

# Exploration

Activities related to establishing a mineral deposit through geological, geophysical and geochemical methods. It is preceded by Prospecting and followed by Planning & Development.

## Exploration methods

### **Geological**

- **drilling,**
- **trenching,**
- **pitting,**
- **Aditing**

### **Geophysical**

- **detailed surface methods – gravity, magnetic, electrical, seismic, etc.**
- **subsurface/borehole methods – gravity, electric logging, etc.**

*Mineral Exploration* is carried out to find new ore deposits to

- Replace deposits presently being mined
- Increase a company's ore reserves (assets) in real terms
- Find new deposits in answer to a perceived change in commodity markets

*Mineral Exploration* is conducted where :

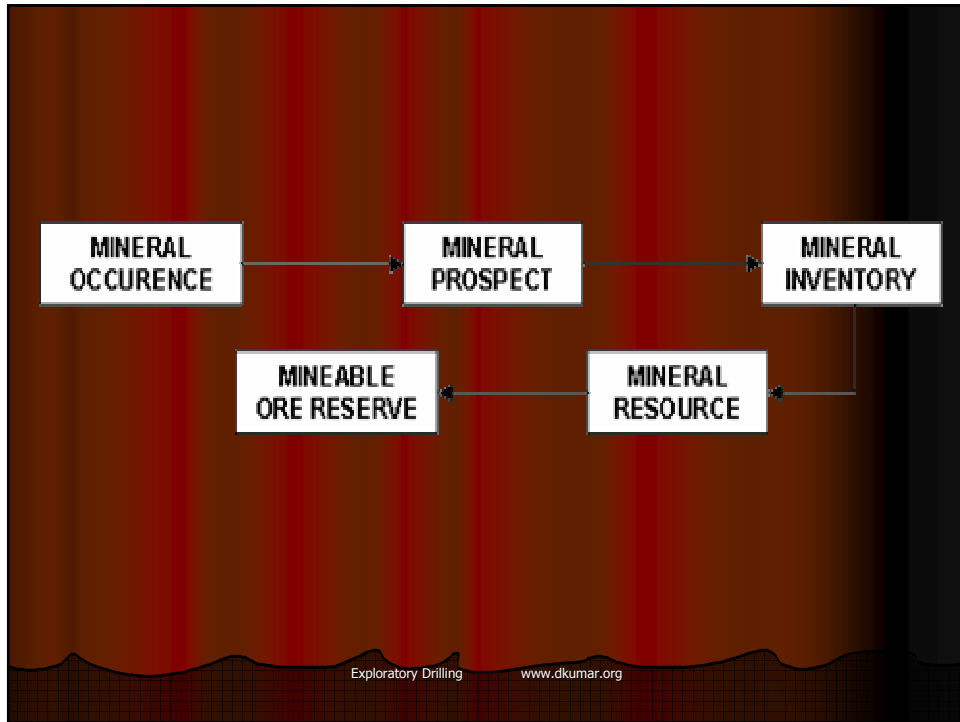
- There are large areas of high mineral potential
- Mineral land rights can be obtained under terms that are reasonable and with long-term certainty of title
- Political and tax regimes are perceived to be relatively favorable and stable

## *Mineral Exploration entails*

- Study of historical, technical and mineral related data
- Systematic regional geological, geophysical and geochemical surveys in selected areas by mining companies or other agencies
- Acquisition of mineral properties by application to governments for exploration permits or exploration concessions
- Increasingly detailed levels of mapping and surveying, overburden and rock trenching, sampling of rock/mineral exposures, various types of drilling (percussion, reverse circulation, diamond drill), stripping, bulk sampling, underground development and test milling

## *A Mineral Prospect evolves*

- successful exploration from a mineral occurrence (raw mineralized outcrop)
- mineral prospect (indication of economic minerals supported by assays, widths, lengths)
- mineral inventory (with three dimensional exploration through drilling to indicate 'possible' tonnage/grade)
- mineral resource (with more detailed three dimensional exploration to prove 'probable' tonnage/grade)
- mineable ore reserve (with completion of a positive feasibility study and mine development to provide a 'proven' tonnage and grade).



- ### STAGES OF MINERAL EXPLORATION
- Area selection
  - Target generation
  - Resource evaluation
  - Reserve definition
- Exploratory Drilling [www.dkumar.org](http://www.dkumar.org)

## *Area selection*

- Selection of the best, most prospective, area in a mineral field, geological region or terrain will assist in making it not only possible to find ore deposits, but to find them easily, cheaply and quickly.
- Area selection is based on applying the theories behind ore genesis, the knowledge of known ore occurrences and the method of their formation, to known geological regions via the study of geological maps, to determine potential areas where the particular class of ore deposit being sought may exist.
- This process applies the disciplines of basin modelling, structural geology, geochronology, petrology and a host of geophysical and geochemical disciplines to make predictions and draw parallels between the known ore deposits and their physical form and the unknown potential of finding a 'lookalike' within the area selected.
- Area selection is also influenced by the commodity being sought; exploring for gold occurs in a different manner and within different rocks and areas compared to exploration for oil or natural gas or iron ore. Areas which are prospective for gold may not be prospective for other metals and commodities.

Exploratory Drilling

[www.dkumar.org](http://www.dkumar.org)

## *Target generation*

investigations of the geology via mapping, geophysics and conducting geochemical or intensive geophysical testing of the surface and subsurface geology. In some cases, for instance in areas covered by soil, alluvium and platform cover, drilling may be performed directly as a mechanism for generating targets.

Exploratory Drilling

[www.dkumar.org](http://www.dkumar.org)

## ***Resource evaluation***

- Resource evaluation is undertaken to quantify the grade and tonnage of a mineral occurrence. This is achieved primarily by drilling to sample the prospective horizon, lode or strata where the minerals of interest occur.
- The ultimate aim is to generate a density of drilling sufficient to satisfy the economic and statutory standards of a ore resource.
- The aim of resource evaluation is to expand the known size of the deposit and mineralisation.

## ***Reserve definition***

- Reserve definition is undertaken to convert a mineral resource into an ore reserve, which is an economic asset.
- more intensive and technical, aimed at statistically quantifying the grade continuity and mass of ore.
- Reserve definition also takes into account the milling and extractability characteristics of the ore, and generates bulk samples for metallurgical testwork, involving crushability, floatability and other ore recovery parameters.
- Reserve definition includes geotechnical assessment and engineering studies of the rocks within and surrounding the deposit to determine the potential instabilities of proposed open pit or underground mining methods.
- This process may involve drilling diamond core samples to derive structural information on weaknesses within the rock mass such as faults, foliations, joints and shearing.

# Programme of Exploration

- Planning for conducting Explorations
- Drill hole / Borehole layout
- Procedure
- Field Work
- Laboratory testing
- Testing and Correlation of results