an average mineral product it would be contrary to fact to value it as such and an otherwise good appraisal would become hypothetical and could lose credibility.

The fifth step in the income approach to mineral property appraisal is to establish realistic estimates of the direct extraction, processing and sales expenses that will be associated with the anticipated levels of mineral product sales. If sufficient and reliable data are available these estimated expenses can be compared to other mineral properties that are producing comparable mineral products under comparable operating and market conditions. Normally there are also certain indirect costs associated with the operation of a mineral property known as general and administrative expenses. If these indirect costs have simply been allocated to a particular mineral property they must be examined for their appropriateness.

The net income which the subject property can reasonably be expected to produce is estimated by subtracting the estimated direct and indirect operating expenses and, if applicable, any royalty or mineral interest payments from the estimated gross income. The definition of the proper net income to use is predicated on the definition of value being sought and the purpose and intended use of the appraisal. A mineral property, just like any other type of real property, has a multiplicity of values associated with it that can be very different from each other.

The generally accepted method of working with noncash costs in a mineral property appraisal is the same as in conventional income property appraisal. One exception that occurs is with the accounting cost of depletion. Depletion is a tax deduction that is allowed to be taken by mineral property owners due to the exhaustibility of their primary source of income - the mineral reserve. At this time the Internal Revenue Service (IRS) recognizes two types of depletion allowance calculations: cost or unit depletion and statutory or percentage depletion. The income tax paying entity normally calculates both types and should use the larger of the two for income tax purposes (10). Income tax depletion, however, is no more an operating cost than is income tax depreciation. They are both cost recovery mechanisms of the tax code.

The cost or unit depletion method involves prorating the amount capitalized into the depletion account against the number of production units in the mineral reserve. The computation is analogous to unit-of-production depreciation schedules. The amount capitalized into the

depletion account is the depletion basis and is comprised of acquisition costs and associated fees plus any exploration expenses that were capitalized instead of expensed. Statutory or percentage depletion is determined by selecting the smaller of the product of the depletion rate for the mineral(s) being produced times the gross income from mining or 50% of pretax net income calculated without a depletion deduction. The taxpayer then uses the larger of cost or percentage depletion on the tax return. Depletion is available to any taxpayer who has an economic interest in a mineral property covered by the depletion legislation. This income tax provision allows mineral property lessors to claim depletion on royalty income from mineral production (10).

The Components of Generic Mineral Property Annual Cash Flow are shown in an accompanying. The generalized mineral property operating incomes shown in this table may have to be modified in accordance with jurisdictional definitions of value for taxation or legal purposes or due to special requirements of lenders, investors or the client. The purpose and intended use of the minerals appraisal will usually make clear which of the mineral property income values shown in the table is the appropriate one to capitalize for the value being sought.

The holding period in a mineral property appraisal is usually the estimated life of the mine and it can be calculated by dividing the mineral reserve by the anticipated annual production rate. Few mines seem to have realistic operating lives that extend beyond twenty years and the present value of cash flows beyond this time frame are not usually significant to the value conclusion. Many mines stop operating solely due to exhaustion of the mineral reserve. Many mines also cease operating because they develop physical operating problems that increase costs to a level higher than prevailing mineral product prices or because mineral product prices fall below a breakeven level. Other mines may be caused to shut down because they may be located too near urban or environmentally sensitive areas. Urban expansion may be a more common cause for the lack of development of construction materials properties than depletion of the mineral reserve (16). These types of problems can seldom be foreseen and therefore the purpose and intended use of the appraisal should provide the minerals appraiser with guidance in the selection of an appropriate holding period.

Many conventional real estate investors acquire a commercial building as a property that they intend to upgrade, hold for a certain period of time and then sell at an appreciated price. The resulting reversion value may make up the bulk of both the return on and return of the initial investment. Most mineral property owners or operators do not engage in exploration, development and mining for this purpose. They intend to operate the property as a mine and receive their returns solely out of the resulting operating cash flows. Many mineral properties essentially have no, or a very low, reversion value due to their distance from any population center or the inability of the operator to foresee any reasonable post-mining use and to reclaim in a manner that will facilitate this use. The time frame from initial discovery of a valuable mineral deposit to depleted mineral reserves may easily extend beyond twenty years which may also cause any reversion value to be incidental to the operating value.

Some forward-looking mining companies operate their mines in a manner that will conform with a specific post-mining use that can have a significant reversion value, depending on when the minerals appraisal is performed. Some mineral properties are also being looked at as

potential underground property storage sites or as potential municipal waste facilities at the completion of mining. If the property could be sold to another owner, or put to a post mining use by the same owner, a value that could be reasonably estimated from these business activities could provide a materially significant reversion value. The mineral right would need to be examined in order to determine who is the owner of the space formerly occupied by the minerals.

The financial activities of the mineral property operator can also create interesting appraisal problems when the operator is engaged in hedging, futures, forward sales and commodity loan activities. For some appraisal purposes these activities may be more properly examined as enterprise revenues and expenses that are returns to management rather than to the property. Commodity loans and forward sales, however, may require production and sales from the subject mineral property and in this case they would more properly be considered a return to the property. Because many mining companies are international in scope, the minerals appraiser may have to consider the effects of currency translations in order to properly determine value. These price protection and enhancement activities can have significant and material effects on the value of a mineral property.

Royalty Methods

The royalty approach to value is applicable when the mineral property in question actually has a royalty, or some other non-working mineral interest, associated with it or when the purpose and intended use of the minerals appraisal is to estimate only the value of the mineral royalty itself without independently considering the details of the particular physical and chemical qualities of a given mineral deposit (7). The royalty approach to value is a combination of the comparable sales (leases) and income approaches and requires that a relatively large number of royalties for deposits containing the same type and quality of mineral commodities obtained under arms-length conditions with time, place and economic comparability are available to be examined and compared. The valuation of a specific royalty, however, must be based on the definitions, procedures, terms, and conditions specified in the mining lease.

The required details of royalty and mineral interest agreements between property owners and mineral operators are generally not available to minerals appraisers to review. Royalty agreements are invariably negotiated between a single property owner and a single mineral operator and apply only to a specific mineral property and may or may not run with the land. Royalty agreements between a governmental entity and a private operator should not be presumed to reflect a market royalty. In order to adequately compare a set of royalty agreements the minerals appraiser needs much more information than is generally available. Agreement clauses that limit the mineral operator, contain option clauses for sale of the property, shares in lieu of cash, payment-in-kind, participation in hedging, futures or forward sales or contain some form of cap on the ultimate amount payable to the royalty holder must be critically examined.

A method referred to as ‘relief from royalty’ has been occasionally mentioned in the literature as an acceptable method to derive the value of a mineral right for a mineral property that is owned and operated by the same entity (7). In addition to all the constraints inherent in the royalty method, any analysis relying on a relief from royalty approach must be clearly labeled as

hypothetical because a royalty does not exist in fact and may not have any reasonably probable existence in the future.

Discount Rates and Marketability Factors

The selection of the appropriate discount rate is, after the estimation of mineral reserves, perhaps the most controversial part of an income approach to mineral property appraisal due the almost total lack of data or information concerning actual returns to mineral property operators on a property basis as opposed to a corporate basis. Using a corporate discount rate when the company is quite large and has multiple properties poses questions about the diversification effects on rates of return created with portfolios of properties. This same problem is present when using corporate discount rates for companies that only sell the mineral product in intracompany transactions or have foreign operations.

Choosing a Minerals Appraiser

From a practical perspective, the client should expect the minerals appraiser to be trained, experienced and competent to deal with the technical and economic aspects of mineral resource and reserve estimation, development and execution of mining plans and the marketing of the mineral product. Without appropriate knowledge, skills and abilities in these aspects of mineral operations the appraiser is not in a position to properly understand the limitations of the various approaches to value or the explicit, implicit and tacit requirements and assumptions contained in USPAP and would be leaving the bulk of the appraisal to an outside expert while essentially accepting full responsibility for the work product. A two-day course in minerals appraisal no more qualifies a residential or commercial property appraiser to appraise mineral properties than a two-day course in residential or commercial property valuation qualifies a minerals appraiser to appraise these kinds of properties.

The enactment of FIRREA has created some additional problems for appraisers, conventional as well as minerals, with the requirement that they be certified general appraisers in order to legally appraise nonresidential property. This legal requirement varies by the state the property is located in and, in some cases, the appraiser's state of residence. Some states are mandatory states, in the sense that the appraisal of any real property within that state must be performed by a properly 'licensed' appraiser. Other states are 'federally related transaction' (FRT) states in which any appraisal not connected with a federally regulated financial institution is essentially exempt from the 'licensing' statutes. All federal eminent domain agencies have adopted the FIRREA requirements but, they have documented provisions for handling specialized properties, such as mineral properties, by using an appropriately qualified minerals industry professional that need not be a certified appraiser. Some states have licensing and registration laws that legally require any person performing the tasks required for an appraisal of a mineral property to be properly 'licensed' as a geologist or mining engineer (15).

Additional confusion has come from the federal financial regulators in their rules for appraisals for the institutions they regulate: the services of an appraiser would not be required "if the transaction only involves the severable interest rather than the parcel or tract of land. Where mineral rights, timber rights, or growing crops, and the associated parcel or tract of land, are the subject of a real-estate related financial transaction, the services of an appraiser would be

required” (15). While the mineral right itself may be considered to be intangible property, the mineral right itself is worthless without the real property that either is the mineral product or contains the mineral product.

There are two private organizations that provide a designation or certification for minerals appraisers: the American Society of Appraisers (ASA) and the American Institute of Minerals Appraisers (AIMA). The requirements for earning the ASA designation in Mines and Quarries are quite similar to those for the AIMA’s Certified Minerals Appraiser. Both organizations require a bachelors degree and at least five years of verifiable experience in the competent application of market-based appraisal approaches and methodologies utilized for appraising mineral properties, rights and mineral interests. These requirements attempt to ensure that the minerals appraiser possesses a thorough understanding of the commercial and legal aspects of the many different types of ownership that can be carved out of a mineral property and their effect on the value of the whole property and the minerals estate. Both organizations require the submission of mineral property appraisal or valuation reports as part of the requirements: two for ASA and three to five for AIMA. ASA requires candidates for designation to pass an open group examination in the appraisal of mines and quarries while AIMA thinks this requirement is redundant.

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