



Valuation of Mineral Properties from a Consultant's Perspective

CIM Toronto Branch and MES Student Day

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January 15, 2015

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Career as a Professional Geoscientist



- Exploration geologist in Newfoundland, New Brunswick, Quebec, and Ontario.
- Independent geological consultant.
- WGM Limited
 - Senior Geological Associate
 - Senior Geologist and Manager of Business Development
 - President
- Chief Mining Consultant for the Ontario Securities Commission.
- Involved in development of NI 43-101.
- President and CEO, RPA Inc.



- Director of the PDAC from 1996 to 2011.



- Was a CIM Distinguished Lecturer on Canadian Disclosure Standards.



- President of the Association of Professional Geoscientists of Ontario in 2010/2011.



- Currently serving as Past Chairperson of the Committee for Mineral Reserves International Reporting Standards (CRIRSCO).



- Advice to the mining industry for over 25 years.
- *The specialty firm of choice for resource and reserve work.*
- All stages:
 - exploration and resource evaluation
 - scoping, prefeasibility and feasibility studies
 - financing, permitting, construction, operation, closure and rehabilitation.
- Clients are financial institutions, governments, major mining companies, exploration and development firms, law firms, individual investors, and private equity ventures.
- Offices in Canada, United States & United Kingdom.
- Head office in Toronto.
- 100% employee owned.



- Our mission
 - To apply our broad and deep experience to provide objective, independent advice.
- Our vision
 - To enable mining industry operators and investors to make the right decisions for business success.
- Our proof
 - Accurate, credible technical reports that are accepted and relied on time and again, among financial institutions and major regulatory bodies worldwide.
- At RPA, we:
 - Deliver what we promise
 - Provide unsurpassed quality
 - Communicate effectively with clients and other stakeholders
- All of these characteristics are embodied in our motto:

Rock solid resources. Proven advice.

Overview – Mineral Property Valuation



- Property value vs. stock price.
- Purpose of valuations.
- Mineral property life cycle.
- Types of mineral properties.
- Valuation methods.
- Valuation examples.



What is Being Valued?

- Important to distinguish between valuation of mineral property and valuation of a company (and the company's stock price).
- Components of mining company stock price:
 - Mineral properties
 - Other assets and liabilities (e.g. cash and debt)
 - Commodity markets
 - Quality of management
 - Market recognition and liquidity
 - Market sentiment.
- This talk focuses on valuation of mineral properties, not stock prices.

Purpose of Valuation from Consultant's Perspective

- When an independent valuation is required for:
 - Mergers and acquisitions
 - Non arm's length transactions
 - Support for mineral property agreements
 - Litigation
 - Compensation for expropriation
 - Accounting book value
 - Impairment testing
 - Insurance
 - Inheritance (distribution)
- May need to comply with CIMVal Standards and Guidelines.

- FMV or MV used for most purposes.
 - Value that would have been paid.
 - Open and unrestricted market.
 - Between informed and prudent parties.
 - Acting at arms length.
 - At a specific date.

| Stage | Properties | Value |
|------------------------|--|--|
| Early exploration | Many | Low |
| Drilling |  A thick grey arrow pointing upwards, spanning the four rows from Drilling to Production. |  A thick grey arrow pointing downwards, spanning the four rows from Drilling to Production. |
| Detailed Investigation | | |
| Feasibility Study | | |
| Production | | |
| Closure | Few | High |

- Producing mineral properties can be:
 - Producing mines.
 - Development planned or under construction.
 - They contain mineral reserves and/or mineral resources.
- Non-producing mineral properties can be:
 - Early stage exploration properties.
 - Drilling stage exploration properties.
 - Properties with identified mineral resources.
 - Prefeasibility or feasibility stage projects.
 - Marginal development properties.
 - Past producing mines.

- A Mineral Resource is a mineral deposit that has reasonable prospects for economic extraction. Quantity and quality of the resource are commonly expressed as tonnes and grade at different confidence levels.
 - Measured – highest confidence level.
 - Indicated – moderate confidence level.
 - Inferred – lowest confidence level (insufficient to convert to Reserve).
- A Mineral Reserve is that part of the mineral resource demonstrated to be economically extractable.
 - Proven – highest confidence level.
 - Probable – moderate confidence level.

Valuation Approaches for Different Types of Mineral Properties

| Valuation Approach | Valuation Method | Producing and Development Properties | Advanced Properties with Resources | Exploration Properties |
|--------------------|-------------------------|--------------------------------------|------------------------------------|------------------------|
| Income | Discounted Cash Flow | Yes | Maybe | No |
| | Real Options | Yes | Yes | No |
| Cost | Appraised Value | No | Yes | Yes |
| | Geoscience Factor | No | Maybe | Yes |
| Market | Comparable Transactions | Yes | Yes | Yes |
| | Option Agreement Terms | Yes | Yes | Yes |

- Income Approach
 - Principle of anticipation of benefits.
 - Discounted cash flow methods.
 - Real options and risk modelling.
 - Best applied to advanced stage properties.
- Market Approach (Sales Comparison Approach)
 - Principle of substitution.
 - Comparable transactions analysis.
 - Option agreement terms analysis.
 - Generally applicable to all stages.
- Cost Approach
 - Principle of contribution to value.
 - Appraised value method.
 - Geoscience factor method.
 - Applicable to early stage properties.

- Best applied to advanced stage properties.
 - Production stage.
 - Development stage
 - Economic analysis stage.
 - Feasibility study.
 - Prefeasibility study.
 - Preliminary economic assessment.
- Reliable and reasonable data current as of the valuation date.
 - Mineral reserves and/or mineral resources.
 - Mining method, rate and schedule.
 - Metallurgical recoveries.
 - Capital cost estimate including sustaining capital and closure costs.
 - Operating cost estimate including G&A.
- Commodity price projections and currency exchange rate.
- All applicable royalties and taxes.
- Appropriate discount rate.

Discounted Cash Flow Analysis: Canadian Gold Mine Example



| <u>All currency in US\$M</u> | | | | | | | |
|--|------------|----|-----|--|-----|------------|-------|
| Year | 1 | 2 | 3 | 4 | 5 | 6 | Total |
| Gold processed - K oz | | 50 | 100 | 100 | 100 | 100 | 450 |
| Gold recovered - K oz | | 40 | 90 | 90 | 90 | 90 | 400 |
| Revenue @ \$1,300 | | 52 | 117 | 117 | 117 | 117 | 520 |
| Operating costs | | 32 | 54 | 54 | 54 | 54 | 248 |
| Net revenue | | 20 | 63 | 63 | 63 | 63 | 272 |
| Capital costs | 80 | 20 | 3 | 3 | 3 | 3 | 112 |
| Pre-tax cash flow | -80 | 0 | 60 | 60 | 60 | 60 | 160 |
| After-tax cash flow | -80 | 0 | 48 | 48 | 48 | 48 | 112 |
| Pre-tax Net Present Value | 84 | | | After-tax Net Present Value | | 53 | |
| Pre-tax Internal Rate of Return | 40% | | | After-tax Internal Rate of Return | | 30% | |

- Compile information on properties with similarities to the subject property.
 - Same commodity, e.g., gold, uranium, copper.
 - Same political jurisdiction, access and infrastructure.
 - Similar geological setting and mineral deposit type.
 - Similar stage of exploration or development.
 - Transactions within reasonable time period before valuation date.
- May need to analyze option agreement terms to estimate value of comparable properties.
- Express values of market comparable properties in terms of:
 - Overall property value,
 - Value per hectare, or
 - \$ per oz Au or \$ per unit metal in resource.
- Examine statistics of market comparable values to derive an appropriate range to apply to the property being valued.

Analysis of Comparable Transactions without Resources: BC Gold Property Example



| Property | Transaction Date | Size in hectares | Property Value \$M | \$/hectare |
|--|------------------|------------------|-----------------------|------------|
| A | 2011 | 1,058 | 8.46 | 7,998 |
| B | 2011 | 1,900 | 2.27 | 1,197 |
| C | 2011 | 2,046 | 2.25 | 1,099 |
| D | 2011 | 3,561 | 3.90 | 1,094 |
| E | 2012 | 4,780 | 5.00 | 1,046 |
| F | 2011 | 4,577 | 2.46 | 537 |
| Mean | | | 4.06 | 2,162 |
| Median | | | 3.18 | 1,097 |
| Without highest and lowest \$/ha value | | | | |
| Mean | | | 3.35 | 1,109 |
| Median | | | 3.09 | 1,097 |
| Recommended \$/ha Range | | | \$1,000 to \$1,200/ha | |

Analysis of Comparable Transactions Example: Quebec Gold Property with Resources



| Property | Transaction Date | Au oz in Resource | Property Value \$M | \$/oz Au |
|--|------------------|-------------------|--------------------|----------|
| A | 2012 | 479,100 | 39.18 | 81.79 |
| B | 2012 | 917,000 | 38.00 | 41.44 |
| C | 2012 | 63,885 | 2.47 | 38.69 |
| D | 2011 | 2,000,000 | 60.00 | 30.00 |
| E | 2012 | 92,533 | 2.44 | 26.34 |
| F | 2012 | 280,500 | 3.13 | 11.14 |
| Mean | | | 24.20 | 38.23 |
| Median | | | 20.56 | 34.35 |
| Eliminate highest and lowest \$/oz value | | | | |
| Mean | | | 25.73 | 34.12 |
| Median | | | 20.24 | 34.35 |
| Recommended \$/oz Range | | | \$30 to \$40/oz | |

- Net Present Value of a production, development, or economic study stage property can be estimated from a projected stream of cash flows discounted at an appropriate rate.
- Value of exploration and other non-producing mineral properties can be estimated by analyzing market transactions on comparable properties.
- Technical experience and judgement is a critical requirement for valuation of mineral properties.
- Mineral property asset value is but one component of the value of a mining company and the share price.

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