

Sales Comparison Valuation of Development and Operating Stage Mineral Properties

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Focus of this Paper

- Estimation of Market Value as the basis of the Appraisal of mining properties
- For feasibility study properties through operating properties
- Using the Sales Comparison Approach

Context

- Mining industry valuations are commonly based on Net Present Value (NPV) of Cash Flows
 - NPV/DCF method of the Income Approach.
- Most mining industry appraisals only provide an economic evaluation NPV, or an estimate of Investment Value based on a specific entity's (company's) investment parameters.
 - Not an estimate of Market Value based on inputs derived from markets for mining industry assets.

Examples of Misleading Income Approach Valuations

- Appraisal report by a certified appraiser estimates the Market Value of Utah copper “reserves” at US\$1.8 Billion in 2005 when copper is \$1.70/lb (\$3.70/kg).
 - Report used to raise funds for mining equipment and mill.
 - After a year of mining and milling the copper “reserves” at higher copper prices the mining company goes bankrupt.
- In 2007, an appraisal report by a certified appraiser estimates the Market Value of a 20 ac (8 ha) Wyoming gold exploration property at US\$128 Billion when gold was \$660/oz.
 - Report used to raise investment funds.
 - No evidence yet that a mine will ever be developed.

Misleading Valuations

- Arizona property containing early 1900s onyx-marble mine has Market Value of US\$1.4 Billion in 1983.
 - In 1987, sells for US\$15 Million.
 - Valued in 1989 for \$1.2-1.8 Billion by a highly experienced geologist.
 - Market value appraisal reports over the next 20 years by the geologist confirm the value at ~\$3 Billion.
 - The property's 16 mining claims are marketed to investors at \$150 Million each.
 - No mine redevelopment yet.
- Three separate valuation reports in 2002-2003 by geological engineering consulting companies for 322 000 acres (130 000 ha) of coal and hydrocarbon rights in Montana gave the value as US\$5 Billion, \$8 Billion, and \$361 Billion.
 - The mineral rights holder failed to raise \$50 Million by 2008 to drill the resources.

Misleading Valuations

- An operating quarry in Connecticut is valued by a certified appraiser at \$2.4 Million for a 2004 State Government taking for a highway
 - After the State had paid \$3.2 Million for the 150 thousand ton crushed stone inventory: \$21/ton
 - The court awards \$27 Million plus interest

In all five cases, only the income approach was used.

Generally serious flaws can be identified if detailed review can be performed.

Sales Comparison Approach Rarely Employed

- Most minerals appraisers have no training in sales comparison adjustments.
- Real estate appraisers who attempt mineral property appraisals use small adjustments (10% - 30%) appropriate for houses.
- Large value adjustments, sometimes >100%, are necessary for mineral property comparisons, such as tonnage, grade, and risk. Total adjustments may be greater than 10-fold.

Transaction Comparisons Across Borders

- Often said that it is not possible to compare transactions across regional or national borders.
- Company managers track how much their competitor paid for that copper property or mine in Chile, Peru, Canada, Australia, or the Democratic Republic of Congo.
- Many companies invest around the world.

Transaction Analysis

- Transaction Analysis is used for generating market derived inputs for all three Appraisal Approaches.
- For example, the information generated here can be used to build cash flow models for extracting market Internal Rates of Return (discount rates).
- Author recommendation: Convert the transactions to a common unit basis for use in the Sales Comparison Approach.

Possible Components of the Transaction Analysis

Acquisition Date

Buyer - Major or Minor player

Acquisition Type - Company or Property

Interest Purchased - Ownership or rights; percentage

Price paid for comparison component - real property, mineral rights

Geology

Development Status

**Reserve Category Quantities – Proven and Probable
Resource Category Quantities – Measured, Indicated,
Inferred**

Adjust to a common certainty or value basis - reserve equivalent tonne/kg/oz

Price paid per unit (e.g. reserve equivalent kg)

Exploration/Development/Expansion Potential

Annual Production Rate Seller

Annual Production Rate Buyer

Life of Mine, Production Years

Mine Type - Surface, underground, mixed

Products, Important By-product

Production Loss/Product Recovery %

Investment Planned Buyer

Product Price or Price Forecast

Royalty Rate

Operating Cost per unit of production

Sales, General and Administrative, % of sales

Net Income before income taxes, per unit or % sales

Comments - Additional information

Possible Components of the Sales Comparison Approach

Adjust Transaction Unit Values to the Subject of the appraisal

Adjustment Bases

Agreement/Sales date

Effective Date of Valuation

Price Paid per unit (e.g. \$/reserve equivalent tonne)

Long Term Product Price Expected

First adjust unit price paid to Effective Date of Valuation

Adjust long term product price to Effective Date of Valuation

Possible Components of the Sales Comparison Approach

Adjustment factors may contain overlapping components. Be careful to avoid double counting of the influence of components

Adjustment Factors

Minority Interest

Project Development Status

Deposit Grade

Deposit/Project Size

Property Control and Security of Tenure

Capital Investment Requirement

Operating Cost/Net Operating Income

Production Loss/Recovery /Metallurgical Complexity

Product Quality

Product Market Stability

Discovery and Expansion Potential

Location and Access

Infrastructure

Permitting Issues

Reclamation

Country Risk

Project Risk

Taxes, Royalties, Levies

Brookfield Quarry, Connecticut Transaction Analysis and Sales Comparison Analysis

Photo 1: Brookfield Quarry, Connecticut:
Subject

Photo 2: New Milford Quarry, Connecticut:
Transaction 1





Table 1. Appraisal 1 - Transaction Analysis for 4 Transactions

Acquisition	Subject Property Brookfield CT	Transaction 1 New Milford CT	Transaction 2 Montrose CO	Transaction 3 East Granby CT	Transaction 4 Naugatuck CT
Acquisition Date	29 July 2004	Q2 2006	Q2 2005	7-Jul-95	3-Jun-03
Buyer	Major aggregates producer likely	O&G	Sky Ute S&G	Tilcon	Haynes
Acquisition Type		Company acquired	Company acquired	Property acquired	Property acquired
Price Paid		\$37m	\$8.9m	\$13.465m	\$1.225m
Property Interest Purchased ¹	Minerals and surface	Minerals and surface	Minerals and surface	Minerals and surface, including batch plants	Minerals and surface
Price for Real Property Component		\$32m	\$7.15m	\$9.965m for land + minerals; \$3.5m surface structures	\$1.225m
Production Status (Seller)	433k tpy sold, growing to 644k tpy	250k - 300k tpy sold	Est 50k tpy + temp mthly leased prodn.	av 1.0m tpy (0.75-1.5m tpy)	30k -40k tpy sold
Production Planned (Buyer)	660k tpy gross, yielding 644k tpy net sales	1.0m tpy gross, yielding 900k tpy net sales	Grow sales over 3 years to 300k tpy.	av 1.0m tpy	250k - 400k tpy
Investment Planned by Buyer	\$1.5m P&E	\$10m P&E (net)	\$2.8m P&E (net)		\$2m P&E
Geology	½ granitic gneiss and harder rock, ½ dolomitic marble, with minor schist late in mine life. Negligible overburden.	Dolomite, flat lying, some overburden.	Sand & gravel, flat lying 36 - 60ft thick, 2 - 3ft overburden.	Trap rock (basalt)	Granite <i>in situ</i> covered by average >10ft mix of boulders, sand and clay.
Reserves - tons	14.7m	~30m	8m	25m	12m
Resources, excluding Reserves - tons		~30 - 50m	5.7m	19m (+ more inferred)	0
Reserve Equivalent Acquisition Price, per ton		\$0.61	\$0.66	\$0.31 ²	\$0.102
Life of Mine, production yrs	22	Seller >100 Buyer 70	Seller 80 Buyer 30	Seller 28 Buyer	Buyer 30 - 50
Product	Crushed stone, including CTDOT spec approved granitic gneiss.	Manufactured sand, crushed stone	½ sand, ½ crushed stone	Crushed stone, including to CTDOT spec	Crushed stone; some sand and silt
Production Loss	≤2.5%	Seller ~20% Buyer ≥10%	Seller ? Buyer <1%		Up to 40% in boulder-debris mix
Product Price \$/ton	Seller av \$10.25/t Buyer av ~\$12.50/t	Seller av est \$10.00/t Buyer av ~ \$12.40/t	Seller av \$6.80/t Buyer av \$8.50/t	Seller av \$7.48/t (1994) Buyer av \$7.65/t (1996)	Buyer \$9.50/t
Direct Operating Cost (incl loading sales) per ton	\$4.50	Seller \$7.50 - 8.00 Buyer \$5.25	Seller >\$5 Buyer \$5.00	Seller \$3.66/t Buyer \$4.35/t	Buyer \$6.10/t
Sales General and Administrative, percent sales	Seller 13% Buyer 15%	Seller 13% Buyer 8%	Seller 20% Buyer 13%	Seller 6% Buyer 8% (actual)	Buyer 18%
Return to Management, percent of sales	Seller 15% Buyer 15%	Seller 10% Buyer 15%	Seller 5% Buyer 5%	Seller 15% Buyer 10%	Buyer 10%
Net Operating Income, percent of sales	Seller 26% Buyer 32%	Seller 0% Buyer 27%	Seller 0% Buyer 14%	Seller 20% Buyer 15%	Buyer 2%
Comments	Grandfathered, pre-existing, non-conforming use. Little competition -- high barrier to entry. Good highway access to Danbury region and further south.	No highway spec stone. \$3/t trucking disadvantage versus Brookfield. No backlog potential.	Prime location. Intense competition. Buyer plans to capture ½ of regional market. Resource 5.7m ton unlikely mineable.	Quarry is the dominant supplier of hard crushed stone in its market region. Hartford County economy depressed for many years at time of sale.	Distressed sale of failed operation. Acquired by Seller on 7 Mar 2000 for \$1.8m to supply chip-seal market. High operating cost ratio.

Two simplistic Sales Comparison trials using Net Operating Income (NOI) adjustments are followed by the full Sales Comparison Adjustment Table

Note the large (NOI) adjustment multiples derived for Transaction 4, justifying its low acquisition price

Table 3. Appraisal 1 - NOI-Based Trial Adjustment of 4 Transactions to Brookfield Quarry Based on Resource Tonnage

Acquisition	Transaction 1 New Milford CT	Transaction 2 Montrose CO	Transaction 3 East Granby CT	Transaction 4 Naugatuck CT
Acquisition Date	Q2 2006	Q2 2005	7-Jul-95	3-Jun-03
Buyer	O&G	Sky Ute S&G	Tilcon	Haynes
Reserve Equivalent Price, per ton	\$0.61	\$0.66	\$0.31	\$0.102
Reserve Equivalent Price, 2004\$/t	\$0.55	\$0.61	\$0.36	\$0.108
Av Product Price (Buyer), 2004\$/t	\$11.12	\$7.29	\$8.90	\$10.09
<u>Adjustments to Reserve Equiv Price:</u>				
Extreme Reserve Life Correction	+125%	+30%	+25%	+65%
Adjusted Reserve Equiv Price, \$/ton	\$1.24	\$0.79	\$0.46	\$0.18
Brookfield Buyer's Net Operating Income, \$/ton	\$4.00	\$4.00	\$4.00	\$4.00
Buyer's Net Operating Income, \$/ton	\$3.00	\$1.02	\$1.34	\$0.20
Ratio Brookfield NOI to Transaction Buyer's NOI	1.33	3.92	3.00	19.82
Brookfield Reserve, \$/ton	\$1.65	\$3.11	\$1.37	\$3.54
Subject Value (million)	\$24	\$46	\$20	\$52
Less P&E value (million):	\$1	\$1	\$1	\$1
Subject Real Property (million):	\$23	\$45	\$19	\$51

Table 4. Appraisal 1 - Trial NOI-Based Adjustment of 4 Transactions to Brookfield Quarry Based on Purchase Price and Expected Annual Production Rate

Acquisition	Transaction 1 New Milford CT	Transaction 2 Montrose CO	Transaction 3 East Granby CT	Transaction 4 Naugatuck CT
Acquisition Date	Q2 2006	Q2 2005	7-Jul-95	3-Jun-03
Buyer	O&G	Sky Ute S&G	Tilcon	Haynes
Purchase Price Real Property (million)	\$32.00	\$7.15	\$10.665	\$1.225
Acquisition Investment, 2004\$(million)	\$28.69	\$6.66	\$12.54	\$1.301
Av Product Price (Buyer), 2004\$/t	\$11.12	\$7.29	\$8.90	\$10.09
Brookfield Buyer's Net Operating Income, \$/ton	\$4.00	\$4.00	\$4.00	\$4.00
Buyer's Net Operating Income, \$/ton	\$3.00	\$1.02	\$1.34	\$0.20
Ratio Brookfield NOI to Transaction Buyer's NOI	1.33	3.92	3.00	19.82
Brookfield's Long Term Production Rate, tons/year	644,000	644,000	644,000	644,000
Transaction's Projected Long Term Production Rate, net tons/year	900,000	300,000	1,000,000	350,000
Ratio Brookfield's Production Rate to Transaction's	0.72	2.15	0.64	1.84
Subject Value = Acq Inv't x NOI ratio x Production ratio (million)	\$27.35	\$56.07	\$24.20	\$47.45
Less Brookfield P&E value (million):	\$1.00	\$1.00	\$1.00	\$1.00
Brookfield Real Property Value \$million	\$26.4	\$55.1	\$23.2	\$46.5

Table 2. Appraisal 1 - Adjustment of 4 Transactions to Subject Brookfield Quarry Property

Acquisition	Transaction 1 New Milford CT	Transaction 2 Montrose CO	Transaction 3 East Granby CT	Transaction 4 Naugatuck CT
Acquisition Date	Q2 2006	Q2 2005	7-Jul-95	3-Jun-03
Buyer	O&G	Sky Ute S&G	Tilcon	Haynes
Reserve Equivalent Price, per ton	\$0.61	\$0.66	\$0.31	\$0.102
Reserve Equivalent Price, 2004\$/t	\$0.55	\$0.61	\$0.36	\$0.108
Av Product Price (Buyer), 2004\$/t	\$11.12	\$7.29	\$8.90	\$10.09
<u>Adjustments to Reserve Equiv Price:</u>				
Extreme Reserve Life Correction	+125%	+30%	+25%	+65%
Reclaimed Land Sales	0%	-15%	0%	0%
Net Operating Income	+30%	+130%	+100%	+700%
Production Loss	+10%	0%	0%	+25%
P&E Investment	+20%	+20%	0%	20%
Production Expansion Capability above short term plans	-25%	-10%	-15%	-20%
Non-Conforming Pre-existing Use and Other Permit Issues	+30%	+30%	+15%	0%
Sand Production	-15%	-15%	0%	0%
State Highway Specification Rock	+25%	0%	0%	0%
Competition, Distance to Markets, Barriers to Entry	+50%	+100%	+75%	+100%
Regional Highway Access	+30%	+10%	0%	0%
Ownership of Surface and Minerals	0%	0%	0%	0%
Brookfield Reserve, \$/ton	\$4.29	\$4.07	\$1.56	\$3.43
Subject Value (million)	\$63	\$60	\$23	\$50
Less P&E value (million):	\$1	\$1	\$1	\$1
Subject Real Property (million):	\$62	\$59	\$22	\$49

Transaction Analysis and Sales Comparison Adjustments for the Las Brisas Gold Mining Concessions, Venezuela, February 2006

Nine transactions from around the world are shown here, analyzed and adjusted to the Las Brisas property.

In the Sales Adjustment table, Operating Margins are used to adjust the transactions to the effective date of valuation, due to a rapidly increasing gold price market. Other economic factors are then used in the subsequent adjustments.

Cristinas Camp

North



El Potaso

Boundary Zone

Pozo Azul

Brisas Plain



Acquisition	Transaction 1 Youga, Burkina Faso	Transaction 2 Bermejil, Mexico	Transaction 3 Mayskoye, Russia	Transaction 4 North Mara, Tanzania	Transaction 5 Amapari, Brazil	Transaction 6 Paracatu, Brazil	Transaction 7 Suurikuusikko, Finland	Transaction 8 Guariche, Venezuela	Transaction 9 Choco 10, Venezuela
Agreement Date	9-Sep-03	22-Mar-05	4-Sep-03	8-Jul-03	6-Nov-03	9-Nov-04	12-May-05	19-Jul-05	11-Feb-06
Buyer	Etruscan	Goldcorp	Highland Gold	Placer Dome	Wheaton River	Kinross	Agnico-Eagle	Hecla	Gold Fields Ltd
Acquisition Type	Corporation acquired	Property acquired	Corporation acquired	Corporation acquired	Corporation acquired	Corporation acquired	Corporation acquired	Corporations acquired	Corporation acquired
Property Interest Purchased	90% interest in concessions	Deposit 100%	100% of license	100% of mine and 423 sq km tenements	100% of deposit	Remaining 51%, giving 100% control	Remaining 86%, giving 100% control	100% interest in concession	95% interest in concession
Deposit/Mine Acquisition Price Component	\$5.5m	\$70m	\$34.9m	\$288m	\$105m	\$261.2m (for 51%)	\$121m (for 86%)	\$4,525,000	\$353m (for 95%)
Development Status	Preliminary feasibility study	Indicated Resources only	Undeveloped	New operating open pit mine	Mine Design	Operating open pit mine	Indicated Resources and drilling	M&I Resource	New operating open pit mine
Development Investment Planned	Feasibility Study	Feasibility study	\$90m for mine construction	50% capacity increase considered	\$54m for initial mine construction	\$112m for SAG mill	Feasibility Study in progress	Exploration and evaluation drilling	\$50m expansion
Reserves- P&P, oz Au	664,800	0	3,680,000 (non- CRIRSCO)	2,940,000	1,390,000	8,485,000	0	N/A	1,223,000
Resources- M&I, oz Au Excluding Reserves	81,200	2,370,000	8,970,000	1,310,000	300,000	22,000	1,950,000	373,816	502,000
Resources- Inferred, oz Au	510,000	0		102,500	1,000,000	0	1,060,000	519,547	1,700,000
Total, oz Au	1,256,000	2,370,000	12,650,000	4,350,000	2,690,000	8,505,000	3,010,000	893,363	3,400,000
Reserve Equivalent Price, per oz Au	\$8.67	\$59.07	\$8.14	\$79.56	\$58.66	\$60.28	\$112.90	\$14.35	\$196.00
Life of Mine, production yrs	5.5	10	30+	10+	11	27	N/A	N/A	10+
Mine Type - Open pit, underground, or combination	Open pit	Open pit	Combination	Open Pit	Open pit, then underground	Open pit	Combination	Open pit	Open pit
Operating Cash Cost per oz Au	\$255	\$200	\$160-170	\$200	Open pit \$144; underground \$195	\$220	High	N/A	\$185
Gold Recovery	93%	60-65%	>90%	89%	90 - 94%	78%	Difficult	N/A	93%
Important By-product	No	No	Ag	No	No	No	No	No	No
Au Price at Agreement Date, \$/oz	\$382.25	\$432.50	\$370	\$348.15	\$380.25	\$431.90	\$424.20	\$419.25	\$544.40
Comments	\$1m assumed paid for tenements. Govt. NPI 10%	Combined with sister Los Filos pit	Russian 6% royalty assumed	\$10m assumed paid for exploration tenements		0.33% royalty and 1.0% tax on net sales	\$10m for other assets; complex metallurgy; 2% NSR royalty	\$2m assumed for tenements	\$10m assumed paid for exploration tenements

Table 8- Side-by-side Comparison of the 9 Transactions

Sales Adjustment Factors

- Time and Price adjustment: Adjusts for change in gold price, to that at the effective date of valuation. This percentage adjustment factor is the ratio of the operating margins at the two dates.
- Developed v. Undeveloped Reserve adjustment
- Reserves v. Resources balance adjustment
- Deposit/project size adjustment
- Open Pit v. Underground Mining adjustment
- Operating Cost (including energy price factors) adjustment
- Country Risk adjustment
- Other Risk adjustment

Acquisition	Transaction 1 Youga, Burkina Faso	Transaction 2 Bermejil, Mexico	Transaction 3 Mayskoye, Russia	Transaction 4 North Mara, Tanzania	Transaction 5 Amapari, Brazil	Transaction 6 Paracatu, Brazil	Transaction 7 Suurikuusikko, Finland	Transaction 8 Guariche, Venezuela	Transaction 9 Choco 10, Venezuela
Agreement Date	9-Sep-03	22-Mar-05	4-Sep-03	8-Jul-03	6-Nov-03	9-Nov-04	12-May-05	19-Jul-05	11-Jan-06
Buyer	Etruscan Resources	Goldcorp Inc.	Highland Gold Mining	Placer Dome	Wheaton River	Kinross	Agnico-Eagle	Hecla	Gold Fields
Reserve equivalent price, \$/oz Au	\$8.67	\$59.07	\$8.14	\$79.56	\$58.66	\$60.28	\$112.90	\$14.35	\$195.70
Au price at agreement date, \$/oz	\$382.25	\$432.50	\$375.00	\$348.15	\$380.25	\$431.90	\$424.20	\$419.25	\$544.40
Au price at 10-Feb-06, \$/oz	\$557.00	\$557.00	\$557.00	\$557.00	\$557.00	\$557.00	\$557.00	\$557.00	\$557.00
Time and Price adjustment	+150%	+70%	+90%	+140%	+95%	+65%	+70%	+70%	+5%
Developed v. Undeveloped Reserve adjustment	0%	0%	0%	-50%	0%	-40%	0%	0%	-40%
Reserves v. Resources balance adjustment	0%	0%	+20%	0%	0%	0%	0%	0%	+10%
Deposit/project size adjustment	+100%	+50%	0%	+25%	+30%	0%	+30%	130%	0%
Open Pit v. Underground Mining adjustment	0%	0%	+50%	0%	+25%	0%	+50%	0%	0%
Operating Cost (including energy price factors) adjustment	+50%	+30%	+20%	+20%	+20%	+20%	+20%	+10%	0%
Metallurgical complexity and recovery adjust	-20%	+20%	+10%	-15%	-15%	+10%	+10%	-20%	-20%
Valuable Byproduct adjustment	+20%	+15%	+15%	+20%	+20%	+30%	+15%	+25%	+25%
Discovery and expansion potential adjustment	-20%	0%	-10%	-20%	-10%	+20%	-30%	-10%	-25%
Location and Access adjust	+20%	-15%	+30%	0%	0%	0%	+15%	+20%	0%
Country Risk adjustment	0%	-50%	0%	0%	-50%	-50%	-60%	0%	0%
Other Risk adjustment	0%	-15%	+80%	0%	0%	0%	-10%	+15%	0%
Taxes, Royalty, Levies adjust	+10%	0%	+10%	0%	-5%	-5%	-5%	0%	0%
Brisas Reserve, oz Au	\$65.92	\$97.62	\$97.90	\$116.86	\$97.26	\$58.37	\$156.41	\$76.66	\$101.72
Brisas Resource (M&I), oz Au	\$32.96	\$48.81	\$48.95	\$58.43	\$48.63	\$29.19	\$78.21	\$38.33	\$50.86
Subject Value (million)	\$781	\$1,157	\$1,160	\$1,384	\$1,152	\$692	\$1,853	\$908	\$1,205

Table 9- Sales Comparison Adjustment Grid

Reconciliation and Final Estimate of Market Value for Brookfield Quarry

Value derived from mining:

Sales Comparison Approach: \$55 million

Income Approach: \$30 million

Reconciled value from mining: \$45 million

Add value derived from concurrent backfilling with clean fill and reclaimed land sale:

Income Approach: \$25 million

Total Market Value: \$70 million