

# Regulatory Trends in Mineral Property Valuation—An International Perspective

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**R**egulation of the valuation process and reporting for mineral properties has increased substantially in the past two decades in the U.S. and internationally. This regulation of mineral property valuation methodology began as part of the general regulation of the reporting of the geology and reserves of mineral properties some decades ago.<sup>1</sup> However, appraisal reports have important special purposes in the financial operation of our society. So other forces come into play, leading to uncertainties and complexities of jurisdiction and rules. Mineral property appraisals may be used in a wide variety of situations. Their use in securities reporting, including in acquisitions and mergers, is the driving force behind much of the regulation. Other common uses are for accounting, financing of mine development, taxation and establishment of trusts, condemnation, or solely for an owner's internal planning.

The leading countries in imposing regulation are the U.S., Australia, and Canada. Each has taken a very different approach. The U.S. has the oldest formal regulations. During the last decade or so, regulation of mineral property appraisal in the U.S. has developed into a rather difficult, ill-conceived mix. Australia has a generally well-thought-out, stringent code, developed by the Australasian Institute of Mining and Metallurgy (AusIMM). In Canada, poorly defined regulations are soon to be replaced with new regulations, and the outcome, although potentially favorable for minerals appraisers, is still uncertain.

This paper compares the development and present status of regulation of minerals appraisal in the U.S., Australia, and Canada. The situations in Australia and Canada, both major mineral-producing countries, have considerable influence in the U.S. This is due to the extremely competitive international character of the mining industry, with a high rate of cross-border operations. A sound regulatory environment may make it easier for a company to raise funds and flourish. In the following sections we also address some of the quirks of the complex U.S. regula-

International regulation of the valuation process and reporting for mineral properties is increasing. Australia, Canada, and the U.S. are the leading countries in developing regulations. The primary driving forces have been prevention of securities frauds and improvement of investor understanding and confidence. The starting point for regulation has been the definition and application of the terms *reserves*, *resources*, and *competent person*. Concerns about regulation particularly relate to the valuation of mineralization not classified as reserves. This paper outlines the development of regulation of mineral property valuation and then discusses the application of the various approaches to valuation of mineral properties.

tory environment and show how it may even discourage the use of a skilled minerals appraiser.

## International Mineral Reserve and Resource Definitions

Estimation of the quantity and grade of mineralization present in a mineral deposit forms a critical foundation in the appraisal of mineral properties in which mineralization has been located and investigated. The mining institutes of the world have been working together since 1994 to develop a uniform international standard for definitions used in reporting estimates of mineralization. The push for a uniform standard is designed to provide or strengthen reporting standards in most parts of the world, enhance cross-border understanding of the information reported, and improve investor confidence in the mining industry.

In 1997, the international Council of Mining and Metallurgical Institutions (CMMI) reached a provisional agreement, heavily based on Australia's usage.<sup>2</sup> In 1998 the United Nations Economic Commission for Europe agreed to incorporate the CMMI standard into a UN classification. This effort has continued and a further meeting on progress was held in the fall of 1999. In essence, this means that the CMMI reporting definitions will be adopted worldwide. As of September 1999, nearly 40 countries had indicated that they are moving towards adopting the UN classification.<sup>3</sup>

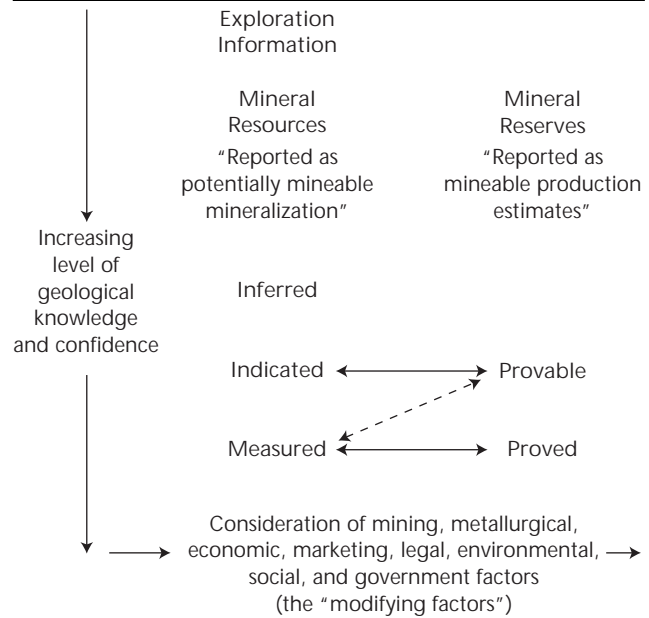
Exhibit 1 illustrates the relationships between the following primary definitions of *mineral resource* and *mineral reserve*. Exhibit 1 and the definitions are taken from *A Guide for Reporting Exploration Information, Mineral Resources, and Mineral Reserves* published in 1999 by The Society of Mining, Metallurgy, and Exploration, Inc. The SME is the institute representing the U.S. in CMMI. Exhibit 1 and the definitions are essentially identical to the 1999 version of the JORC Code<sup>4</sup> used in Australasia.<sup>5</sup>

According to SME, the basic 1999 definitions are as follows:

A '*Mineral Resource*' is a concentration or occurrence of material of intrinsic economic interest in or on the Earth's crust (a Mineral Resources deposit) in such form and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and

### Exhibit 1

#### The Relationship Between the Various Categories of Mineral Resources and Mineral Reserves



This exhibit is essentially the same as that in the 1999 JORC Code, the main difference being that Australasia's JORC Code uses the term *ore reserves* rather than *mineral reserves*.

Measured categories. Portions of a deposit that do not have reasonable prospects for eventual economic extraction must not be included in a Mineral Resource.

A '*Mineral Reserve*' is the economically mineable part of a Measured or Indicated Mineral Resource. It includes diluting materials and allowances for losses which may occur when the material is mined. Appropriate assessments, which may include feasibility studies, have been carried out and include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction is reasonably justified. Mineral Reserves are sub-divided in order of increasing confidence into Probable Mineral Reserves and Proved Mineral Reserves.<sup>6</sup>

The concept of the *competent person* is used to assure that the estimates of resources and reserves are conducted by persons with appropriate levels of qualifications and experience. The following definition is provided in the SME Guide:

A '*Competent Person*' is a person who is a member of a professional society for earth scientists or mineral engineers, or has other appropriate qualifications. The Competent Person must have a minimum of five years experience which is relevant to the style of mineralization

and type of deposit under consideration and to the activity which that person is undertaking. If the Competent Person is estimating, or supervising the estimation of Mineral Resources, the relevant experience must be in the estimation, assessment and evaluation of Mineral Resources. If the Competent Person is estimating, or supervising the estimation of Mineral Reserves, the relevant experience must be in the estimation, assessment, evaluation and economic analysis of Mineral Reserves.

Due to various factors relating to both the regulatory environment in the United States and the organization of SME, the SME's definition of *competent person* is weaker than in the JORC Code or the definition of *qualified person* in proposed Canadian National Instrument 43-101. The SME lacks an enforcement mechanism, whereas that is provided in the other two.<sup>7</sup>

### Regulation Development in the U.S.

The U.S. Securities and Exchange Commission The reporting requirements of the U.S. Securities and Exchange Commission (SEC) are perhaps the best known by the North American minerals appraisal community. Soon after the SEC was formed in 1934, it adopted Hoover's definitions of proven reserves and probable reserves.<sup>8</sup> These remained in use until the definitions were revised in March 1981, when the SEC adopted Form S-18 for reporting by mining companies. The definitions and disclosure requirements of Form S-18 were transferred without modification to Industry Guide 7 by the SEC in 1992, where they may be currently found.<sup>9</sup>

The SEC focuses on investor protection. This results in its focus on reserves, for which it still uses its own 1981 definitions rather than adopting CMMI definitions. Its rules prohibit disclosure of specific tonnages and grades of mineralization not classified as proven and probable reserves.<sup>10</sup> The SEC rules similarly restrict the reporting of valuation estimates to reserves. The SEC's definition of a *reserve* is

That part of a mineral deposit which could be economically and legally extracted or produced at the time of the reserve determination.

The SEC's general prohibition on the quantitative reporting of mineral resources and other exploration results, forms a substantial barrier to the full implementation of the CMMI standards in the U.S. This situation is in stark contrast to developments in Australia and Canada, which are described below.

This policy of prohibition by the SEC is intended to reduce the speculation associated with initial, in situ estimates of resources, which are invariably greater than the reserves, if any are delineated.<sup>11</sup> Also there is frequent investor misunderstanding of the mining industry's distinction between reserves and resources. For example, in 1987, a group led by T. Boone Pickens engaged in a hostile takeover battle to control Newmont Mining Company. Among the assertions of the Pickens-led group was that Newmont had not adequately disclosed the value of its gold reserves. Newmont's custom was (and continues to be) to disclose its reserve estimates as of December 31 each year. However, the assertions by the Pickens-led group resulted in a decision to disclose updated estimates. About 10 days after Newmont's disclosure of the updated reserve estimate, Newmont disclosed its resource estimates in addition to the updated reserve estimate, along with carefully crafted disclaimers that the economic viability of the resource estimates had not yet been determined. The Wall Street Journal promptly added the reserve and resource estimates together and gave the result as Newmont's new reserve estimate. This is not what Newmont had claimed at all, but reflects the nearly synonymous usage of *reserves* and *resources* in everyday English.<sup>12</sup>

Appraisals are not commonly part of the disclosure statements filed with the SEC. However, there are times when the results of mineral property appraisals have been and can be included in SEC filings. In one case, the use of an independent appraisal value was disclosed as an alternative to the historic cost basis book value in calculating the dilution of the per share value for an initial public offering (IPO). In most IPOs, the insiders acquire their shares prior to and for considerably less than the public offering (for example, if the insiders purchase their shares for \$1 and the public offering price is \$10). When the public shares are combined with the insider's shares, the average value per share is reduced. This is known as dilution of the per share book value on completion of the public offering. In those U.S. states having "fair, just, and equitable" securities law standards, sales of IPOs with too high a dilution are prohibited. Disclosure of the appraised value of the exploration-stage properties,<sup>13</sup> in the example case, allowed a dilution calculation demonstrating that if the appraised value, which valued the insider shares at more than the public offering price, were more correct than the book

value, it was the insiders rather than the public who would suffer the dilution in per share value.

Appraisals may also be part of the valuation of a company involved in a tender offer. Even companies with profitably operating mines with proven and probable reserves commonly hold interests in properties that are more or less raw prospects. These properties can have significant value even though resources or reserves have not yet been delineated. That value may be sufficiently great to compel securities disclosure. Appraisal methodologies are generally based on market value estimates that can be less speculative than otherwise derived values based on initial resource estimates and can therefore be considered for disclosure purposes.<sup>14</sup>

The reality, though, is that to date the SEC reporting regulations have prevented the public disclosure of quantitative (but not qualitative) resource estimates for almost all mineral properties in the U.S.<sup>15</sup> The Canadian regulations are important because a large share of the U.S. mineral properties are held by Canadian companies. Also, the Canadian stock exchanges have become the primary place for North American junior companies to raise capital.

For many assignments, the appraiser will not be provided with estimates outside the proven and probable reserves because those estimates have not been publicly released. In such situations, the company management is usually also unwilling to provide the appraiser with their raw drilling data used in making those estimates, since that usually has not been publicly released. In most cases, this is because the appraisal report is written for submittal outside of the company, and it is sometimes ordered by a party with an outside or minority interest.

Most assignments received by U.S. minerals appraisers are for the appraisal of mineral properties still only at the exploration or prospect stage, possibly having some mineral resources delineated. In such cases, the effects of the regulations leave the appraiser attempting to determine deposit parameters from public domain information and an interpretation of the geology from visual inspection.<sup>16</sup> The value of the unreported resources can be many millions of dollars. Even if the assignment is for the appraisal of an operating mine with a defined reserve base, much of the value of the property is often outside of the reserve base. It can be attached to the expectation that the management will be able to continue an organized approach to upgrading a portion of its resource base

to reserves in a timely manner as needed, and to the probability of defining additional resources on the property.<sup>17</sup> Whether one attempts to use sales analysis or an income approach to determine the value, it is difficult to develop a fair value for delineated mineralization without knowing the basic information about its quantity and quality. Appraisers could find themselves being questioned by a lawyer about the use of speculation, particularly if this speculation involves the assignment of future income potential to an undefined resource.

Resolution of this dilemma will differ in each case. The minerals appraiser who is not provided with exploration data beyond that delineating proven and probable reserves can state this in the report and indicate its resulting impact on the appraisal. A considerable percentage of U.S. minerals appraisers have internalized the SEC's notion expressed in its Industry Guide 7, that value should only be assigned to reserves. This attitude, though, does not match with the facts of the marketplace, which show that the value of resources and exploration potential often reach many tens of millions of dollars.<sup>18</sup>

#### The Savings and Loan Crisis and the Development of USPAP and State Licensing

In the late 1970s, the U.S. savings and loan industry and some banks began to collapse under the weight of loans gone bad. The crisis reached its peak in the mid-1980s. The resulting workouts required more than \$100 billion in federal bailout funds. The Resolution Trust Corporation was formed with a primary function of liquidating enormous quantities of foreclosed real estate.

Some of the blame for this stunning collapse of a large portion of the U.S. lending industry was placed on overvalued real estate and business appraisals. This led to the federal government seeking more control of appraisers and appraisal standards than self-regulation by appraisers. Congress authorized The Appraisal Foundation to serve as the "Source of Appraisal Standards and Appraiser Qualifications." In 1986-1987, it developed its original Uniform Standards of Professional Appraisal Practice (USPAP).

In 1989, The Appraisal Foundation formed the Appraisal Standards Board to continue the development and amendment of USPAP. Since then, each year the Board has amended the document. The 2000 edition is 191 pages long and contains standards for appraisal of real property, personal property, and

businesses, as well as standards for appraisers providing consulting services about real property and real estate.

The major appraisal institutes of the U.S. require their members to abide by USPAP. As yet, the American Institute of Minerals Appraisers (AIMA), which certifies minerals appraisers, has not made USPAP a requirement for its members, although it does recommend its use. All federally chartered financial institutions and federal agencies use USPAP as their minimum appraisal standard. In 1989, the federal Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA) was signed into law. This requires states to set appraisal standards and to set standards for licensing and certification. All states then adopted USPAP for their standards.

Minerals are an integral part of real estate, and mineral rights are real property under U.S. law. Therefore, the appraisal of mineral deposits falls under Standards 1 and 2 of USPAP, the real property appraisal standards. However, if one is appraising a mine as a business, the standards for appraisal of a business, Standards 9 and 10, may be more appropriate.

The small percentage of minerals appraisers who abide by USPAP generally find that it forms a beneficial framework for their reports. However, many minerals appraisers will argue that they do not need to apply the USPAP standards to their work, and to a large extent they will still be correct. Only occasionally are minerals appraisers contracted for appraisals for use in loan applications to federally or state-chartered lending institutions. However, they are often for submittal to federal agencies, such as the National Park Service, Forest Service, Bureau of Land Management, or the Internal Revenue Service, in which case they should abide by USPAP. Appraisals for submittal to state agencies should also abide by USPAP.

FIRREA, in amendments since approximately 1992, has exempted the appraisal of mineral rights in limited circumstances from its control for federally related transactions. The exemption is where the mineral rights are “severable from the land when the transaction does not involve the associated parcel or tract of land.”<sup>19</sup> As at any time with law, there are issues with definitions that would be best interpreted by a lawyer. However, the exemption of the appraisal of mineral rights may not necessarily exempt the appraisal of a mineral deposit, even if the mineral estate is clearly severed from the surface estate. For example, the Supreme Court of Colorado, the home

state of the authors, has a long history of giving the ownership of minerals a higher priority than the ownership of mineral rights.<sup>20</sup>

Few minerals appraisers are state-licensed. Most find it necessary to work across a large number of states, making state licensing an impractical concept. In Colorado, the appraisal of mineral rights (not minerals) is specifically excluded from the jurisdiction of the state’s Board of Real Estate Appraisers. However, such exclusions of jurisdiction are a state-by-state matter, and our understanding is that most states do not have such exclusions. The American Institute of Professional Geologists deserves a good portion of the credit for lobbying for those exclusions that do exist. Some states mandate state licensing for all real estate appraisals, while others only mandate it for federally related transactions.<sup>21</sup>

To become state-licensed at a level that would legally allow a minerals appraiser to appraise a mineral property under the jurisdiction of a state real estate appraisal board would now be an almost impossible task for a minerals appraiser coming from a minerals industry background. It requires being a Certified General Appraiser, the highest level of state licensing. A handful of geologists and mining engineers (probably less than 10), became licensed as Certified General Appraisers when the licensing laws were first introduced, at which time the requirements were less onerous and apparently applied somewhat more generously. To become a Certified General Appraiser requires 180 hours of approved appraisal courses, 3,000 hours of demonstrated real property appraisal experience gained over at least 2½ years, and passing the Certified General exam. The 3,000 hours of experience must abide by USPAP, and generally at least 1,500 hours should be on non-residential appraisal. To demonstrate the 3,000 hours of experience, and to show that it was gained legally, the minerals appraiser will probably need to perform much if not all of it, under the supervision of a Certified General Appraiser, who will cosign the appraisal reports. Without moving into another field of appraisal, such as appraisal of commercial buildings or agricultural properties, this will be nearly impossible for a minerals industry professional to accomplish. We have received some suggestions that in a few states, with some luck and the help of a lawyer, it may be possible for a minerals appraiser to have his 3,000 hours of appraisal experience approved without any of it being under a Certified General Appraiser.

Even if one were to achieve the Certified General Appraiser status in one state, the reality is that each minerals appraiser generally conducts appraisal work in a large number of states. The niche of minerals appraisal is so small that the number of mineral property appraisal projects that minerals appraisers can obtain in their home state is generally too low to provide a living. Reciprocity between state appraisal boards is generally not occurring. Therefore, Certified General Appraisers need to go through the arduous, time-consuming exercise of applying for a Temporary Practice Permit for each assignment in each state in which they work. To be fully legal in a few states, such as California, they also need to register temporarily, if allowed, or be fully licensed with the state board of geology or state board of engineering.

In reality, it is rare that minerals appraisers are taken to task for violating the state regulations for being viewed as doing real estate appraisals without the pertinent state real estate appraiser's license. However, it does happen, and penalties can be imposed. In one case, a minerals appraiser advised us that he was severely reprimanded and fined. In such cases the argument will center on whether conducting an appraisal of the mineral estate or mineral rights is considered to be conducting real estate appraisal. Technically, the settlement of the specific case may depend on whether the mineral estate has been severed from the surface estate or whether one is appraising mineral rights rather than the physical minerals estate. Doing the minerals appraisal as a real estate appraiser under state licensing theoretically requires abiding by USPAP. The cautious strategy for the minerals appraiser would be to always take the costly approach of contracting a real estate appraiser with the appropriate license (Certified General Appraiser) for the state of the assignment to sign the minerals appraisal report, as one minerals appraisal firm always does. It would also be wise to always abide by USPAP, particularly if the surface estate is part of the package being appraised.<sup>22</sup>

Acceptance and expectation of the use of USPAP in minerals appraisals has been growing rapidly. USPAP's emphasis is on full disclosure, which includes all information that has been considered, actions that may have influenced, and any ground rules used in the conduct of the appraisal. Ethics and competency provisions are included up front.

## Appraisal Methodologies Under USPAP

USPAP Standards 1 and 2 are founded on the three universally accepted approaches to appraisal: cost, income, and sales comparison. The following comments address specifics that could be of issue for a minerals appraiser. We do not attempt to address all methods of analysis available within each approach.

*NPV or DCF Methods (Income Approach).* Most minerals appraisers rely heavily, or exclusively, on the development of a net present value (*NPV*) as the value determined for their appraisals of properties with reserves or resources. We do not attempt to defend or advocate for this approach to value here but rather merely to review the current circumstances.

Standards 1 and 2 of USPAP do not discourage the use of net present value as an appraisal method. USPAP calls it discounted cash flow (*DCF*) analysis. This method is lumped in with other income capitalization approaches to value. However, for a complete appraisal under USPAP, one must consider all three of the universally accepted approaches to appraisal: cost, income, and sales comparison. Needless to say, a heavy emphasis is placed on the latter. After consideration, the appraiser can exclude an approach by stating why it is inapplicable.<sup>23</sup> *DCF* analysis is accepted with a lot of caution, as is any income approach. USPAP views it as a method that could be open to considerable misuse or abuse.<sup>24</sup> And we must agree. Therefore, USPAP places considerable emphasis on the use of realistic cash flow projections and the determination of a representative discount rate. It warns that, "market-value *DCF* analyses should be supported by market-derived data, and the assumptions should be both market- and property-specific." That is, commonly used discount rates, such as those derived from using the capital asset pricing model (*CAPM*) or the weighted average cost of capital (*WACC*), should if possible be supported or replaced by those derived from sales analysis. It also recommends that *DCF* analysis "is best applied in developing value opinions in the context of one or more other approaches."<sup>25</sup>

As part of the income approach for a complete appraisal, the appraiser must "analyze such comparable rental data as are available to estimate the market rental of the property."<sup>26</sup> This implies that the appraiser must abstract an appropriate royalty rate and associated discount rate (or capitalization rate)

from the market and use these as a basis for valuation of the mineral estate as if leased fee, even if the property is owner-operated. A representative set of royalty data can be very difficult to develop for many mineral commodities, and it will require use of data from commodity groupings. However, for appraisals related to federal agencies, such as in eminent domain or takings situations, it would be wise for the minerals appraiser to estimate value from three perspectives: lessor (royalty holder), operator, and owner-operator.

Interpretation of subjective terms in USPAP, such as the requirement for an income projection to be based on “reasonably clear and appropriate evidence,” could cause difficulty if the income approach is used to value a mineral property that has not reached the feasibility study stage.

In appraising most kinds of undeveloped minerals properties, it is common practice for minerals appraisers to model the development costs of a possible mine on the property, then calculate the *NPV* of the cash flows or royalties that would be generated. We reduce the *NPV* to a realistic value by modeling the start of the project in the future—say, 10 or 20 years hence—and applying a probability factor of occurrence or a high (risk-adjusted) discount rate.<sup>27</sup> We use a similar *NPV* methodology for appraising undeveloped reserves and resources associated with operating mines. A strict interpretation of USPAP could prevent such hypothetical modeling for the income approach.

**Cost Approach.** For a complete appraisal, the cost approach must be considered. But the cost approach 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.<sup>28</sup> The concept of estimating replacement cost for a unique mineral deposit or for improvements, such as a mill built at the site of such a deposit, is generally ridiculed. The authors have expressed that view in the past. Mineral properties are valuable for their minerals, which are the inventory for their plants; they are not valuable for their plants.<sup>29</sup> We cannot create an identical mineral deposit near a plant at any cost. In fact, the only value of the plant at a depleted mineral deposit comes from salvage and scrap. Evans of the Bureau of Land Management states, “A final, and almost always inappropriate approach, is the cost approach to value.”<sup>30</sup>

Instead of replacement cost, some minerals appraisers use a total of exploration and development

expenditures on the property as the basis of their cost approach. But, the money put into acquiring the moose pasture and then exploring it over 15 years is a very poor indicator of today’s value of the resource. It does not at all take into account the value derived or lost through undertaking that risk. As the Toronto Stock Exchange/Ontario Securities Commission (TSE/OSC) Mining Standards Task Force put it bluntly in its *Interim Report*, “There are methods (of valuation), such as valuing at cost, that are inappropriate. These should be identified and prohibited.”<sup>31</sup>

However, the cost approach does not necessarily rely on replacement cost, nor on expenditures. Its foundation is the estimation of the contributory value of each component of the property being appraised.

Appraisers of rural real estate in the U.S. face similar issues to minerals appraisers when appraising farm and other land, water, and timber. The American Society of Farm Managers and Rural Appraisers (ASFMRA) teaches in its courses a method for deriving from sales analysis the contributory value to the subject property of various land classes and the improvements.<sup>32</sup> The methodology is based on sales analysis but does not require the use of so-called comparable sales. In theory, analysis of mineral property sales data should provide similar contributory values for categories of mineralization. However, the SEC’s restriction limiting the reporting of quantitative data to 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.<sup>33</sup>

**Sales Comparison Approach.** This approach presents many severe problems in application for the minerals appraiser when working with all but a few types of mineral properties.<sup>34</sup> As Grant says, “There is far more comment on the limitations of the comparable sales method than its merits.”<sup>35</sup> We will first present a substantial overview of many of the problems, but we do not reject the approach. Some suggestions about its application are then provided.

The sales comparison approach generally depends on three basic assumptions. The first is that there are reasonably comparable properties; the second is that a ready market exists for these properties; and the third is that there are sales of those properties at fair market value. In the case of the residential real estate and general office space markets in cities, these requirements are easily met. Such transactions form

the bulk of appraisal business and result in the bias towards the comparable sales method of valuation. However, in cases of smaller residential markets (for example, unique vacation homes) or specialized industrial plants, determining a comparable sales value is more difficult. The appraiser must start making more assumptions and adjustments in arriving at a valuation. These assumptions and adjustments introduce uncertainty into the process, and uncertainty can be called “speculation” by those objecting to any one of the assumptions and adjustments.

In the case of mineral properties for most mineral commodities, we are typically working with a severe shortage of sales data and rarely have sales that can be called comparable. A significant amount of judgment or assumption on the part of the minerals appraiser is necessary in doing analysis for the sales comparison approach. Therefore, the accusation of “speculation” can be made against the assumptions introduced by the appraiser undertaking this approach, just as it is often made against the income forecasts introduced by the minerals appraiser in the *NPV* or *DCF* methods of the income approach.

Some appraisers believe that the comparable sales approach may work reasonably well for some mineral properties, for example, gold properties. There has been a lot of activity in trading gold properties in recent years, so we can arguably find at least one comparable sale for a gold property that has some semblance of similarity of geological and geographical characteristics. For a reasonable statistical basis, we should have at least four. However, one of the authors, D. Abbott, and his colleague H. Sandri conducted a survey of mineral property appraisers in early 1998 to determine their preferred method(s) of appraisal. Seventy-one appraisers, companies, and banks were contacted and asked about their use of some form of cash flow, comparable sales, or other methodology for valuing mining properties. Sixty-three used some form of cash flow analysis as their primary method, although in most cases comparable sales or another method was used as a validation check. Of the six firms that used comparable sales as their primary validation method, all backed up the comparable sales with a cash flow analysis. These six included three firms that regularly bought and sold properties or kept detailed databases of all property transactions and one firm primarily involved in *USPAP* valuations (and thus employing *USPAP*'s bias towards comparable sales). The most frequent “other” method employed

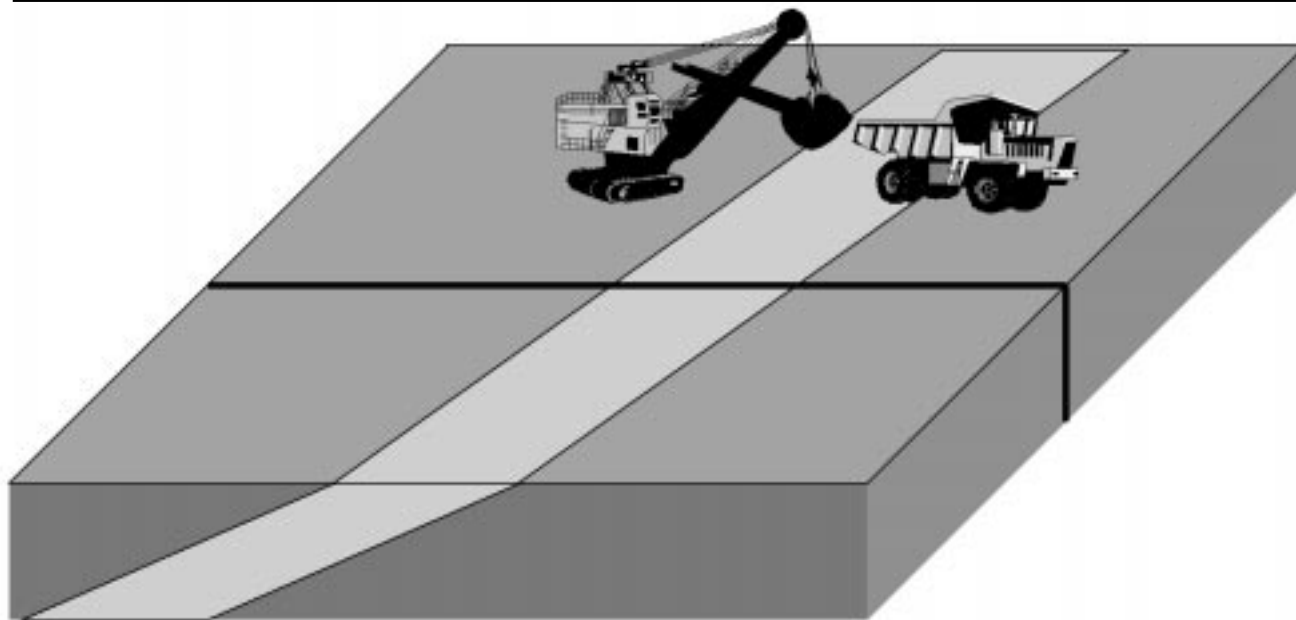
was some variation of “value of resource ounces in ground” calculation.<sup>36</sup> Almost all respondents agreed that the more information and the more methods used as a cross check, the more comfortable they were with the estimates. And it must be kept in mind that in almost all cases the properties being considered were gold properties, which underwent a high rate of sales relative to other types of mineral properties during the 1990s.

For appraisal of industrial minerals properties, comparable sales are in short supply. For example, in the appraisal of a hard rock iron-titanium property in Wyoming, the closest thing to a comparable sale in recent years may be the trade of an ilmenite-rutile beach sand deposit in Australia or Africa five years ago. Finding the trade in the first place can take intense research. But data from that trade will not get us in the correct ballpark. It may not even put us in the correct city, even if we are good at doing fancy adjustments using matrix rating methods such as those of L.C. Kilburn.<sup>37</sup> Obtaining all of the information on a trade necessary to evaluate it is generally difficult to impossible. Also, mineral property trades generally include multiple assets, so one must adjust away those assets not relevant to the particular property. Then one needs to contend with all of the variants of the geological characteristics of the deposits, its stage of exploration or development, geographical location, including access to utilities and transport, environmental issues, etc. Furthermore, the terms of the trade are almost never simple in the mining industry, so one must adjust for carried interests, royalties, stock options, and payments spread out over many years dependent on exploration or feasibility study success.

As another example, consider the case of property adjacent to and containing the lateral extension of a successful quarry that has developed a market over the years for its unique building stone. Exhibit 2 conceptually illustrates this situation. The building stone quarry fully supplies the market for its variety of stone and has several decades of reserves left. This is the upper property in Exhibit 2 with the truck and shovel illustrating the quarrying operation. Two years ago, the quarrying operation was sold. The two halves of the property differ because one has existing equipment and plant, but the cost of these items is relatively readily determined. The established quarrying operation has fully developed the market and is capable of supplying the demand for some time to come. Therefore, the mere existence of equivalent building stone

## Exhibit 2

## Conceptual Illustration of Two Properties



Since its sale, one property has begun producing building stone. The adjacent property is geologically similar but is not in production and is separately owned.

on the adjacent property (lower property in Exhibit 2) does not make the properties of equal value on a per acre or similar basis after adjustment for the value of plant and equipment. The lower property would likely sell for a substantial discount relative to the comparable. As is true of most industrial minerals properties, the ability to successfully market the product is the most critical component of a valuation, a component not generally considered by the comparable sales method, which assumes a ready market for the property.

Some appraisers discuss the sales comparison approach as a less speculative alternative to the income approach. As can be seen, though, from the above discussion, the adjustments applied in working with this approach can also be viewed as “speculative.” USPAP encourages the use of all three approaches to value in developing the market value estimate.

The analysis of sales draws us into studying the actual marketplace. The derivation of market value as applied in USPAP and the courts requires the appraiser to base the analysis as closely as possible on market data. In the courts, the income approach often loses to simple sales comparison in the valuation of mineral properties.<sup>38</sup> The minerals appraiser should attempt to base the conclusion of value on as many indicators of market value as can be obtained, espe-

cially if the case is to go before a court. This may require casting a broader net, involving analysis of sales of properties containing different mineral commodities to that of the subject. At the very least, sales comparison should be used as a validity or “sanity check.”<sup>39</sup>

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 analysis. The approach can be used by the application of analysis methods that do not require comparable sales but only comparison of sales based on common units of measure.<sup>40</sup>

As in the appraisal of rural real estate, the sales comparison approach can draw upon the same analyses of sales that could be employed under the cost approach as discussed above. Ratio analysis is employed for rural real estate to break the data down to component levels for each property, to develop dollar per unit values for each component of the properties. For mineral properties this can also be done, for example, using a basis of dollars per acre or dollars per ton. The sales selected for comparison are adjusted to the subject by adjusting the mix of components at the unit level to that of the subject. The components for mineral properties can be, for example, levels of exploration and development of the mineralization, water rights, land owned, access road,

surface improvements, and surface facilities. Adjustments for quality of mineralization, geological characteristics, size of deposit, and location can also be made at the unit level to bring the compared properties to the subject.

Overall, the combination of FIRREA with state licensing and USPAP can lead minerals appraisers into some tough situations. In these cases we either pack our bags and move on or develop the necessary skills and methods to work with the regulations and direction of court decisions to produce our best estimate of value.

### Federal Land Acquisitions

When a U.S. Federal agency is buying or condemning land, yet another document rules. The Uniform Appraisal Standards for Federal Land Acquisitions (UASFLA) was first released in 1973, then updated in 1992 to its present 132 pages. It reads rather like a court's legal decision. Since a substantial number of condemnations are settled by courts, case law forms an important basis for this document. In effect UASFLA is a set of guidelines rather than a set of rules.

UASFLA very strongly recommends the use of sale comparison over the income approaches. In eminent domain situations in the U.S., the federal agencies compensate only for the taking of real property based on constitutional property rights, not the value of any business loss. UASFLA grudgingly permits the use of income approaches if adequate sales comparisons are not available, but it also provides a lot of cautions about the care needed in their application. It is particularly important to exclude business value. It takes away the ability to use speculative income, which would generally remove the ability to consider the *NPV* of reserves and resources not yet in production. However, based on U.S. Circuit Court decisions in the early 1980s in favor of mineral property owners, UASFLA is forced to allow the *NPV* of speculative royalty income for undeveloped mineral properties. It does not allow the use of conventional cash flows in such cases since this could include business value to the property operator.

UASFLA applies the Unit Rule, which requires a property to be appraised as a single unit, then the value apportioned among the various interest holders. Under the Unit Rule, mineral properties are typically appraised on the basis of dollars per acre. Since a real estate appraiser is almost always in charge, with little

desire in researching the value of the minerals estate, the minerals owner often receives the short end of the stick. Many minerals appraisals are essentially thrown out of court in eminent domain hearings because the appraiser has not applied the appropriate ground rules.

### Mineral Appraisal Standards in Australia

Minerals appraisers in Australia work in a relatively idealistic environment. They work under a well-thought-out code for mineral property valuation, built on the foundation of a strong code for estimating resources and reserves.

Australia's Joint Ore Reserves Committee (JORC) first met in 1971. It submitted its first recommendations on mineral resource and ore reserve reporting to the Australian Stock Exchange in 1972. *The Australasian Code for Reporting of Mineral Resources and Ore Reserves*, known as the JORC Code, has developed from there. Represented on the committee are the Australasian Institute of Mining and Metallurgy (AusIMM), the Australian Institute of Geoscientists (AIG), and the Minerals Council of Australia.

The JORC Code was first introduced in 1989 and has undergone several revisions.<sup>41</sup> The current version is the 1999 edition. Australia has been the international leader in developing a standard for the reporting of mineral resources and reserves. The previously discussed international reporting definitions of the CMMI and the United Nations' classification grew out of the JORC Code.

The 1999 edition of the JORC Code has been modified to reflect the international standard agreed upon by the CMMI. Therefore, the definitions mirror those listed above from the SME version. The JORC Code has strong enforcement provisions and has been incorporated in its entirety into the listing rules of the Australian Stock Exchange, as has been the case since its introduction. This is in stark contrast to the situation in the U.S. where the SME's version has no enforcement provision and the SEC shows no signs of moving to update its Industry Guide 7 to mesh with the international standard.

In June 1995, AusIMM introduced the VALMIN Code for valuation of minerals properties. This grew out of 1989 and 1994 valuation conventions organized by AusIMM and a 1990 policy statement on minerals valuations by the Australian National Companies and Securities Commission.<sup>42</sup> The 1998 edition has been

expanded to include technical assessment reports that have an economic basis, particularly feasibility studies. It is formally titled *Code and Guidelines for Technical Assessment and/or Valuation of Mineral and Petroleum Assets and Mineral and Petroleum Securities for Independent Expert Reports*. The Australian securities bodies and financial institutions strongly support the VALMIN Code, i.e., to a degree that compliance is essentially obligatory. Compliance is a requirement for reports to the Australian Stock Exchange.

The VALMIN Code is a compact, 23-page document of requirements and guidelines. It is based on requirements for disclosure (transparency), independence and competence of the expert, and assurance that all material information is included and conclusions are based on such. The document provides extensive guidance on what information must be gathered and evaluated and the level of detail that must be included in a valuation report. This includes instructions on, for example, when a site inspection is required, the detail of capital and operating costs that must be gathered, review of employee relations, and investigation of environmental and land access matters. This guidance is down to instructions on the labeling of maps and the information that maps must convey. The VALMIN Code places a considerable burden of responsibility on the commissioning entity, including the requirement for adequate disclosure of information pertaining to the subject. It does not provide specific instructions on the approaches to valuation, leaving the selection of valuation methodologies and their application up to the judgment of the appraiser.

The VALMIN Code is heavily oriented to the provision of standards for valuation of mineral assets of public companies that will be used in securities filings or for major fund-raising, and for valuation of mineral securities subject to mergers and acquisitions. The Code assumes that the commissioning entity owns the subject to be appraised. The Code seems to provide substantial overkill for small minerals appraisal assignments commissioned by small private companies or individuals for, say, the valuation of their holding of an undeveloped gravel deposit. The Code makes no provision for a summary report as allowed under USPAP, which would make it difficult to produce a brief report.

The VALMIN Code will continue to evolve to meet the mineral valuation needs of Australasia. Agencies and institutes in many countries are review-

ing the Code to determine if it would be appropriate for them to apply a variant of it. This includes Canada, which is discussed below.

## Mineral Appraisal Standards in Canada

In Canada there have not been any specific regulations or guidelines for minerals appraisers to follow. However, steps are being taken to change this in the near future.

As background, a couple of documents have relevance. The Canadian Provincial Securities Administrators' National Policy No. 2-A, *Guide for Engineers, Geologists and Prospectors Submitting Reports on Mining Properties to Canadian Provincial Securities Administrators*, a simple four-page document, has been the main reference for writers of independent technical reports for public digestion describing mineral properties. This document encourages, but does not require, the use of the term *ore* in place of *reserve*, and mineralization in place of resource. The process of revising National Policy No. 2-A has been ongoing since 1995. The 1997 fallout from the multi-billion dollar Toronto Exchange-based Bre-X swindle, using salting at the Indonesian Busang gold deposit, helped push this process into high gear.<sup>43</sup> The revelation of the scam destroyed much of the already low public confidence in Canadian-based mining investments. The result is the currently proposed Canadian Provincial Securities Administrators National Instrument 43-101, a comprehensive standard for reporting on mineral properties, which will rescind National Policy 2-A.<sup>44</sup> It is still in the draft stage. Although a second draft for public comment was promised for release in fall 1999, it had not been seen by early 2000.

The various Canadian stock exchanges can require valuations of mineral properties in certain circumstances, such as takeover bids and related party transactions, particularly when the payments are being made in shares. However, valuation methods are not suggested. The Vancouver Stock Exchange, recognizing the international reporting problems involved, in 1997 released its *Junior Mining Standards*, which calls for additional due diligence and disclosures beyond those called for in National Policy No. 2-A. For resource/reserve reporting, it requires abiding by the Canadian Institute of Mining, Metallurgy, and Petroleum's (CIM) recommendations, Australasia's JORC Code, or a similar code. After the November 29, 1999, merger of the Vancouver Stock Exchange

with the Alberta Stock Exchange to form the Canadian Venture Exchange (CDNX), the *Junior Mining Standards* have been slightly updated, referencing proposed National Instrument 43-101 and issued as Appendix 3F, *Mining Standards Guidelines*.

The TSE/OSC formed a Mining Standards Task Force in the wake of the Bre-X fiasco and asked it to be the major player in the development of National Instrument 43-101. The Mining Standards Task Force initially recommended bringing the process of mineral property valuation under control as far as the securities industry is concerned. Its proposals, including its suggestions on valuation rules, were aired at a special valuation session of the Prospectors and Developers Association of Canada (PDAC) annual convention in Toronto in March 1998, and an *Interim Report* was published for comment in June 1998. The *Interim Report* recommended that the CIM's 1996 definitions of resources and reserves, with its six categories (the term *possible reserves* was included), be adopted. However, it would only allow feasibility studies and appraisals to be based on proven and probable reserves, the same restriction as applied by the U.S. SEC. Australians Michael Lawrence, who spearheaded the VALMIN Code development,<sup>45</sup> and Trevor Ellis, made strong pitches against this restriction on appraisals at the 1998 PDAC meeting, and some Canadians lobbied behind the scenes. The result was that the restriction has been dropped from the draft National Instrument 43-101. The Mining Standards Task Force determined that particular methods for valuation of mineral properties should not be dictated in the regulation.

The *Interim Report* recommended that the CIM form an ad hoc committee of valuation practitioners to review approaches to valuation of mineral properties. The committee has been working on developing a final report for submittal to CIM by December 2000. The report is expected to put forward proposed standards heavily based on the VALMIN Code. The CIM has also adopted the CMMI's reporting standard for resources and reserves, with slight modification. NI 43-101 is expected to adopt the current standard of the CIM.

It appears that regulation of minerals appraisals in Canada will soon be very similar to that in Australia. With no overlapping regulation of appraisals at the national or provincial level, minerals appraisers will not be subjected to the regulatory complexities of those working in the U.S.

### Definition of *Competent or Qualified Persons*

One consequence of spectacular failures of the status quo like the savings and loan scandals in the U.S. in the 1980s and the Bre-X fiasco in Canada in 1997 is a call for some method of assuring that those who perform appraisal work meet certain minimum standards and be licensed, certified, chartered, or otherwise vetted as having the competence to perform appraisals. The JORC Code requires that public reports of mineral resources or mineral reserves be prepared by one or more *competent person(s)*. A *competent person* is defined as "a person who is a Member or Fellow of The Australasian Institute of Mining and Metallurgy and/or the Australian Institute of Geoscientists, with a minimum of five years experience which is relevant to the style of mineralization and type of deposit under consideration and to the activity which that person is undertaking."

The TSE/OSC Mining Standards Task Force recommended adoption of a *qualified person* concept. The qualified person would be responsible for design, implementation, and assessment of mineral exploration and development programs; the estimation and classification of resources and reserves; and the review, approval, and, where required, certification of all reports and disclosures related to such programs and estimates. *Qualified persons* are defined as members of a recognized, self-regulating professional association. The recognized, self-regulating professional associations would have minimum qualification standards for members and a code of ethics that includes provisions recognizing failure to report financial fraud as unethical and prohibiting members from entering into confidentiality or similar agreements that prevent the member from reporting situations endangering the financial welfare of the public.

While the benefits of the concept of the competent or qualified person are readily apparent, the details of deciding just who is competent or qualified is not.<sup>46</sup> Geoscientists, mining engineers, processing engineers, environmental science professionals, mineral economists, and sometimes lawyers provide critical pieces of professional expertise in making reserve estimates and appraisals. No one is fully qualified in all areas. And as the Mining Standards Task Force noted, inter-professional squabbles between geoscientists and engineers in Ontario have

prevented geoscientists in Ontario from being licensed, thus depriving Ontario geoscientists from joining a recognized, Provincial professional association. Even assuming that a recognized professional association exists, ensuring that an acceptable ethics code exists, is enforceable, and is actually enforced presents additional problems, which have not really been examined or worked out. Such questions are only beginning to be faced by various mining professional societies around the world.<sup>47</sup> Nevertheless, it is clear that societal demands will sooner or later result in some form of the competent or qualified person concept being mandated for mineral appraisers.

## Conclusions

The regulation of mineral appraisal practice is clearly evolving and in flux due to fairly recent failures of previous ways of doing things. There are increasing societal demands for standards in the way in which appraisals are conducted as reflected in USPAP and the TSE/OSC Mining Standards Task Force's recommendations. Likewise there are demands for minimum qualifications for, and accountability of, those who perform appraisals. While these demands are not always fully thought-out or developed into meaningful and workable schemes, they are real.

Australia has developed a clear, enforceable minerals appraisal code based on a strong, enforceable reporting standard for reserves and resources, both with high competency standards for the individuals responsible for the reports. Canada is rapidly working to install a similar system. The CMMI's reporting standards for reserves and resources has become the standard for the world, with the United Nations' adoption of its definitions and about 40 countries indicating that they are working towards similar adoption.

In contrast, in the U.S., minerals appraisers must work within a system that handicaps them. The SEC shows no intention to move to implement the CMMI's standards. The SME that has adopted them has no enforcement ability of its own. The SEC's reporting standards restrict the reporting of quantitative data on mineralization to only the reserve category. This often prevents the minerals appraiser from obtaining important data about the subject property and properties sold.<sup>48</sup>

The enforcement of real estate appraiser licensing in the U.S. at the state level can put the minerals appraiser in a legal bind. Most minerals appraisers

find it necessary to work across many states due to the small number of active mineral properties in each state. The real estate appraisal regulations of the majority of states are believed to place the minerals appraiser under the jurisdiction of the state's real estate appraisal board's licensing requirement if the appraisal is for a state- or federally chartered institution, and even if not in many states. It is a difficult challenge for a minerals appraiser to become licensed as a real estate appraiser. Obtaining the Certified General Appraiser status in one state and using temporary practice permits to work across state lines would be an insurmountable obstacle. Contracting an appropriately state-licensed Certified General real estate appraiser to sign a minerals appraisal report is a daunting and expensive strategy that is sometimes used to work around those difficulties. This poorly designed system of state regulations encourages the now extensive direct employment of state-licensed real estate appraisers on the appraisal of mineral deposits for which they do not have the appropriate education and experience to appraise.

Few minerals appraisers within the U.S. abide by the USPAP appraisal standards. They are rarely enforced on minerals appraisers, except for reports submitted to state and federal agencies. It is difficult to understand how to appropriately apply Standards 1 and 2, which are designed for the appraisal of real estate, to the appraisal of mineral deposits. Once experience is gained, though, it does provide a useful framework. In appraising mineral deposits, most minerals appraisers rely heavily on value estimates derived from the NPV analysis of projected cash flows. USPAP encourages reliance on sales analysis. Court decisions also often favor sales analysis as the basis of the valuation because the sales can be pointed to as market data. However, appropriate sales data can be very difficult to obtain for most types of mineral deposits. The SEC's reporting regulations also can restrict the amount and usefulness of the data available within the U.S. and also in other countries for properties of U.S.-listed companies. Some suggestions have been put forth in this paper on how to effectively analyze a broader variety of sales.

Those conducting valuations of mineral deposits in Australia have the distinct advantage of a uniform nationwide code, which is designed specifically for the valuation of mineral deposits and mineral securities. The JORC and VALMIN Codes also have a strict set of competency provisions, requiring appropriate

qualifications and experience for the individuals responsible for the reports. Minerals appraisers working in Canada are also expected to soon have the advantage of a very similar set of standards. Although some initial problems inevitably arise with these standards, the review process of the responsible industry institutional committees should allow these standards to evolve to meet the needs of the minerals industry and the public. The U.S. has taken a very different path.

## Notes

1. The terms *appraisal* and *valuation* tend to be used interchangeably in the minerals industry when referring to an appraisal assignment and a formal report of appraised value. In the U.S., the term *appraisal* is usually applied. In the English-speaking mining world outside of the U.S., the term *valuation* is more commonly used. In the U.S., the term *appraiser* is used for the valuation expert, in place of the international terms *valuer* and *valuator*.
2. The primary bodies involved in the international effort to develop a single set of reserve and resource definitions are AusIMM; the Canadian Institute of Mining, Metallurgy, and Petroleum (CIM); the Institution of Mining and Metallurgy (IMM); the Society for Mining, Metallurgy, and Exploration (SME); and the South African Institution of Mining and Metallurgy (SAIMM). At the beginning of 2000, the AusIMM, SME, and SAIMM had formally adopted and placed into effect revised codes with identical definitions, differing only in reference to their home country securities regulations.
3. Australasian Institute of Mining and Metallurgy, "Australia Leads Way in Establishment of Global Mineral Reporting Standards—Launch of the 1999 JORC Code," *The AusIMM Bulletin*, no. 6 (September–October 1999): 74–75.
4. Joint Ore Reserve Committee, *Australasian Code for Reporting of Mineral Resources and Ore Reserves* (The JORC Code), 1999 ed. (Carlton, Victoria, Australia: AusIMM, 1999). Latest edition available online: [www.ausimm.com.au/codes/jorc/](http://www.ausimm.com.au/codes/jorc/).
5. Australasia, in an economic and political context, effectively encompasses Australia, New Zealand, Papua New Guinea, and nearby islands of the South Pacific Ocean.
6. Society of Mining, Metallurgy, and Exploration (SME), *A Guide for Reporting Exploration Information, Mineral Resources, and Mineral Reserves* (March 1999). Available online: [www.smenet.org/pdfs/SMEGdRep.pdf](http://www.smenet.org/pdfs/SMEGdRep.pdf).
7. For a fuller explanation of these differences, see David M. Abbott, Jr., "Who is a Competent or Qualified Person and Who Cares?" *The Professional Geologist*, vol. 36, no. 1 (January 1999): 6–7; David M. Abbott, Jr., "The Qualified Person for Resource and Reserve Estimation," *Mining Engineering* (September 1999): 64, 72.
8. H.C. Hoover, *Principles of Mining* (New York: McGraw-Hill Book Co., 1909).
9. U.S. Securities and Exchange Commission, *Industry Guide 7*, first published 57 Federal Register 36442 (July 30, 1992) but available from various sources.
10. *SEC Industry Guide 7*; David M. Abbott, Jr., "SEC Reserve Definitions—Principles and Practice," *Colorado Professional Geologist*, vol. 15, no. 1 (March 1985): 7–11; updated manuscript available with David M. Abbott, *Reporting Requirements of the SEC's Industry Guide No. 7 in Securities Law Requirements for Ore Reserves* (Prospectors and Developers Association of Canada, 1997), 19–61; David A. Holmes, and David M. Abbott, Jr., "Defining Industrial Minerals Reserves: Common and Subtle Problems," presented at the 1992 Annual Meeting of the Canadian Institute of Mining, Metallurgy, and Petroleum and the 28th Annual Forum on the Geology of Industrial Minerals—manuscripts of this paper were distributed then and until publication in B.J. Walker, editor, *Proceedings of the 28th Forum on the Geology of Industrial Minerals, West Virginia Geological and Economic Survey Circular C-46*, 116–123 and included with Abbott, 1997.
11. A.C. Noble, "Geologic Resources vs. Ore Reserves," *Mining Engineering* (February 1993): 173–178.
12. Abbott, 1997.
13. *SEC Industry Guide 7*.
14. *SEC Industry Guide 7*, instruction to paragraph (b)(5), no. 3.
15. The SEC's position stems from its regular contact with what Hoover (1909) referred to as the "charlatans of mining" who misuse terms to "cover the flights of their imaginations."
16. T.R. Ellis, "Lessons Learned About Standards from Applying Both VALMIN and USPAP on a Complex Appraisal Project," presented at the 2000 Annual Meeting of the Society of Mining, Metallurgy, and Exploration (SME) in Salt Lake City, Utah, February 28–March 1, 2000, Preprint 00–129.
17. T.R. Ellis, "Appraisals of a Gold Property Royalty Interest—A Case Study of Reserve Additions," accepted for publication in the 1999–2000 *Journal of the ASFMRA*.
18. R.D. Lawrence, "Should Discounted Cash Flow Projections for the Determination of Fair Market Value be Based Solely on Proven and Probable Reserves?" presented at the 2000 Annual Meeting of SME in Salt Lake City, Utah, February 28–March 1, Preprint 00–64; Ellis, "Appraisals of a Gold Property Royalty Interest—A Case Study of Reserve Additions."
19. FIRREA, 12CFR225.62 para. (h).
20. T.R. Ellis, "The U.S. Mineral Property Valuation Patchwork of Regulations and Standards," presented at the Mining Millennium 2000 convention of CIM-PDAC in Toronto, Canada, March 5–10, 2000, Paper 525, 4.
21. Appraisal Institute, *The Appraisal of Real Estate*, 11th ed. (Chicago: Appraisal Institute, 1996), 713.
22. Ashton recently pointed out another problem with some industrial mineral properties, namely that some construction materials, definitely considered minerals by geologists, are considered rocks that are part of the surface estate in a growing minority of approximately 17 states. As with all property appraisals, land title issues are critical, particularly where the surface and mineral estates have been severed. R.L. Ashton, "Assays From the Legal Vein: What Does the Construction Industry Mine? Some Courts Say Rocks; Geologists Say Minerals," *Engineering and Mining Journal* (October 1998): 16LL–16TT.
23. Appraisal Standards Board, *Uniform Standards of Professional Appraisal Practice* (USPAP), 2000 ed. (Washington, D.C., The Appraisal Foundation, 2000), Standards Rule 2-2(a)(xi), 22.
24. USPAP, Statement on Appraisal Standards No. 2, 73.
25. *Ibid.*
26. USPAP, Standards Rule 1-4(c)(i), 16.
27. T.R. Ellis, "Critique of Three Case Histories of Mineral Valuation," *American Institute of Mineral Appraisers Newsletter*, vol. 3, no. 1 (March 1998): 2–4.
28. R.H. Paschall, *Appraisal of Construction Rocks*, 2d ed. (Westminster, Colorado: American Institute of Professional Geologists, 1998).
29. Ellis, "Critique of Three Case Histories of Mineral Valuation."
30. J.R. Evans, "Guidelines for Fair Market Value (FMV) Appraisal of Mineral Interests," *Technical Bulletin*, 1998 ed. (California State Office: BLM Division of Energy and Minerals, 1998), 16.
31. Toronto Stock Exchange and Ontario Securities Commission Mining Standards Task Force, *Setting New Standards: Proposed Standards for Public Mineral Exploration and Mining Companies—Interim Report* (Toronto: TSE Publications, 1998).
32. American Society of Farm Managers and Rural Appraisers, *Rural Appraisal Manual*, 8th ed. (Denver: American Society of Farm Managers and Rural Appraisers, 1995), chapter 12.
33. The degree to which the SEC restriction will affect the ability to appraise a property will depend on whether the client is the property's owner and the purpose or intended use of the appraisal.

34. E.G. Hoover, "Valuation Geology," *The Professional Geologist*, vol. 34, no. 10 (September 1997): 8–9; T.A. Loucks, "The Valuation of Hard Rock Mineral Property," *Proceedings of the Thirty-Sixth Annual Rocky Mountain Mineral Law Institute* (Rock Mountain Mineral Law Institute, 1991), 11-1 to 11-22; Paschall, 1998; R.H. Paschall, "Valuation of Undeveloped Rock and Aggregate Deposits," *Mining Engineering*, vol. 51, no. 5 (September 1999): 66–67.
35. R. Grant, "The Comparable Sales (Real Estate) Method of Valuation," in *Mineral Valuation Methodologies 1994: Proceedings VALMIN '94* (Sydney, Australia: The Australasian Institute of Mining and Metallurgy, 1995), 155–165.
36. Another method of valuation, a probabilistic approach, has been urged in the petroleum business in P.R. Rose and J.C. Jones, *Making Money Winning Environmental Lawsuits* (Society of Petroleum Engineers, Preprint 25835, 1993); and P.R. Rose and J.C. Jones, "Recovering Corporate Assets Through Environmental Lawsuits," *Journal of Petroleum Technology* (June 1995): 496–501. Gustavson and others challenged this approach in J.B. Gustavson, M.R. Silverman, and T. Stauffer, *Court Values Versus Reality: A Rebuttal to Making Money Winning Environmental Lawsuits* (Society of Petroleum Engineers Preprint 37943, 1997). The point here is not to advocate either position but merely to suggest that probabilistic methods have been successfully employed. However, like all statistically based methods, the success of probabilistic methods depends on the "law of large numbers," the requirement for a large number of valid data points to provide statistical reliability. This requirement is more easily met in the petroleum business than in the mining business, and more frequently for gold properties than for comparable industrial minerals properties. For most mineral commodities, any probabilistic method will need to be founded on a refined NPV approach based on theorizing about the range of potential project outcomes, as shown in C. Sorentino and D.W. Barnett, "Financial Risk and Probability Analysis," in *Mineral Valuation Methodologies 1994: Proceedings VALMIN '94* (Sydney, Australia: The Australasian Institute of Mining and Metallurgy, 1995), 81–101; T.R. Ellis, "Appraisal of Sandstone-Type Uranium Prospects Using Computer Modeling," presented at the 1979 SME-AIME Annual Meeting in New Orleans, February 18–22, 1979, Preprint 79-5; T.R. Ellis, "Estimation of Minimum Specifications for Economically Explorable Sandstone-Type Uranium Deposits," *Colorado School of Mines Quarterly*, vol. 74, no. 1 (January 1979): 71; I.C. Runge, "Uncertainty and Risk in Mineral Valuation—A User's Perspective," in *Mineral Valuation Methodologies 1994: Proceedings VALMIN '94* (Sydney, Australia: The Australasian Institute of Mining and Metallurgy, 1995), 119–138.
37. L.C. Kilburn, "Do Shareholders Really Care About Mineral Property Value?" *Proceedings, Prospectors and Developers Association of Canada and the Natural Resource and Energy Law Section of the Canadian Bar Association* (Toronto, Ontario: March 11, 1998), 41–52; L.C. Kilburn, "Valuation of Mineral Properties Which Do Not Contain Exploitable Reserves," *CIM Bulletin*, vol. 83, no. 940 (1990): 90–98.
38. Paschall, 1999.
39. Grant, 1994.
40. ASFMRA, Chapter 6.
41. T.R. Ellis, "The Australian Code for Reporting of Identified Mineral Resources and Ore Reserves," unpublished paper presented and distributed at the Colorado Mining Association's 94th National Western Mining Conference in Denver, Colorado, February 24–27, 1991.
42. T.R. Ellis, "The Australian VALMIN Code for Mineral Appraisals," *American Institute of Mineral Appraisers Newsletter*, vol. 1, no. 4 (October 1995): 1–2; T.R. Ellis, "Valuation Methodologies for Mines and Mineral Tenements," *American Institute of Mineral Appraisers Newsletter*, vol. 1, no. 5 (December 1995): 1–4.
43. V. Danielson and J. Whyte, *Bre-X—Gold Today, Gone Tomorrow* (Toronto: The Northern Miner Press, 1997).
44. Canadian Provincial Securities Administrators, Notice of Proposed National Instrument 43–101, 1998, and Companion Policy 43–101CP, Standards of Disclosure for Mineral Exploration and Development and Mining Properties and Rescission of National Policy Statement No. 2-A. Available online: [www.osc.gov.on.ca/en/Regulation/Rulemaking/Rules/43-101.html](http://www.osc.gov.on.ca/en/Regulation/Rulemaking/Rules/43-101.html).
45. M.J. Lawrence, "Australian Project Valuation Lessons for Canadian Developers," in *Mineral Property Valuation and Investor Concerns: Proceedings, Prospectors and Developers Association of Canada and the Natural Resource and Energy Law Section of the Canadian Bar Association* (Toronto, Ontario: March 11, 1998), 71–96.
46. As one mining company president has pointed out, there is a significant semantic difference between *competent* and *qualified*. This individual, who happens to be a lawyer, notes that because he is a licensed lawyer, he is deemed qualified to represent a criminal defendant like O.J. Simpson. However, since he is not a criminal lawyer by training and experience, he is not competent to represent a criminal defendant and that it would be a violation of legal ethics for him to attempt to do so. Therefore, *competent* is a better word than *qualified* for the persons being discussed.
47. Abbott, "The Qualified Person for Resource and Reserve Estimation"; A.M. Laird, "The Status of Some Recommendations in the Final Report of the Mining Standards Task Force," *CIM Bulletin*, vol. 92, no. 1035 (1999): 12–13.
48. Although the SEC's position can be viewed as antiquated, the mining industry has equally failed to recognize and deal with the basis of the SEC's objections to the term resources, namely the likelihood that estimates of such material can and have been used to mislead the general public (Abbott, 1997). The impact on mineral appraisals occurs when exploration information on resource delineation is withheld from the appraiser.

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