

Glossary of Technical Geological Terms

Anhydrite

An anhydrous calcium sulphate mineral with the chemical formula CaSO_4 . It is closely associated with gypsum and can be associated as an alteration product with porphyry copper deposits.

Arc Normal Fault

A north to north-northeast regional geological structure intersecting the major northwest-trending arc parallel geological structures in the New Guinea island. These structures are sub-perpendicular to perpendicular to the arc parallel structures and also called "transfer" structures.

Arc Parallel Fault

A northwest – southeast trending geological structure in the New Guinea island as a result of the collision of the Australian and Pacific tectonic plates.

Argillic alteration

Low temperature hydrothermal alteration in the upper part of many porphyry copper deposits composed mainly of kaolinite and montmorillonite clays.

Bornite

An important copper ore mineral in porphyry copper deposits with the chemical formula Cu_5FeS_4 with 63.31% copper in composition and also known as "peacock ore". It is a high-grade copper ore often associated with the core or hotter parts of a porphyry deposit.

Breccia

A rock composed of broken fragments of rocks and/or minerals cemented together by a matrix of similar or different composition to the fragments.

B-vein

An important vein-type in porphyry copper deposits. B-veins are typically important hosts of copper ores in porphyry deposits and are characterized by quartz veins with copper and iron sulphide mineralization in the centerline and associated haloes of hydrothermal alteration in the wall rock.

Chalcopyrite

The common copper ore mineral in porphyry copper deposits with the chemical formula CuFeS_2 with a copper composition of 34.63%.

Chalcocite

A copper sulphide mineral (Cu_2S) and an important copper ore mineral. Most chalcocite occurs in the supergene enriched environment below the oxidation zone of copper deposits as a result of the leaching of copper from the oxidized minerals. It is also sometimes found as a primary vein mineral in hydrothermal veins.

Chargeability

The characteristic of a material on how long it holds electrical charges with the unit of measurement millivolt/volt (mv/v). It can be measured by an Induced Polarization (IP) geophysical survey together with resistivity and conductivity measurements. It is commonly used to detect for the presence of disseminated sulphide mineralization in porphyry and porphyry related copper and gold deposits.

Chlorite

A group of common sheet silicate minerals found in rocks altered during metamorphism and hydrothermal activity. It is a common mineral in the outermost part in the propylitic alteration zone of porphyry copper deposits.

Conductivity

The ability of a material to allow the current to flow through it with unit of S/m (i.e. siemens per metre). It can be measured by Induced Polarization (IP) geophysical survey together with chargeability and conductivity. It is directly related to chargeability.

Covellite

A sulphide copper ore mineral (CuS). It typically occurs as an alteration product of other copper sulphide minerals (chalcopyrite, chalcocite, and bornite) present in the same deposits. It is sometimes found as a hypogene mineral in hydrothermal deposits.

Cu/Zn Ratio

The inverse geochemical relationship of copper and zinc elements from a geochemical soil survey in a porphyry copper deposit. Copper values tend to be higher towards the core of the mineralized system whilst zinc values tend to be depleted. The ratio illustrates the enrichment of copper and depletion of zinc and can be used as a vector in determining the presence of copper mineralization in a porphyry copper deposit.

Diatreme

A term used to describe a volcanic vent or pipe that formed by the explosive gaseous energy from a magma.

Dimidi Trend

A mapped north-northeast -trending lineament/structure in the Keveri Project area. Some of the prospects at Keveri are located near the intersection of structures parallel to the orientation of the Dimidi Trend and the northwest-trending "arc parallel" Keveri Fault.

Diorite

A coarse-grained intrusive igneous rock that is intermediate in composition between gabbro and granite. It is composed primarily of plagioclase feldspar, amphibole and pyroxene.

Epidote

A group of silicate minerals found in rocks altered during metamorphism and hydrothermal activity. It is a common mineral in the middle part of the propylitic alteration zone in porphyry copper deposits and can be used during an exploration program to vector in towards the core of a porphyry copper deposit.

Epithermal Deposit

A hydrothermal mineral deposit, occurring mainly as veins, formed in a shallow environment (~1 km) and in the temperature range of 50 - 200°C.

Float Sample

A rock sample which has been dislocated from its original location (i.e. transported) and commonly found in streams, creeks and rivers.

Frieda River

An advanced copper and gold porphyry deposit in the provinces of Sandaun and East Sepik in Papua New Guinea.

Geochemistry

The study of the processes that control the abundance, composition, and distribution of chemical compounds and isotopes in geologic environments.

Geochemical Anomaly

A value or concentration of one or more elements in rocks and soils that is significantly higher (or lower) than background.

Gossan

A brownish leached cap zone in the topmost part of the oxidation profile as a result of the partial or total leaching of sulphide minerals.

Granitoid

A variety of coarse grained plutonic rock composed predominantly of feldspar, quartz and mica. Examples include granite, quartz monzonite, quartz diorite, syenite, granodiorite, tonalite and trondhjemite.

Grasberg

A gold and copper porphyry deposit currently being mined in the province of Irian Jaya in Indonesia.

Gypsum

A soft sulphate mineral composed of calcium sulphate dihydrate, with the chemical formula $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. It is closely associated with anhydrite and found in porphyry copper deposits.

Hidden Valley

An open pit gold and silver mine in the Morobe province in Papua New Guinea.

Hydrofracturing

Fracturing of wall rocks by hydrothermal solutions when the overlying rock pressure is exceeded by the fluid pressure.

Hydrothermal

Hot water solutions emanating or rising from a cooling magma.

Hydrothermal Alteration

A change in the mineralogy as a result of interaction of hydrothermal fluids with rock. These fluids can carry metals in solution either from a nearby igneous source, or from leaching out of adjacent rocks.

Hydrothermal Breccia

A rock texture which is characterized by rock fragments cemented together by an in-fill of minerals, quite often quartz that has precipitated from a hydrothermal solution.

Hypogene

A process that occurs below the earth's surface and tends to form deposits of primary minerals.

Induced Polarisation (IP)

A geophysical method used to identify and measure the electrical chargeability of subsurface disseminated sulphides. It is extensively used in base metal mineral exploration for locating ore deposits e.g. disseminated sulphide ores (porphyry copper deposits). The method involves passing a current through the ground through electrodes and measuring a voltage across other electrodes.

Jog, Dilational Jog

A bend or kink in a geological structure or fault which sometimes plays an important role in the localization of the formation of mineral deposits.

Keveri Fault

A west-northwest-trending fault structure that is part of the southeastern extension of the arc parallel regional structure within the Papuan Fold Belt. Its location can be illustrated with the assistance of interpretation of regional magnetic data.

Lihir

A gold mine on the island of Lihir in Papua New Guinea.

Limonite

A group of supergene minerals mainly derived from weathering of Fe sulphide, iron-bearing carbonate, or silicate minerals.

Litho-geochemistry

The interpretation of rock types using relevant elemental values from the rock assay results. Some elemental values can be useful "discriminator" elements in identifying different rock types.

Mafic Rock

An igneous rock dominated by pyroxene, amphibole, olivine, and mica minerals and high in magnesium and ferric oxides and strongly characterized by its dark color.

Magnetics or Magnetic Data

A ground or airborne geophysical method used to measure the magnetic field associated with magnetic minerals in rocks. The interpretation of this data can reveal geological structures and mineral potential of the sub-surface geology.

Magnetite

A black, opaque, magnetic mineral and one of the most abundant metal oxides with the chemical formula Fe_3O_4 . Magmatic or primary magnetite crystals usually only occur when magma cools slowly enough for crystals to form and settle out of the magma. Hydrothermal or secondary magnetite formed as a result of precipitation from hydrothermal solutions.

Malachite

A secondary or supergene copper carbonate hydroxide mineral, with the formula $\text{Cu}_2\text{CO}_3(\text{OH})_2$ produced as a result of the leaching of primary copper minerals and characterized by its typical green color and effervesces when in contact with hydrochloric acid.

Mesothermal

A hydrothermal mineral deposit or alteration pattern, often being represented or occurring mainly as veins, formed at intermediate depths and pressures with temperatures ranging from 200° - 300°C.

Milled Breccia

A poorly sorted breccia with sub-rounded to rounded fragments and clay-rich matrix as a result of mechanical-grinding of rock fragments due to fluidization from gaseous activity from a magmatic source.

Missima

An open pit gold and silver mine on Misima Island, 200km southeast of the mainland Papua New Guinea.

Ok Tedi

A porphyry copper-gold deposit currently being mined in Papua New Guinea located in the Western Province of Papua New Guinea.

Ophiolites

A section of the earth's oceanic crust (i.e. stratified igneous rock complex) and the underlying upper mantle that has been uplifted/obducted and exposed above sea level and often emplaced onto continental rocks.

Outcrop

An in-situ body of rock exposed at the surface of the earth.

Overprint

Multiple events of hydrothermal activity resulting in the overlap and replacement of previous features, textures and compositions.

Panguna

A porphyry copper-gold deposit in Bougainville Island in eastern Papua New Guinea.

Porgera

An open pit and underground gold mine located in the Enga Province of Papua New Guinea.

Papuan Mobile Fold Belt or Papuan Fold Belt

A geological feature that stretches from the northwest of Irian Jaya to the southeast of Papua New Guinea (PNG). Most of the major copper-gold deposits in PNG are located within this belt.

Phyllic

The high temperature middle part of the hydrothermal alteration zone in porphyry copper deposits characterized mainly of quartz, sericite and pyrite and occurs at moderately acidic (low pH) conditions. It commonly overprints earlier alteration assemblages (e.g. potassic and propylitic) and is commonly related to geological structures.

Porphyry Copper

A large body of porphyritic rock with disseminated sulphide ores. The host rock is typically of granitic to dioritic in composition that has been hydrofractured due to the difference in rock and fluid pressures resulting in stockwork vein networks and breccia zones. Common copper ore minerals are disseminated and veined chalcopyrite and chalcocite with bornite which tends to occur at the core of the porphyry system.

Potassic

The high temperature innermost part of the hydrothermal alteration zone in porphyry copper deposits characterized mainly of K-feldspar, secondary biotite, tourmaline and magnetite. The core zone of porphyry copper deposits.

Propylitic

The most extensive and peripheral alteration zone developed around porphyry copper deposits and characterized mainly by chlorite, epidote and actinolite.

Pyrite

An iron sulphide mineral with the chemical formula FeS_2 . It is the most abundant sulphide mineral and also known as "fool's gold".

Pyrite Halo

Pyrite abundance (>5% by volume) in rock commonly associated with phyllic alteration halos surrounding a porphyry deposit.

Resistivity

The characteristic of the electrical resistance of a material with unit of Ohm-m (i.e. ohm-meters). It can be measured by Induced Polarization geophysical surveys together with chargeability and conductivity. It is the inverse of conductivity.

Scarp

A line of cliffs formed by faulting.

Sericite

A fine grained white mica and common alteration mineral of orthoclase or plagioclase feldspars in porphyry copper deposits that have been subjected to hydrothermal alteration.

Silica

An oxide of silicon (silicon dioxide) with the chemical formula SiO_2 , most commonly found in nature as quartz.

Simberi of Simberi Gold Deposit

An open pit gold mine and associated orebodies on Simberi Island in PNG.

Skarn

Skarns or tectites are hard, coarse-grained metamorphic rocks that form by a process called metasomatism. Skarns tend to be rich in calcium-magnesium-iron-manganese-aluminum silicate minerals, which are also referred to as calc-silicate minerals.

Strike

The trend or orientation of features, structures and faults.

Stockwork Veining

A random network of veins (commonly quartz veins with or without sulphide mineralization) occurring throughout most of a porphyry intrusive deposit as a result of multiple explosive and brecciation events from a magmatic source. This type of veining is commonly associated with potassic alteration zone and can occur in the upper parts of a porphyry deposit.

Supergene

A process that occurs at or near the surface and tends to form secondary minerals.

Tier-1

A term used to describe a world-class mineral deposit. By proposed definition (Schodde, 2006), a deposit worth \geq \$250 million NPV (Net Present Value) threshold (based on an analysis of 143 significant mineral discoveries).

Tonnage

Quantity of ore indicated by volume of metric tonnes contained within an ore body.

Transfer Faults

Interpreted north to north-northeast regional geological structures truncating or intersecting the major northwest-trending arc parallel geological structures within the Papuan Fold of PNG. These structures are generally sub-perpendicular to perpendicular to the arc parallel fault structures and are also called "arc normal/transverse" structures.

Trench

A trench is a narrow excavation in the ground approximately 1-2m in height and width wherein rock samples are collected and rock exposures are mapped.

Ultramafic Rock

Igneous and meta-igneous rocks with a very low silica content (less than 45%) and composed of usually greater than 90% mafic minerals of high magnesium-iron content and strongly characterized by its dark color.

Urua Creek Fault

An interpreted northeast-trending fault intersecting the northwest-trending Keveri Fault.

Vein

A crack or fracture in a rock due to hydrofracturing process filled by minerals such as quartz, carbonates etc. from a hydrothermal solution.

Wafi-Golpu

An advanced copper and gold porphyry deposit in Morobe Province, Papua New Guinea.

Sources

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