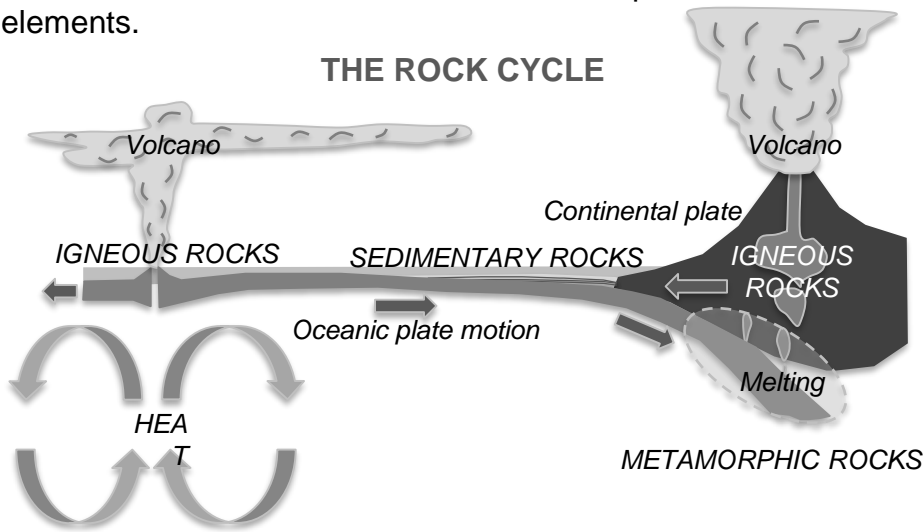


INTRODUCTION TO MINING FACTSHEET

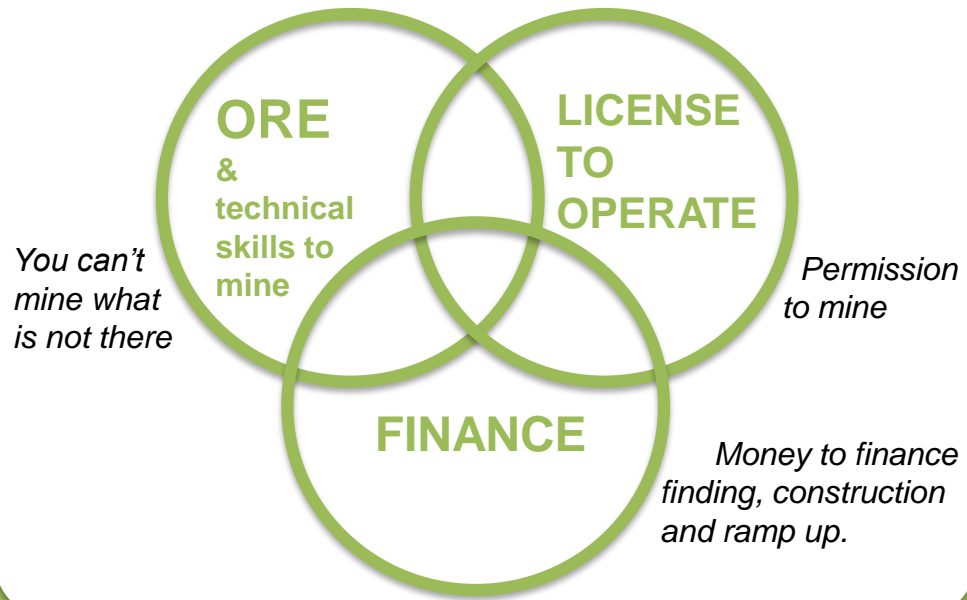
IF YOU CAN'T GROW IT YOU HAVE TO MINE IT

GEOLGY ROCKS – MINERALS - ELEMENTS

Earth was formed 4.56 billion years ago and continues to evolve today. Chemical elements are concentrated in very specific areas through processes such as plate tectonics and volcanoes. Rocks are formed of minerals which in turn are composed of chemical elements.



EVERY SUCCESSFUL MINE NEEDS:



RISK PROFILE

As well as ore, a license to operate and finance, mining requires a large number of inputs, and generates numerous outputs. Any disruption to these components can pose a risk to the objectives of the miner.

- EQUIPMENT
TRUCKS TO TYRES
- UTILITIES
WATER & POWER
- PEOPLE
EMPLOYEES & CONTRACTORS
- PARTNERSHIPS
JOINT VENTURES & COMMUNITIES
- INFRASTRUCTURE
ROAD & RAIL
- DEMAND
FOR COMMODITIES

INPUTS

MINING VALUE CHAIN



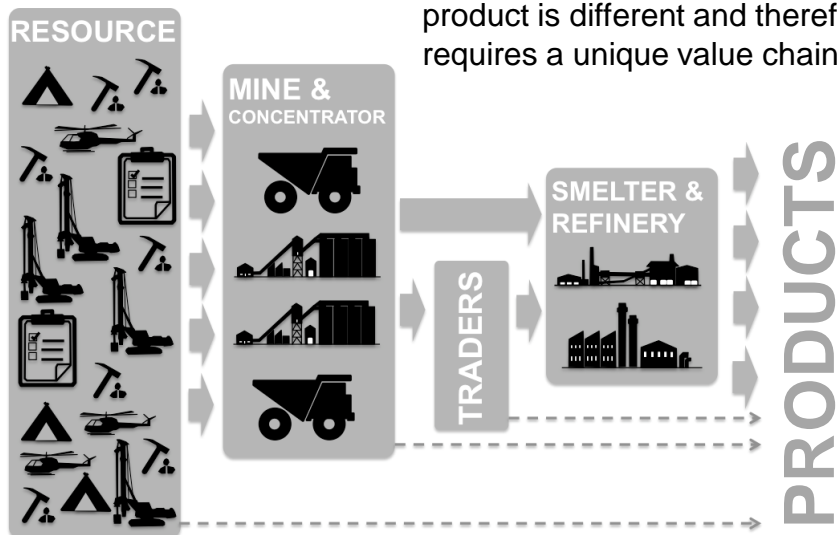
OUTPUTS

- PRODUCT
E.G. COPPER
- WASTE
E.G. TAILINGS
- ENVIRONMENT
REHABILITATED?
- COMMUNITIES
DEVELOPED?
- WEALTH
INCREASED?
- TECHNOLOGY
ADVANCEMENTS?

Some of these risks can be controlled directly, others can only be influenced or monitored. A responsible miner will be openly aware of these risks and be controlling them to the level they deem most appropriate.

VARIATION

Every commodity, ore body, and product is different and therefore requires a unique value chain.



KEY WORDS

- RECOVERY** The fraction of the desired element that is recovered during concentration.
- RESOURCE** A concentration of naturally-occurring solid, liquid or gas in the Earth's crust in such form and amount that economic extraction of the commodity is currently or potentially feasible.
- RESERVE (synonymous with 'Ore')** That part of a resource that can be economically and legally extracted under current circumstances.
- GRADE** Concentration of the desired element in the rock, concentrate or tailings.
- GANGUE** Uneconomic (waste) minerals in a rock.

- SMELTING** Metal extraction process in which an ore mixed with purifying and heat generating substances is heated to a high temperature in an enclosed furnace. Impurities (slag) and metal (matte) are produced.
- TAILINGS** The waste material left over after the process of separating the valuable fraction from the uneconomic fraction (gangue) of an ore. Can include the following: *mine dumps, slimes, tails, refuse, leach residue, slickens.*

MINING VALUE CHAIN

FIND RESOURCES



- 1. TARGET GENERATION.** Identify where in the world you might find a resource using a regional risk tool. Incorporates elements such as geology, infrastructure and political risk.
- 2. TARGET IDENTIFICATION.** Remote sensing, geophysics, geochemistry, and geology techniques used to identify anomalies. Many resources are not visible on the surface.
- 3. TARGET DEFINITION.** Drilling used to prove the presence of resources underground.

PROJECT RESERVES & BUILD

- 4. EVALUATION.** Conceptual, pre-feasibility and feasibility studies. Include metallurgists, miners and engineers to ascertain if the resource can be mined and processed economically.
- 5. DEVELOPMENT.** Pre-production technical studies to fine-tune the mining and processing method, followed by mine development, construction and ramp up.

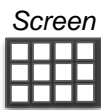
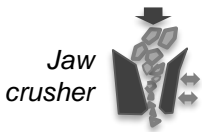


PROCESS CONCENTRATE

Concentrating the desired element to the state in which it can be sold. Typically takes place in a series of plants including concentrators, smelters and refineries. Every ore / product requires a different selection and configuration of the following methods:

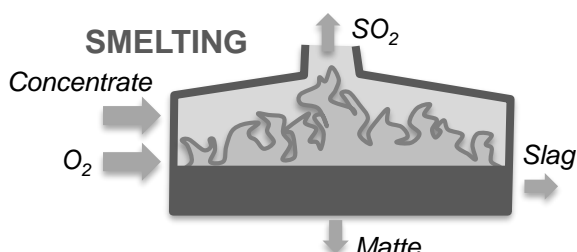


PHYSICAL PROCESSING: Liberation techniques such as crushing, screening and grinding are used to break rocks down to their mineral components. Separation techniques such as flotation are used to separate ore minerals from waste minerals (gangue).



CHEMICAL PROCESSING (Hydrometallurgy): Concentration of desired elements by chemical means. Methods include leaching, solvent extraction, electrowinning, ion exchange, precipitation and crystallisation.

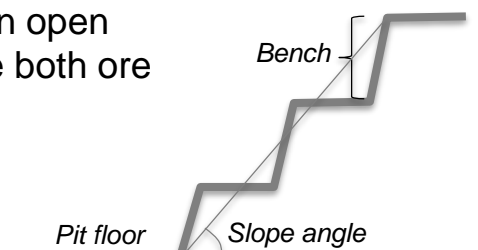
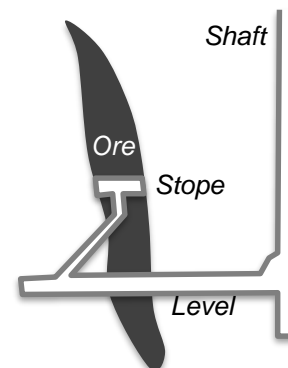
THERMAL PROCESSING (Pyrometallurgy): Concentration of desired elements by heat. Methods include drying, roasting, smelting and casting.



MINE EXTRACT THE ORE



SURFACE (open pit). An open hole in the ground where both ore and waste are moved.



UNDERGROUND. Multiple methods comprising of underground tunnels which allow ore and minimal waste to be extracted.

SHIP



Products and by-products may be produced at any stage of the value chain and sold. Shipping of product is undertaken by methods such as train, ship and helicopter.

CLOSE MINE CLOSURE

ENVIRONMENTAL & SOCIAL LEGACY is a major component of closing mines and plants. Budgeting and planning for this should be undertaken in the project stage.

