Reconciling AISC to Mineral Property Valuations

Denver Gold Group Presentation

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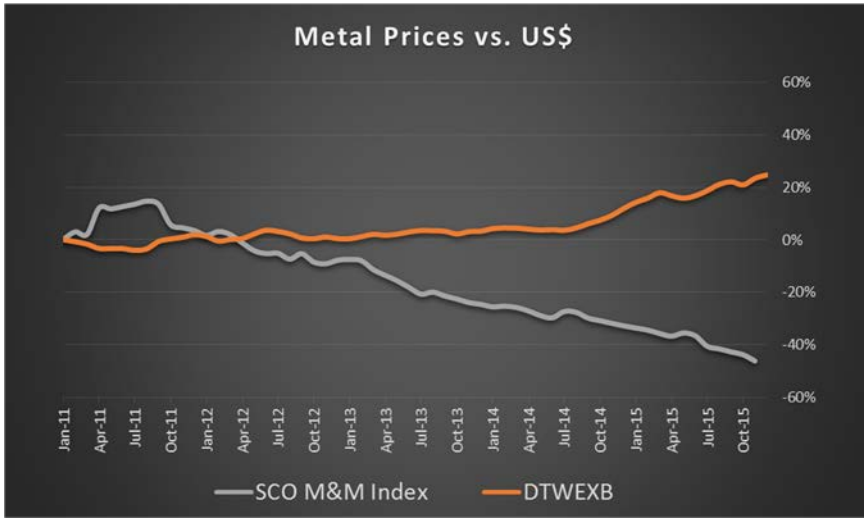
January 26, 2016 (Vancouver, BC)

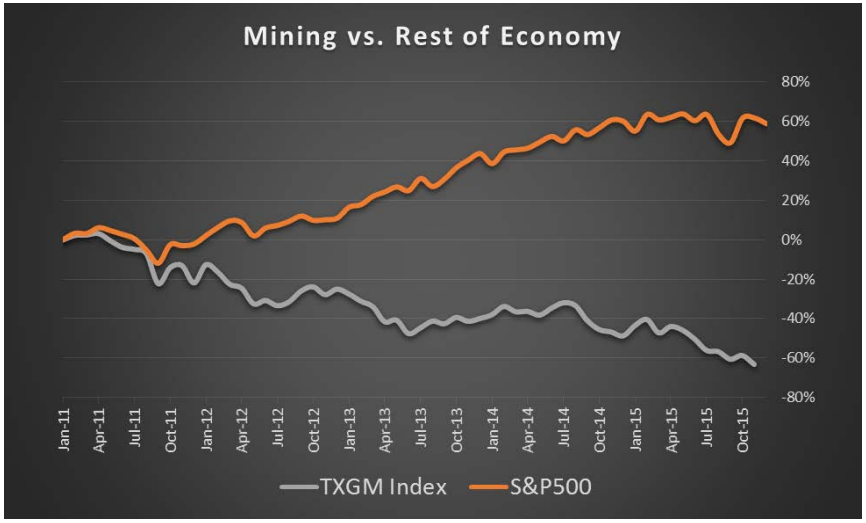
srk consulting

Why This Presentation?

Macroeconomic Trends Have Not Been Kind to the Mining Industry

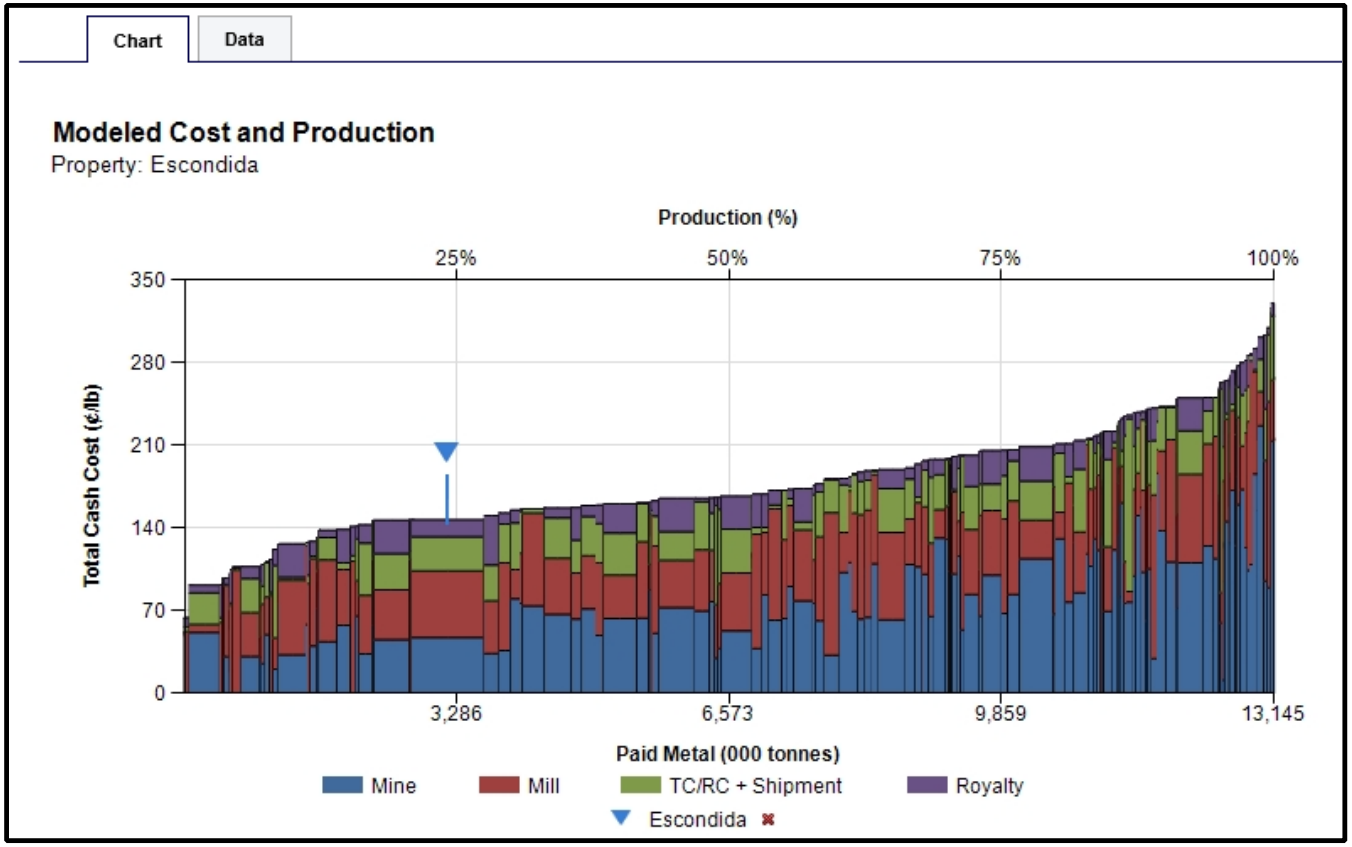
- As of December, 2015 five straight year of YoY metal price declines and accompanying market cap losses





Why This Presentation?

Cost curve position is currently main differentiator of value in this period of low metal prices!



SNL Mine Economics Copper Cost Curve (2016)

Why This Presentation?

But confusion is rampant in the industry about how such costs are complied and defined in a consistent manner

- Adjusted Operating Costs
- All-in Sustaining Costs
- All-in Costs
- C1, C2, and C3 costs
- FOB, CIF, and CFR basis
- By-product vs. Co-product basis
- Cash vs. Non-Cash
- Recovered vs. Payable units

Agenda

The goals of this presentation are three-fold:

1) Review AISC format and discuss overall cost reporting issues and how SRK deals with them;*

2) Discuss SRK Total Cash Cost methodology for cost reporting of greenfield and brownfield mineral projects that are reported in NI 43-101 technical reports (PEA, PFS, FS); and

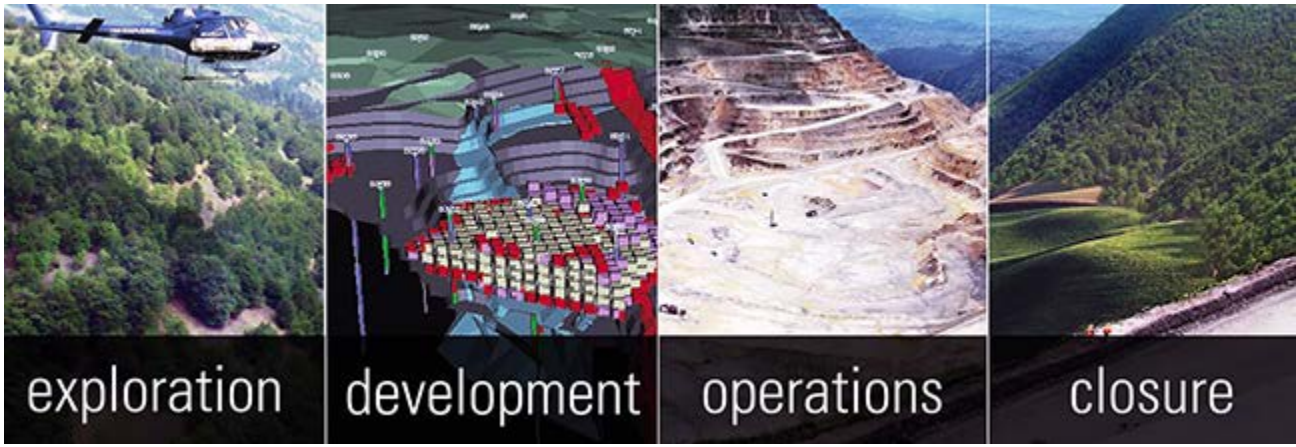
3) Reconcile the differences between SRK and AISC methods.

*in the context of technical-economic valuations using Discounted Cash Flow analysis (aka Income Approach) for greenfield and brownfield mineral projects assuming 100% equity basis for Life of Mine (LoM) period between start of commercial production through final year of production and any subsequent post closure costs.

Key Facts about SRK

Highlights

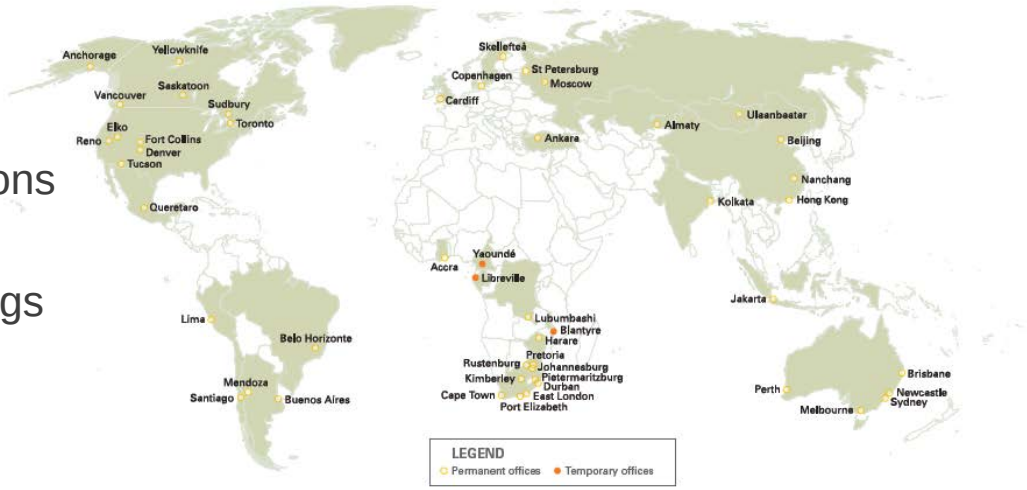
- Established in 1974
- Over 1,400 staff and 150 associates
- 45 offices worldwide
- Primarily in mining industry
- Provide specialist services from exploration through closure
- Owned by employee shareholders



Valuation Portfolio

Project Valuations Supporting

- Feasibility studies
- Audits/Due Diligences/IE Investigations
- Benchmarking
- Financing and Stock Exchange listings
- M&A transactions
- Litigation and arbitration (i.e. ICSID, ICC, UNCITRAL)



By Geography

- Offices in 26 countries
- Located on 6 continents

By Commodity

- Base and precious metals
- Ferrous and speciality metals
- REE
- Coal, uranium, oil sands
- Industrial minerals

Relevant Experience:

- SRK Denver valuation work is generally split 50/50 between technical studies and investment transactional support.
- Thus we both calculate our own valuations and audit outside valuations.

Grant Malensek - Personal Background

- 1987: B.Sc in Geological Sciences from UBC
- 1987-1999: 12 years of international mine exploration and project development experience (Canada, PNG, Indonesia, USA, and S. America)
- 1997: M.Eng Geological Engineering from CSM with minor in Mineral Economics
- 2000-2008: US West/Qwest – Telecom finance
- 2008-2012: Newmont - Project Business Analysis team
- 2012-Present: SRK Consulting (US) Principal Consultant – Mineral Project Evaluation

NI 43-101 Guidelines

No formal mention of cost reporting in NI 43-101 technical reports

Item 22: Economic Analysis – Provide an economic analysis for the project that includes:

(a) a clear statement of and justification for the principal assumptions;

(b) cash flow forecasts on an annual basis using mineral reserves or mineral resources and an annual production schedule for the life of project;

(c) a discussion of net present value (NPV), internal rate of return (IRR), and payback period of capital with imputed or actual interest;

(d) a summary of the taxes, royalties, and other government levies or interests applicable to the mineral project or to production, and to revenue or income from the mineral project; and

(e) sensitivity or other analysis using variants in commodity price, grade, capital and operating costs, or other significant parameters, as appropriate, and discuss the impact of the results.

Current Cost Reporting Methodologies

Two current (Non-GAAP) reporting systems in use today

1) World Gold Council guidelines for precious metal cost reporting*

- Adjusted Operating Costs
- All-in Sustaining Costs
- All-in Costs

*Includes minor non-cash adjustments

2) Wood-McKenzie guidelines for base metal cost reporting**

- C1 Cash Costs
- C2 Cash Costs
- C3 Cash Costs

**Includes significant non-cash items like depreciation and amortization

WGC - Adjusted Operating Costs

Basically operating costs as follows:

- On-site mining costs
- On-site G&A costs
- Royalties/production taxes
- Hedging impacts on operating costs
- Community relations costs
- Permitting costs
- 3rd party smelting, refining, and transport costs
- Non-cash remuneration (site-based)
- Stockpiles/product inventory write-downs
- Operational stripping costs
- By-Product credits

= Subtotal Adjusted Operating Costs

WGC All-In Sustaining Costs (AISC)

Add corporate expenses plus "sustaining" and reclamation capital related to operations

Adjusted Operating Costs; plus

- Corporate G&A
- Reclamation and remediation costs
- Exploration and study costs (sustaining)
- Capital exploration (sustaining)
- Capitalized OP stripping and UG development (sustaining)
- Capital expenditures (sustaining)

= All-in Sustaining Costs

WGC All-In Costs (AIC)

- **Everything else not related to a company's current operations**

All-In Sustaining Costs; plus

- Permitting & Social Responsibility costs
- Exploration and study costs
- Capital Exploration
- Capitalized OP stripping and UG development
- Capital Expenditures

= All-in Costs

For mineral project valuations, these costs are not considered since they do not contribute to the value of the business case in question.

AISC – Main Issues

- Omissions and errors in cost estimates
  - i.e. excluding concentrate TC/RC and freight costs since they are part of a NSR calculation, also not adding smelter penalties

- More stringent definitions needed for:
  - by-product vs. co-product treatment;
  - sustaining capital;
  - G&A; and
  - exploration spending.

- AISC also does not account for
  - working capital;
  - income taxes;
  - acquisition costs and development capital; and
  - financing charges.

By-Product vs. Co-Product Rule of Thumbs

By-Product

- ROT – one or more commodities each contribute less than 20% of total LoM revenue stream
- Becomes a credit against operating costs
- Costs reported on a $/payable unit of primary metal
- i.e. Au (87%) / Ag (13%) = US$/oz Au with Ag revenue counted as by-product credit against costs

Co-Product

- ROT – two or more commodities each contributes greater than 20% of total LoM revenue stream
- Is not credited against direct operating costs
- Costs reported on a $/equivalent payable unit of the primary metal
- i.e. Au (57%) / Ag (43%) = US$/oz Au equivalent with no credit against costs

By-Product vs. Co-Product Rule of Thumbs

By-Product

- Metal prices: $1000 Au, $15 Ag
- Production: 1,000 oz Au, 10,000 oz Ag
- Revenue: $1,000,000 Au, $150,000 Ag (~13%)
- Cash Cost: $700,000
- Cash Cost after by-product credit: $700k - $150k = $550k
- Cash Cost: $550k / 1,000 oz Au = $550 / oz Au

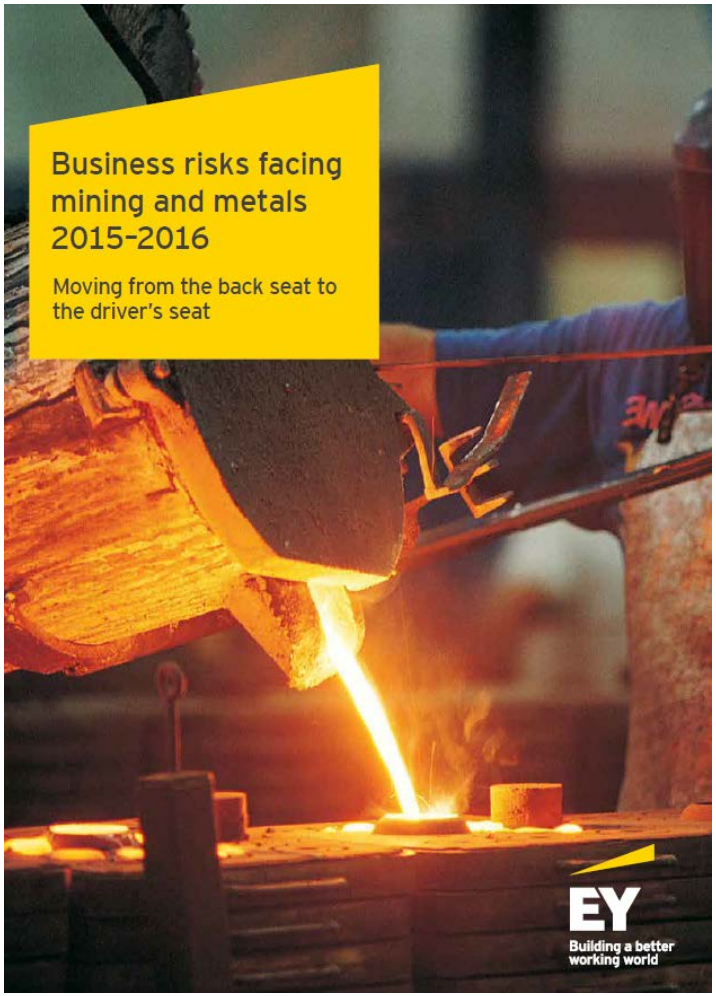
Co-Product

- Metal prices: $1000 Au, $15 Ag
- Production: 1,000 oz Au, 50,000 oz Ag
- Revenue: $1,000,000 Au, $750,000 Ag (~43%)
- Cash Cost: $700,000
- Gold Eq Oz: (1,000 oz Au + ($15/$1000*50,000 oz Ag) = 1,750 oz AuEq
- Cash Cost: $700k / 1,750 oz AuEq = $400 / oz AuEq

Sustaining Capital, G&A, & Exploration

1. Sus Capex – If capex expenditure during LoM results in increase of annual nameplate capacity of >5% going forward, then it is defined as expansion / development capital and not included per current cost reporting methods;
2. G&A – Mineral project valuations rarely, if ever, include corporate G&A costs. However, site and regional office support costs (if present) are included; and
3. Exploration – never include exploration and study costs that don't add additional production in the mine schedule in the valuation (off-mine cost)

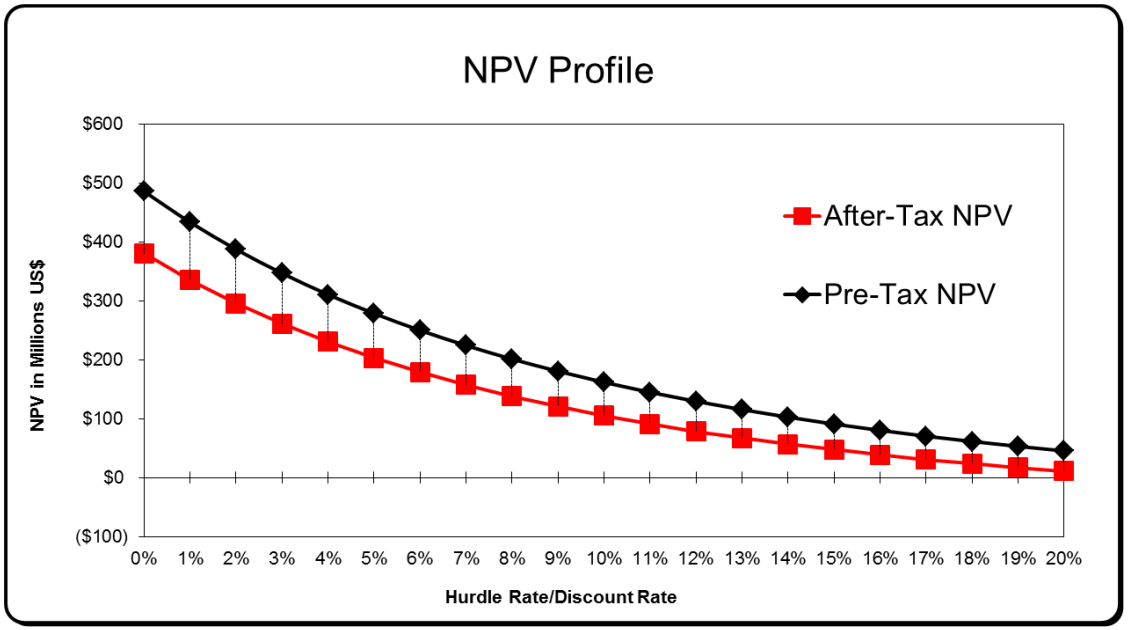
Taxation - E&Y 2015-16 Mining Risks



1. Switch to Growth
2. Productivity improvement*
3. Access to capital
4. Resource nationalism*
5. Social license to operate*
6. Price and currency volatility
7. Capital projects
8. Access to energy*
9. Cybersecurity
10. Innovation*

Income Taxes – Impact on Valuation

Major effect - must be accounted for but not currently included in any cost methodology!



Income taxes can add 300-400 basis points to a discount rate in a mineral project valuation

There's one for you, nineteen for me.
– Taxman, The Beatles, 1966

Taxation Regimes

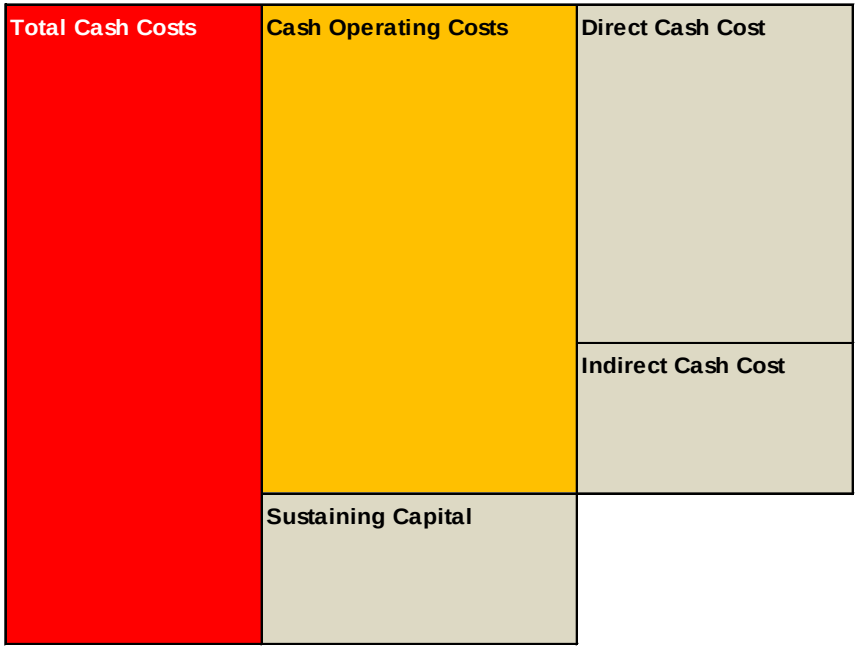
IMF definitions (Sunley and Baunsgaard, 2000)

1. Royalty/Severance tax – already in cost reporting
   a) Production (based on volume of minerals extracted)
      - $/t ore mined
   b) Ad valorum (based on value of minerals extracted)
      - Gross revenue
      - NSR (gross revenue less TC\RC & freight costs)
      - Profit (NSR less OpEx)

2. Corporate Income tax – imposed on normal return and rent - not included in cost reporting

3. Resource rent tax – to capture a larger share of higher return and rent projects - not included in cost reporting

SRK Total Cash Cost Methodology for Mineral Project Valuations for NI 43-101 TR

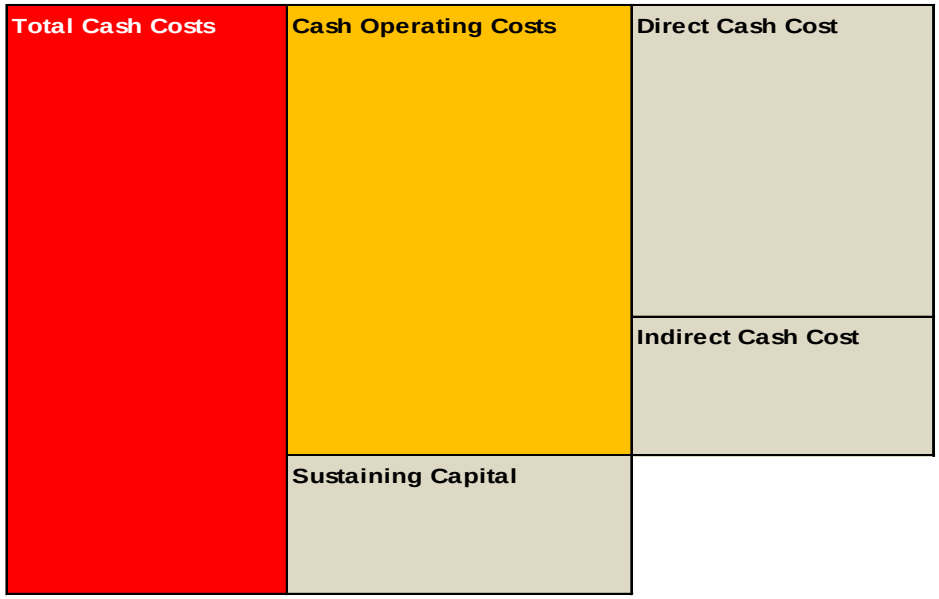


- Direct Cash Costs: costs incurred to produce & sell payable product
- Indirect Cash Costs: costs incurred to keep LLO & SLO in compliance
- Sustaining Capital: investment in assets with >1 year useful life required to "keep the lights and/or pumps on" at designed nameplate capacity

SRK Total Cash Cost Methodology for Mineral Project Valuations for NI 43-101 TR

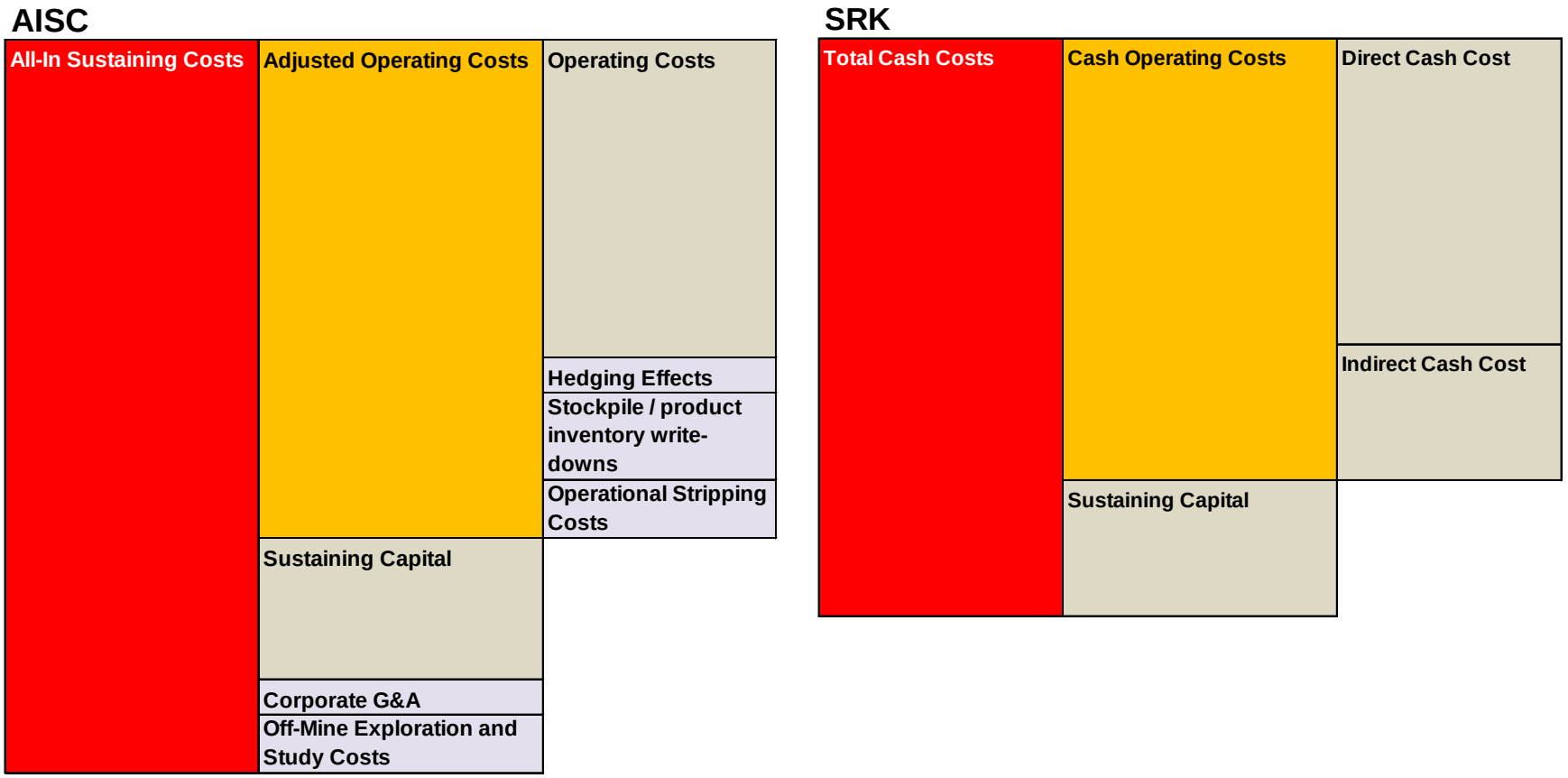
Direct Cash Cost	mining processing leaching, solution pumping, solvent extraction and electrowinning on-site general and administrative expenses any associated services essential to the operation (tailings, water mgmt, power plant, etc.) smelting/refining charges (i.e. TC/RC) freight/insurance costs (truck, rail, port, ship, aircraft to point of custody transfer) selling/marketing costs by-product credits
Indirect Cash Cost	royalties/production taxes (both private and government) permitting/environmental costs (monitoring, testing, filings, etc.) social responsibility costs (i.e. community infrastructure, sponsorships, etc.) expensed concurrent cash reclamation/closure costs other (i.e. JV mgmt fees, WGC fees, etc.)
Sustaining Capital	mining (i.e. fleet replacement, major rebuilds, OP stripping and UG development) processing (i.e. mill motor replacement) infrastructure (tailings dam embankment lifts, replacing gensets at site power plant, etc.) reclamation/closure (capitalized costs during LoM and/or at EoM)
Total Cash Costs	This format can be used for precious, base, ferrous and industrial minerals.

SRK Total Cash Cost Methodology For Mineral Project Valuations in NI 43-101 TR



- Does NOT include:
  - corporate income taxes
  - working capital
  - financing costs
  - corporate G&A costs
  - non cash adjustments for stockpiles / product inventories

Reconciling AISC to SRK Total Cash Cost

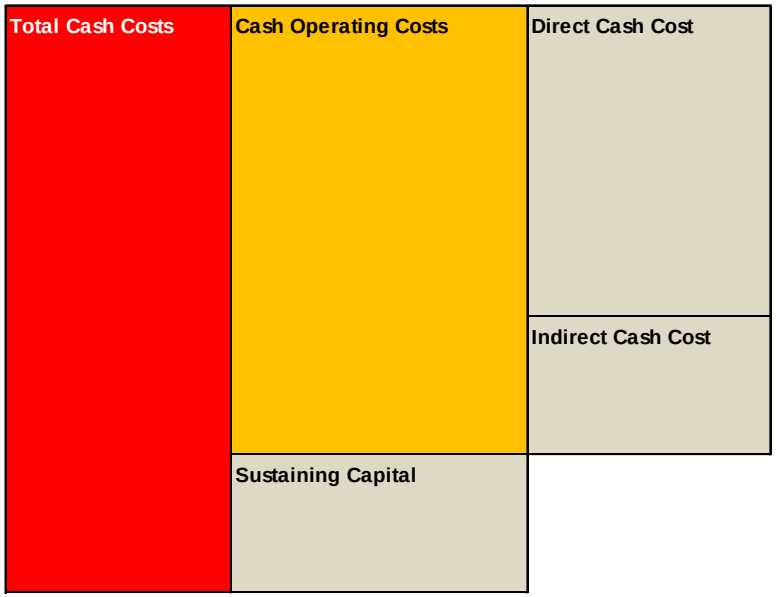


Both methods currently exclude:

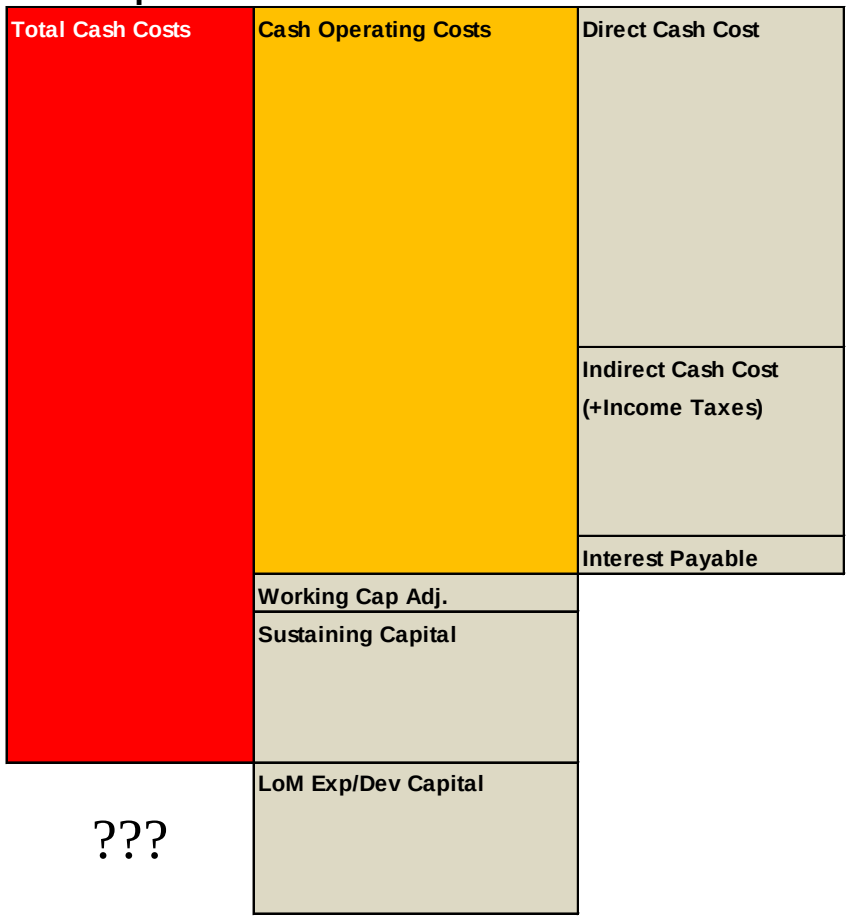
working capital, income taxes, acquisition costs, development capital, and financing

Future?

SRK Current View



SRK Expanded View



The Insidious Hit

IMPAIRMENT CHARGES

(more to follow)

Thanks for the opportunity to share my views about these issues.

Questions?

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Photo credit: Matt Santomarco

Appendix

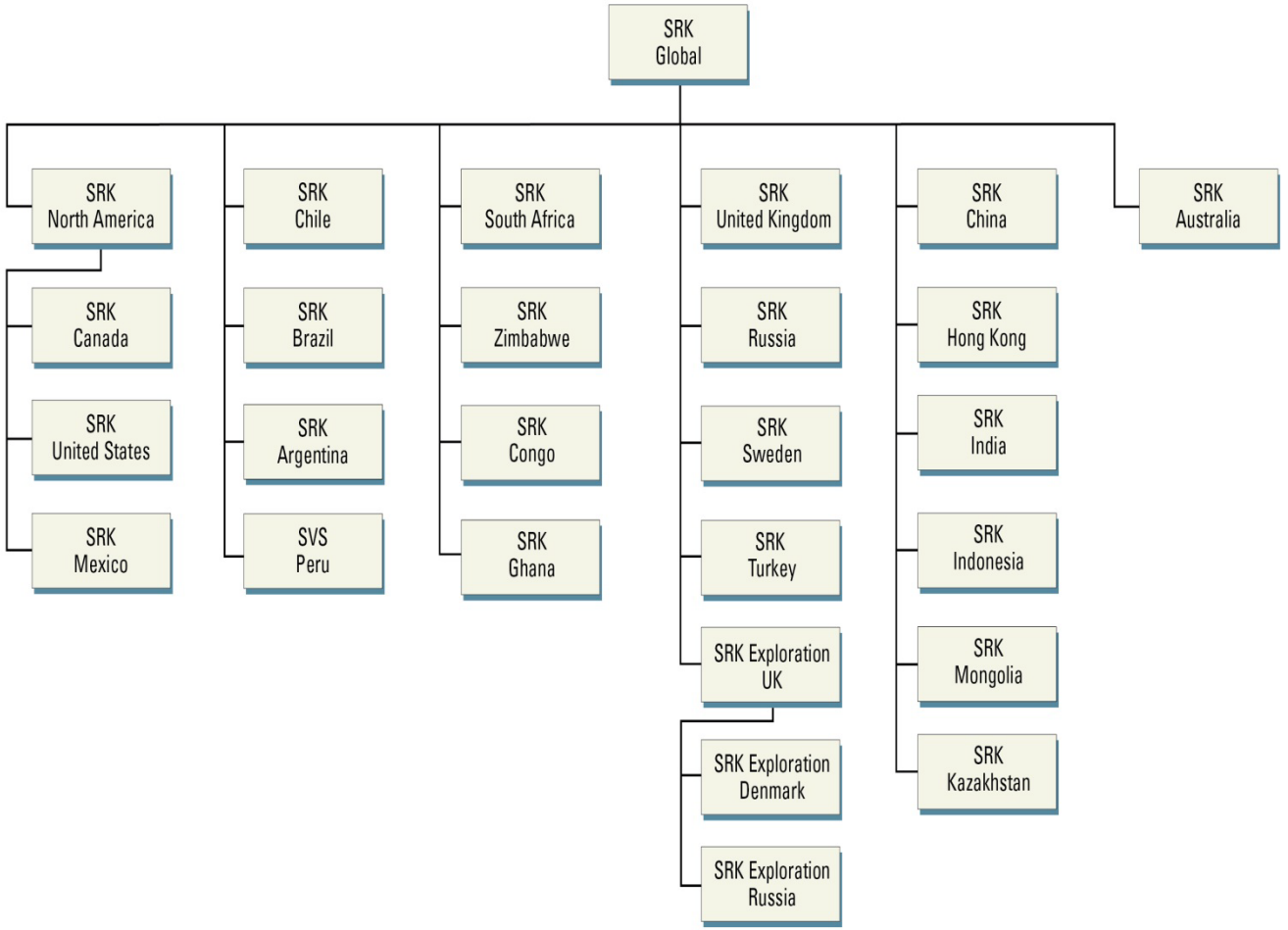
Overview of SRK Group & Services

srk consulting

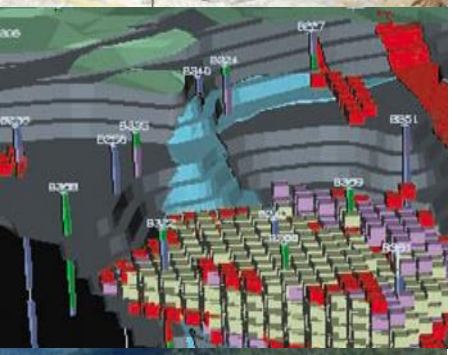
Key facts about SRK

- Established in 1974
- Employs over 1,500 staff augmented with about 150 associates
- Provides specialist services from exploration to mine closure
- Primarily active in the mining industry
- Owned by over 500 employee shareholders

SRK Group

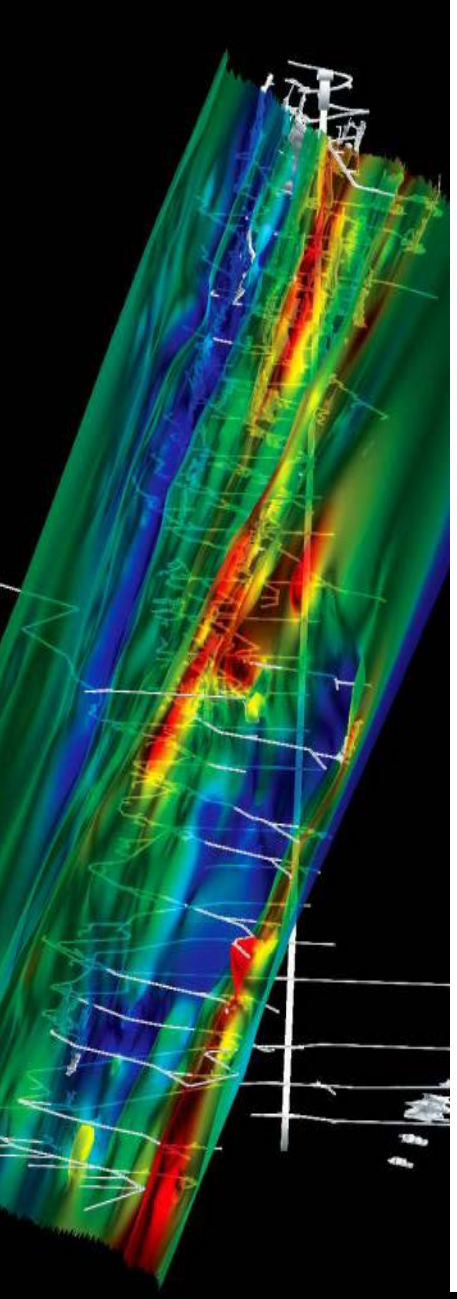

SRK Global
SRK North America
SRK Canada
SRK United States
SRK Mexico
SRK Chile
SRK Brazil
SRK Argentina
SVS Peru
SRK South Africa
SRK Zimbabwe
SRK Congo
SRK Ghana
SRK United Kingdom
SRK Russia
SRK Sweden
SRK Turkey
SRK Exploration UK
SRK Exploration Denmark
SRK Exploration Russia
SRK China
SRK Hong Kong
SRK India
SRK Indonesia
SRK Mongolia
SRK Kazakhstan
SRK Australia

Office locations



Specialist services

- Geology and resources
- Mining
- Geotechnical
- Waste management
- Environmental and geoenvironmental
- Surface water and groundwater
- Mineral economics
- Corporate advisory services



Geology & resources

- Remote sensing
- Structure and alteration
- Resources and reserves
- Independent reporting and due diligence
- Exploration management
- Data management

Geology & resources

Client	Project	Location	Services
AngloGold Ashanti	Mongbwalu Gold	Congo	Structural Geology
Ivanhoe Australia	Osborne Copper–Gold	Australia	NI–43-101 PEA
BNP Paribas	Condestable and Raúl Mines	Peru	Independent Engineer's Report
Cliff Natural Resources	Williams project	Canada	Due Diligence
BHP Billiton	Pinto Valley Copper Mine	USA	Data Management
Teck	Quebrada Blanca Copper Mine	Chile	Resource and Reserve Audit

Mining

- Mine design, planning and scheduling: open pit and underground
- Mine technical audits
- Mine feasibility studies / bankable documents
- Monitoring and completion tests
- Risk assessment and management

Mining

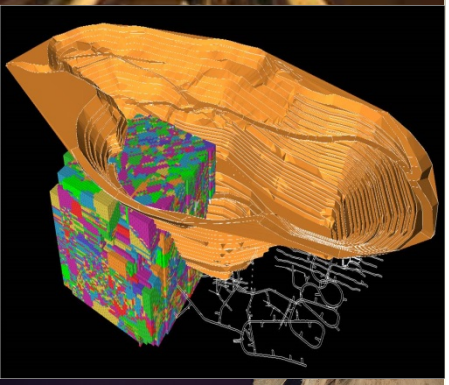
Client	Project	Location	Services
Minera Antamina	Antamina Copper Mine	Peru	Mine Risk Evaluation
Rio Tinto	Diavik Mine	Canada	Mining Method Selection
Guyana Goldfields	Aurora Gold	Guyana	Bankable Feasibility Study
Capstone Mining	Minto Copper–Gold Mine	Canada	Operational Improvement – Mine to Mill Optimization
Areva	Trekkopje Uranium	Namibia	Definitive Feasibility Study

Geotechnical

- Rock slope engineering
- Underground rock engineering
- Mine backfill
- Blast design
- Soil and foundation engineering

Geotechnical

Client	Project	Location	Services
De Beers	Venetia Mine	South Africa	Geotechnical Modelling, Caving Assessment, Mudrush Risk Study
Teck	Highland Valley	Canada	High Level Cave Mining Assessment
Kinross	Kupol Gold Mine	Russia	Geotechnical Review and Training
BHP Billiton	Ekati– Koala Diamond Mines	Canada	Drill & Blast Optimization, UG Study, Mining Geotechnics
Codelco	Chuquicamata Mine	Chile	Geotechnical Mine Design Parameters, Fragmentation Studies
Rio Tinto	Diavik Diamond Mine	Canada	Mudrush Risk Study
Barrick	Kanowna Gold Mine	Australia	Ventilation UG Design Review



Metallurgy and Mineral Processing

- Laboratory and Pilot Plant Testwork
- Flowsheet Design
- Geometallurgical Modelling
- Plant Optimization

Metallurgy & Mineral Processing

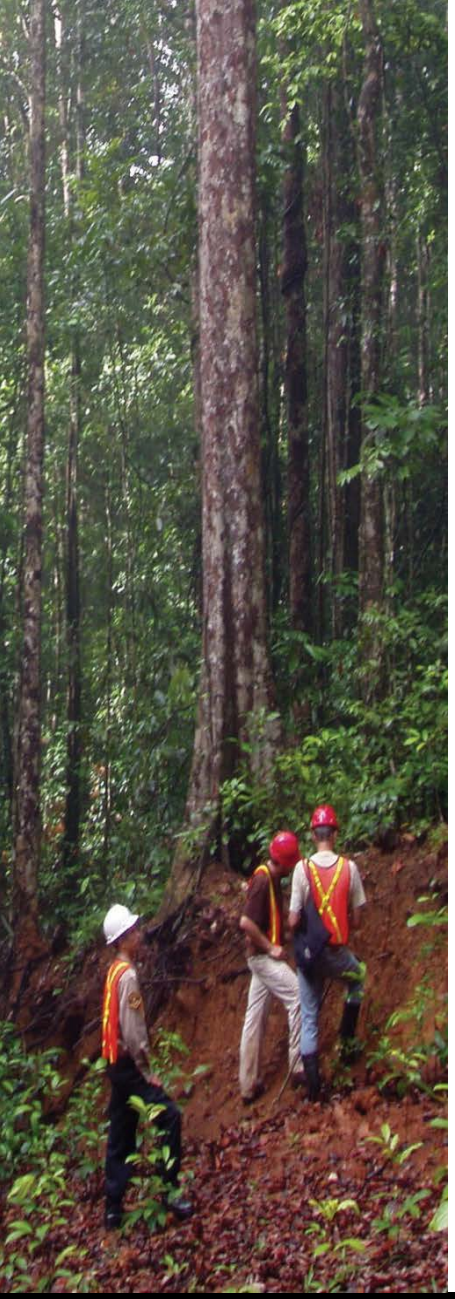
Client	Project	Location	Services
Capstone Mining	Cozamin Co–Pb–Zn Mine	Mexico	Metallurgical Review and Plant Audit
Seafield Resources	Miraflores Gold Project	Colombia	Feasibility Metallurgical Testwork
Nyrstar	UG Campo Morado Mine	Mexico	Grinding and Flotation Circuit Evaluation & Improvements
Nemisa	UG Operation	Mexico	Grinding and Flotation Circuit Modelling
Centerra Gold	Kumtor Mine	Kyrgyzstan	Grinding Circuit Review
Philex Mining	Silangan Project	Philippines	Copper Flotation

Waste management

- Tailings and waste disposal engineering
- Heap leach design and optimization
- Industrial waste disposal
- Effluent treatment

Waste management

Client	Project	Location	Services
Teck	All 6 mining operations	Canada	Full–Scope Geochemistry, Quality and Water Management
Agnico Eagle	La India Gold	Mexico	Heap Leach Water Quality Assessment
Chevron Mining Inc.	Questa Mine	USA	Wastewater Treatment Package
Ma'aden	Al Jalmid	Saudi Arabia	Thickened Tailings Phosphate Disposal
Barrick	Cerro Casale	Chile	Geochemistry related to Waste Management
Kinross	Fruta del Norte	Ecuador	Geochemical Characterization
Anglo American	Mogalakwena Platinum Mine	South Africa	Pilot Paste and Tailing Dam Conversion
Newmont	Batu Hijau Mine	Indonesia	Long –Term Stockpiling of Copper Ore



Enviro & GeoEnvironmental

- Mine rehabilitation and closure
- Permitting and licensing
- ARD and mine waste geochemistry
- EIS/EIA studies
- Environmental audits

Enviro & GeoEnvironmental

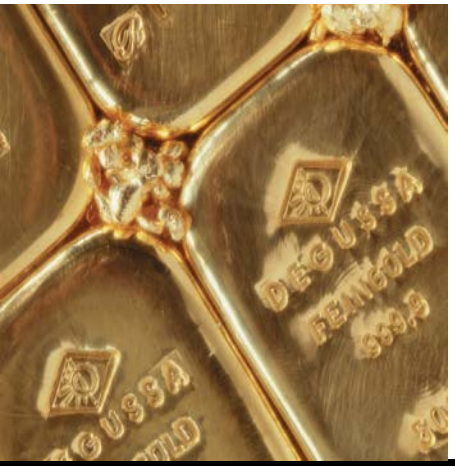
Client	Project	Location	Services
Yukon Government	Faro Mine Complex	Canada	Mine Closure Planning and Implementation
Teck	Elk Valley	Canada	Geochemistry Research
Kinross	Champagne Mine	USA	Permitting and Licensing
Cameco	Rabbit Lake	Canada	Tailing Options Disposal
Coeur d'Alene Mining	Coeur Rochester and Nevada Packard Mines	USA	Environmental Impact Statements (EIS)
Copper Mountain	Copper Mountain Mine	Canada	Metal Leaching (ML) & Acid Rock Drainage (ARD) Monitoring Report

Surface & groundwater

- Mine water management and dewatering
- Hydraulics and hydrology
- Groundwater
- Water quality and pollution control
- Water supply
- Surface and groundwater modelling

Surface & groundwater

Client	Project	Location	Services
Teck	Coal Mountain	Canada	Dewatering & Sulfide Oxidation
Robinson Nevada	Liberty Pit	USA	Pit Dewatering Pipeline Design
Vale Inco	Pipe 2	Canada	Hydrology & Hydrogeology (PFS)
Philex Mining	Silangan	Philippines	PFS Geotechnical & Hydro Drilling Program
Sumitomo Metal	POGO East Deep	USA	UG Expansion Hydrogeology Characterization
De Beers	Pushkin	Russia	Hydrogeology PFS

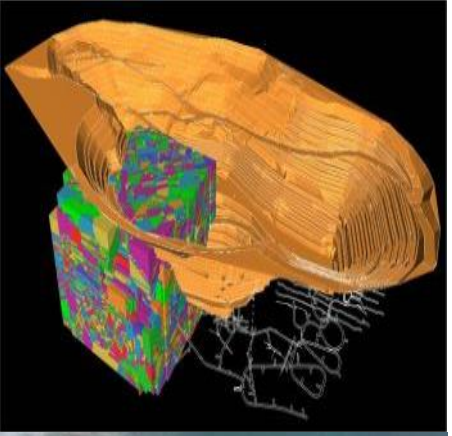


Mineral economics

- Project valuations supporting
  - Feasibility studies
  - Audits / due diligences / IE investigations
  - Benchmarking
- Valuations for
  - Financing and Stock Exchange listings
  - M&A transactions
  - Litigation and arbitration cases
- Modelling support
  - Mine optimization / Trade–off studies
  - Risk assessment – Cost and schedule

Mineral economics

Client	Project	Location	Services
Koza Altin Isletmeleri A.S.	Precious Metals Assets	Turkey	Initial Public Offering (Istanbul Stock Exchange listing)
Churchill Mining PLC	East Kutai Coal Project	Indonesia	ICSID Expert Witness
Yukon-Nevada Gold Corp.	Jerritt Canyon Property	USA	Valuation for Acquisition
Fresnillo PCL	Precious Metals Assets	Mexico	Initial Public Offering (London Stock Exchange listing)
Andes Iron	Iron Properties	Chile	Private Valuation
Kootenay Silver	Promontorio Silver	Mexico	Benchmarking
Twin Metals JV	Twin Metals Copper-Nickel	USA	Mining Method Trade-Off Studies Support



Corporate advisory services

Value management

- Value extraction – Business improvements
  - Benchmarking
  - Best practices
  - Operations
  - Management
- Value creation – New competitive space
  - Economic potential
  - Strategic positioning
  - Core processes
  - Organization

Corporate advisory services

Client	Project	Location	Services
Asia Minor Mining	Iron properties	Turkey	Strategic Positioning
Santa Maria de la Paz	UG Copper–Gold Mine	Mexico	Best Practices, Strategic Positioning
Andes Iron	Iron properties	Chile	Economic Potential, Strategic Positioning
Northern Star	UG Gold Mine	Canada	Economic Potential, Strategic Positioning
Poderosa	UG Gold Mmine	Peru	Benchmarking, Best Practices
Project Sanders	UG Coal Mines	USA	Economic Potential, Strategic Positioning

Mine Operational Assistance

- Open Pit & Underground Technical Assistance
  - Mine design and optimization
  - Equipment selection and production scheduling
  - Drilling and blasting design and optimization
- Open Pit & Underground Operational Assistance
  - Broad commodity experience
  - Geology, mine engineering, and mine operations
  - Drilling and blasting, grade control, operational set-up and optimization
  - KPI development, best practices
- Processing & Metallurgy
  - Grinding optimization / trade–off studies
  - Ore recovery assessment / optimization

Mine Operational Assistance

Client	Project	Location	Services
Yamana Gold	UG Gold Mines	Brazil & Chile	Operational Review
Goldcorp	Los Filos & Red Lake	Mexico & Canada	Crushing Circuit Modeling & Simulation for Expansion
Revett Silver Company	UG Cu–Ag Mine	USA	Mine Operations Technical Review
Andes Iron	Iron properties	Chile	Economic Potential, Strategic Positioning
NEMISA	UG Copper Mine	Mexico	Best Practices, Business Improvement, Strategic Positioning
Capstone	Minto Mine	Canada	Blast optimization, crushing & grinding circuit simulations, throughput improvements

Why choose SRK?

- Mining industry focus
- Our people: expertise, experience and commitment
- Global experience and local presence
- Range of services and expertise: from exploration to closure
- Credibility with financiers and regulators
- Alliance partnering to provide comprehensive solutions
- Strong and lasting relationships