

Cost Approach Methods for Mineral Property Valuation

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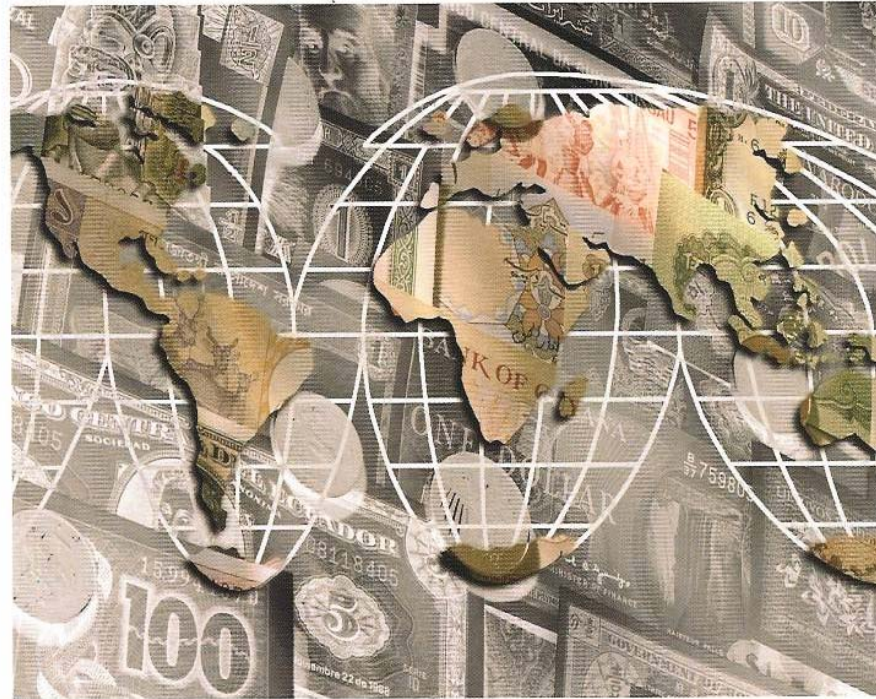


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Denver, Colorado, 25 – 28 February 2007

Relevant Standards

- The International Valuation Standards (IVSs)
- USA's Uniform Standards of Professional Appraisal Practice (USPAP)
- Canada's Standards and Guidelines for Valuation of Mineral Properties (CIMVal)

International Valuation Standards Seventh Edition 2005



International
Valuation Standards
Committee

USPAP

Effective July 1, 2006

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**STANDARDS AND GUIDELINES
FOR VALUATION OF MINERAL
PROPERTIES**

**SPECIAL COMMITTEE OF THE
CANADIAN INSTITUTE OF MINING,
METALLURGY AND PETROLEUM ON
VALUATION OF MINERAL
PROPERTIES
(CIMVAL)**

**FEBRUARY 2003
(FINAL VERSION)**

Regulatory Constraints

- Financial reporting standard
 - International Financial Reporting Standards (IFRSs)
 - USGAAP
- Securities regulators
 - SEC Industry Guide 7
 - TSX Venture Exchange Appendix 3G

Other Constraints – What will these individual bodies accept?

- A lender
- A government agency
- A court

Definitions – IVSs

Cost Approach. This comparative approach considers the possibility that, as a substitute for the purchase of a given property, one could construct another property that is either a replica of the original or one that could furnish equal utility. (GVCP 9.2.1.3)

Definitions

– Dictionary of Real Estate

Cost Approach. A set of procedures through which a value indication is derived for the fee simple interest in a property by estimating the current cost to construct a reproduction of (or replacement for) the existing structure, including an entrepreneurial incentive, deducting depreciation from the total cost, and adding the estimated land value. (4th Ed, Appraisal Institute)

Definitions – CIMVal

The *Cost Approach* is based on the principle of contribution to value. (G3.1)

The Three Approaches to Value – Bases

- Sales Comparison Approach – The principle of *substitution* of value
- Income Approach – The principle of *anticipation* of value
- Cost Approach – The principle of *contribution* to value

Uniform Appraisal Standards for Federal Land Acquisitions

Even though the cost approach is often the least reliable approach to value and is often maligned by the courts, it can be a useful analytical tool in allocating the contributory value of various elements of the property in partial acquisition appraisals. (UAS 2000, A-16)

Cost Approach Methods

— from IVSC Extractive Industries Draft
Technical Paper

- Depreciated Replacement Cost (DRC)
- Multiple of Exploration Expenditure
- Appraised Value
- Geoscience Matrix
- Rural Cost Appraisal/Land Mix Adjustment

Depreciated Replacement Cost (DRC)

The DRC method is available for use in the Extractive Industries, where it is commonly applied to buildings and other surface structures, plant and equipment. (IVSC EI TP Draft, 8.5.3.1)

$$\text{DRC} = (\text{Reproduction or Replacement Cost}) - (\text{Physical Depreciation} + \text{Functional Obsolescence} + \text{External Obsolescence})$$

Multiples of Exploration Expenditure (MEE) method

- A Prospective Enhancement Multiplier (PEM), based upon a Valuer's assessment of the property's prospectivity to date, is applied to the relevant and effective past exploration expenditure on the property. (IVSC EI TP Draft, 8.5.3.2)
- Described by M. Lawrence and P. Onley, 1994
- Applicable for exploration properties without delineated resources.
- $\text{Value} = \text{Effective Expenditure} \times \text{PEM}$

Appraised Value method

- Akin to MEE method. Apply addition adjustment, instead of PEM, to a similar basis of exploration expenditures.
- The addition adjustment:
 - warranted future expenditures comprised by a “reasonable exploration budget” to test the remaining exploration potential of the exploration property.
(IVSC EI TP Draft, 8.5.3.3)
- Described by W.E. Roscoe, 2000
- $\text{Value} = \text{Effective Expenditure} + \text{Warranted Expenditure}$

Geoscience Matrix method

- Originally developed by L.C. Kilburn for valuation of non-producing mineral properties in Canada (Kilburn, 1990). Modified and expanded by others.
- To the cost of acquiring an unexplored mining claim, apply 4 prioritized adjustment factors from a matrix of 19. Adjust for the subject property's characteristics of:
 - location
 - known valuable mineralization
 - geophysical, geochemical, and geological targets
(IVSC EI TP Draft, 8.5.3.4)
- The adjustment factors are multiplicative.

Geoscience Matrix method

Subject claim value = (unexplored claim cost)
x (location factor) x (grade factor) x
(geophys/geochem factor) x (geology factor)

Calculate for each claim in the tract, then sum.

Cautions for MEE, Appraised Value, and Geoscience Matrix Methods

- Only designed for exploration properties.
- Generally applied without market transaction reference. To be a market-based method, need a means of market measurement to calibrate adjustment factors.
- Use in combination with another method, preferably from another approach.
- Best done by or with someone who has a good knowledge of the geology of the subject property and of deals involving similar exploration properties.

Rural Cost Appraisal method

- Adaptation of land mix adjustment method taught by the American Society of Farm Managers and Rural Appraisers (ASFMRRA).
- Generally requires plentiful sales transaction data, such as is available for gold properties. More transactions than typically used in sales comparison approach.

(IVSC EI TP Draft, 8.5.3.5)

Rural Cost Appraisal method

- Adjust transactions for time, location, etc.
- Ratio analyses or simultaneous equations are used to calculate the unit value of the components of the subject property -- developed reserves, undeveloped reserves, resources, exploration land, water rights, and other assets.
- The quantitatively adjusted values of the components are then summed.
- Add DRC value of buildings, plant and equipment.
(IVSC EI TP Draft, 8.5.3.5)

Rural Cost Appraisal method

Value $\approx au + bv + cw + dx + ey + fz + \text{land surface} + \text{DRC (buildings + P\&E)}$

$u = \text{\$/developed Reserve unit}$

$v = \text{\$/P+P undeveloped Reserve unit}$

$w = \text{\$/M+I Resource unit}$

$x = \text{\$/Indicated Resource unit}$

$y = \text{\$/acre exploration}$

$z = \text{\$/ac-ft annual water rights}$

Rural Cost Appraisal method

To derive unit values:

- Solve simultaneous equations constructed for transacted properties.
- Find puritan transactions – e.g., having only M&I Resource, or exploration acreage, or water rights.

International Financial Reporting Standards (IFRSs™)

including International Accounting Standards (IASs™)
and Interpretations as at 31 March 2004.

Armenia
Aruba Austria Australia
Bahamas Bahrain Bangladesh
Bangladesh Belgium Benin Bosnia and Herzegovina
Bosnia and Herzegovina
Bulgaria
Canada
Cayman Islands
Chad
China
Croatia
Cyprus
Czech Republic
Denmark
Dominican Republic
Ecuador
Egypt
Estonia
Finland
France
Germany
Ghana
Gibraltar
Greece
Guatemala
Guyana
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Hungary
Iceland
Ireland
Italy
Japan
Jordan
Kenya
Kuwait
Kyrgyzstan
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Lithuania
Luxembourg
Macao
Madagascar
Malawi
Malaysia
Maldives
Mali
Mauritius
Mexico
Moldova
Mongolia
Morocco
Netherlands
Netherlands Antilles
Nepal
New Zealand
Nicaragua
Norway
Oman
Pakistan
Panama
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Financial Reporting

- Presently DRC is the only cost approach method allowed in valuations for financial reporting under the IFRSs and IVSs.
- Should our extractive industries cost approach methods be allowed?
- The author has written submissions to the IVSC and the IASB Extractive Activities Project Team requesting recognition of these additional cost approach methods.

Conclusions

- The Cost Approach for minerals and petroleum properties has many more methods available than just the Depreciated Replacement Cost method.
- For market valuations, the MEE, Appraised Value, and Geoscience Matrix methods should be applied with caution. Two or more methods should be applied, preferably from two or more approaches.
- The Rural Cost Appraisal method is a particularly powerful valuation method. However, we must await minerals and petroleum property transaction data becoming readily accessible, for minerals appraisers to be able to commonly apply this method.