

GLOSSARY OF GEOLOGICAL TERMS

These terms relate to prospecting and exploration, to the regional geology of Newfoundland and Labrador, and to some of the geological environments and mineral occurrences preserved in the province. Some common rocks, textures and structural terms are also defined. You may come across some of these terms when reading company assessment files, government reports or papers from journals.

Underlined words in definitions are explained elsewhere in the glossary. New material will be added as needed - check back often.

- A -

A-HORIZON SOIL: the uppermost layer of soil also referred to as topsoil. This is the layer of mineral soil with the most organic matter accumulation and soil life. This layer is not usually selected in soil surveys.

ADIT: an opening that is driven horizontally (into the side of a mountain or hill) to access a mineral deposit.

AIRBORNE SURVEY: a geophysical survey done from the air by systematically crossing an area or mineral property using aircraft outfitted with a variety of sensitive instruments designed to measure variations in the earth's magnetic, gravitational, electro-magnetic fields, and/or the radiation (Radiometric Surveys) emitted by rocks at or near the surface. These surveys detect anomalies.

AIRBORNE MAGNETIC (or AEROMAG) SURVEYS: regional or local magnetic surveys that measures deviations in the earth's magnetic field and carried out by flying a magnetometer along flight lines on a pre-determined grid pattern. The lower the aircraft and the closer the flight lines, the more sensitive is the survey and the more detail in the resultant maps. Aeromag maps produced from these surveys are important exploration tools and have played a major role in many major discoveries (e.g., the Olympic Dam deposit in Australia).

ALLOY: a metal made by combining two or more metals. An alloy is always harder than its component metals: some examples...

Bronze is an alloy of copper and tin.

Pewter is made from tin, lead and copper.

Brass is made from zinc and copper.

Amalgam is an alloy made from mercury and another metal, e.g., silver in the case of teeth amalgam. Mercury is also used in silver and gold mining (particularly the artisanal type) because these metals combine readily with mercury.

Electrum is a naturally-occurring alloy of gold and silver mostly.

Steel is an alloy made mostly from iron and some carbon and then other metals are added for different end uses.

Awarite is a naturally-occurring alloy of iron and nickel – found locally in NL.
Stainless steel is an alloy of mostly iron with some carbon and chromium.

ALTERATION: chemical or mineralogical changes in the composition of a rock. Alteration can be the result of weathering or metamorphism, or can form as the result of the passage of hydrothermal fluids through rocks.

ALTERATION ZONE: an area where rocks have been altered to secondary (or alteration) minerals commonly associated with mineralization caused by hydrothermal fluids (See Pyrophyllite). Alteration minerals are commonly non-economic and are called Gangue. Alteration zones can range from the mm-scale (adjacent to veinlets – called wall-rock alteration) to km-scale, such as that seen near Manuels, on the Avalon Peninsula. In the latter case, one of the alteration minerals, pyrophyllite, has become a viable economic commodity.

AMPHIBOLE: an important group of silicate minerals containing iron, magnesium and calcium; they are generally dark coloured. A primary example is hornblende.

AMPHIBOLITE: a dark-colored metamorphic rock of mafic composition consisting mainly of the minerals hornblende and plagioclase

AMYGDULE: a cavity (also named amygdales or vesicles) in a volcanic rock that formed when gas or vapor bubbles were trapped in lavas; the gas subsequently escaped and the cavity is preserved and may be filled later with secondary minerals, such as calcite, chlorite, hematite or quartz.

AMYGDALOIDAL: a term describing volcanic rocks that contain numerous amygdules.

ANDESITE: a fine-grained volcanic rock of intermediate composition (half-way between felsic and mafic rocks, i.e., between rhyolite and basalt), consisting largely of plagioclase and one or more mafic minerals, for example, biotite, hornblende or pyroxene. It is the volcanic or extrusive equivalent of diorite. The name comes from the Andes Mountains of South America.

ANORTHOSITE: a coarse-grained, igneous rock consisting mostly of calcium-rich feldspar known as labradorite; commonly found in Labrador.

ANTICLINE: a type of fold in bedrock that is, or once was, convex upward, with its limbs dipping away from its axis (core or centre). The oldest rocks in an anticline occur in its central part or core. The nose zones (maximum area of curvature of the fold at the top) can be areas of concentration of quartz and, therefore, gold in some places.

ANOMALY: any unexpected deviation from the norm. In mineral exploration, prospectors are mainly concerned with anomalies in the geophysical and geochemical character of rocks, tills, soils, water or unconsolidated sediment in streams or lakes sediments. Anomalies are classed as positive or negative, i.e., either above or below the average value. In some cases anomalies may reflect buried mineralization or zones of hydrothermal alteration. Not all anomalies are economically significant. In fact, many can be explained by geological features: graphitic beds in

sedimentary rocks (very common in Central Newfoundland), for example, will create an excellent electromagnetic (EM) conductor that can be mistaken for a massive sulphide lens.

APHANITIC: refers to a very, very fine-grained texture in an igneous rock, where crystals are too small to be seen with naked eye.

APPALACHIANS: the Paleozoic orogen or mountain belt along the east side of North America extending continuously for 3500 km from Newfoundland to Alabama. Rocks in the Appalachians were affected by several pulses of Paleozoic deformation, metamorphism and plutonism, between about 540 and 300 million years ago. The Appalachians are bounded to the west by various parts of the North American Craton, including the Grenville structural province, which forms part of the Northern Peninsula. The Appalachians in Newfoundland contain four principal geological divisions (from west to east): the Humber Zone, the Dunnage Zone, the Gander Zone, and the Avalon Zone.

AREA OF INFLUENCE: an additional area (unstaked at time of option) surrounding the (optionees) original claims that ought to be included in the terms of an option agreement for the benefit of the prospector. The same terms in the option agreement will apply to claims staked later (by either party) in this area of influence within a defined time period.

ARKOSE: a sedimentary rock formed by the cementation of sand-sized grains of feldspar and quartz: arkoses occur commonly in the Avalon Zone of Newfoundland.

ASBESTOS: a white to green, fibrous form of the mineral serpentine that is widely used in fire-retardant and heat-resistant applications; can be very hazardous to one's health if the dust is inhaled. Asbestos was historically produced from the Baie Verte Mine from 1963 to 1994.

ASSAY: a chemical analysis that determines the amount of an element in a sample of rock, soil, till or stream /lake sediment, etc. The concentrations of precious metals such as gold and silver are typically reported as grams of metal per tonne (g/t) of rocks; base metal assays (copper, lead, zinc, etc.) are given in ppm or weight percent. Assay sheets from laboratories typically give gold concentrations in parts per billion (ppb) - 1000 ppb equals 1 part per million (ppm), which equals 1 gram/tonne. There are 28.35 grams in one normal (avoirdupois) ounce and 31.10 grams in one Troy ounce. Base metal assays are typically measured in parts per million (ppm); 10,000 ppm equals one percent. See Gram Conversions.

AUGEN: these are eye-shaped mineral grains or aggregate of mineral grains in a mylonite (high strain zone), gneiss or a schist; augen is German word for eye.

AUGER: soil augers are approx. 1 m long hollow steel tubes with a T-shaped top for maneuvering and a type of drill on the base for taking soil samples. The base on some types can be unscrewed and extensions added for taking samples under deep bogs – especially helpful in Newfoundland.

AUREOLE: the zone of contact metamorphism surrounding an igneous intrusion. Aureoles commonly contain Hornfels, a very hard, fine- to medium-grained rock that rings like a bell when hit with a hammer. These contact zones are also the location for Skarns (see below).

AVALON ZONE: the easternmost of the four main geological divisions of the island of Newfoundland. Its western boundary is defined by the Dover Fault in northeastern Newfoundland and by the Hermitage Bay Fault in southeastern Newfoundland. Equivalent rocks to the Avalon Zone occur sporadically along the south coast of Newfoundland, as far west as La Poile. The Avalon Zone is characterized by its Cambrian shales and by its Late Precambrian volcanic, sedimentary and plutonic rocks. Avalon Zone rocks host well-known deposits of gold, fluorite, hematite and slate, throughout the Appalachians.

- B -

B-HORIZON SOIL: the intermediate layer in a soil situated below the A-horizon and consisting of clays and oxides; sometimes termed sub-soil. Also called the zone of accumulation, the reddish-brown B-horizon is the most typically sought material in soil surveys in Newfoundland and Labrador because of its high mineral content. The colour of the horizon can be attributed to the presence of iron oxides.

BACK-ARC BASIN: the regional depression above a subduction zone, between an island arc and the continental mainland, commonly underlain by oceanic crust. It also contains sediment eroded from the volcanic arc and the continent. Rocks that developed in back-arc basins are common in Central Newfoundland and are associated with Volcanogenic Massive Sulphide Deposits (see Besshi).

BAIE VERTE LINE: a major fault zone in western-central Newfoundland marking the contact between the Dunnage Zone to the east and the Humber Zone.

BANDED IRON FORMATION (BIF): a rock composed of dark-colored layers of iron-rich minerals that are interlayered with light-coloured, silica-rich material. These rocks were principally deposited from seawater as chemical sediments world-wide in marine basins or seas about two billion years ago. BIFs are locally associated with gold deposits in Newfoundland, e.g., at Nugget Pond in the Baie Verte Peninsula.

BARITE: a white to pink, heavy mineral that is the main ore of barium; barite is used in drilling muds, paints and TV screens. Barite deposits occur on the Avalon Peninsula.

BASALT: a dark-colored, typically fine-grained (see aphanitic) volcanic rock composed chiefly of plagioclase, pyroxene ± olivine. The equivalent intrusive rock is a gabbro. It is the major rock type in modern and ancient ocean basins and is the most abundant volcanic rock in the earth's crust. Some basalts are porphyritic or amygdaloidal.

BASE METAL: a general term used to refer to the common (basic) commercial metals, such as copper, lead and zinc, as opposed to the more "precious" metals gold and silver.

BATHOLITH: A large intrusive body of igneous rock: surface area is usually greater than 100 sq km. The Ackley Granite in eastern Newfoundland is an example of a batholith.

BED/BEDDING: the presence of layers (strata, beds or laminations) in sedimentary or volcanic rocks. The layers are distinguished from each other by features such as composition, color and grain size.

BEDROCK: the solid mass of rock that makes up the Earth's crust. Bedrock that is now exposed to the atmosphere is known as an outcrop or an exposure. Because of glaciation and subsequent coverage of the bedrock by glacial debris and other material, the actual amount of bedrock exposure in Newfoundland and Labrador is less than 5%. The other 95% of the bedrock is covered by bog, forest, water and glacial deposits such as till, sand and gravel. In some places, the bedrock has been broken up and split apart by thousands of years of freeze-thaw cycles; this process produces subcrop; this takes the form of angular boulders that are only displaced from the original bedrock location, perhaps, by centimetres. Erratics, on the other hand, can be quite large (metres across) and when partially buried in bog and/or till, can be difficult to distinguish from actual bedrock.

BESSHI TYPE DEPOSIT: stratabound or concordant deposits of massive to layered pyrrhotite, chalcopyrite, sphalerite, pyrite and galena hosted by interbedded marine basalts and clastic sedimentary rocks that formed in extensional oceanic environments, such as back-arc basins. Alteration associated with this type of deposit is similar to that in VMS deposits: for example, quartz, chlorite, calcite, iron carbonate, pyrite and sericite. Thick early Paleozoic sedimentary and mafic volcanic sequences of central and southern Newfoundland should be considered prospective ground for this type of deposit.

BIOGENIC CHEMICAL SEDIMENT: sedimentary rocks derived from living organisms such as fossiliferous limestones and coal, commonly found in Western Newfoundland and Southeastern Labrador.

BIOTITE: the black variety of the mica group of minerals containing potassium, aluminum, magnesium and iron.

BLACK SMOKER: a vent on the seafloor from which hydrothermal fluids are emitted. As soon as these fluids mix with seawater, they cool and very small grains or crystals of sulphide minerals precipitate that resembles a cloud of black smoke. Black smoker videos are easily found on the internet and are great for illustrating part of the process that leads to the formation of volcanic massive sulphide deposits.

BOUDINAGE: layers, such as dykes, sills or sedimentary beds that have been deformed and pulled apart into sausage-like sections.

BOULDER TRAINS: these are linear or fan-shaped trains or trails of boulders, characterized by some very special traits that allow them to be easily recognizable in the field. The Strange Lake boulder train in Labrador is an example of REE-rich boulders that are traceable to their source, the Strange Lake Rare Earth Deposit. Diamondiferous kimberlites in the Northwest Territories have been found using similar techniques. Bedrock mineralization, and in some cases - mines, have commonly been found by prospectors tracing mineralized boulders to their source based on a knowledge of ice travel.

BRECCIA: a coarse-grained volcanic, sedimentary or hydrothermal rock composed of angular broken rock fragments. These are held together by a matrix that may consist of finer-grained rock fragments, mineral cement, or very fine-grained material.

BRITTLE FAULT: a fault structure along which rocks have been deformed by fracturing

BUY-OUT CLAUSE: a clause within an option agreement that gives a company the option of buying out the prospector's interest in a property for cash and/or shares. A company may offer a buy-out agreement in lieu of an advance royalty agreement.

- C -

CALCITE: one of the most common, rock-forming minerals with composition CaCO_3 . Calcite is commonly white but comes in many different colours and is the principal constituent of limestone.

CALC-SILICATE ROCK: a crystalline metamorphic rock formed mainly of calcium-bearing silicate minerals such as tremolite (an amphibole) or epidote.

CALDERA: a large-scale, roughly circular volcanic depression, formed near the top of a volcano when huge eruptions empties the magma chamber under the volcano. The caldera can then be filled with sediments and volcanics and intruded by younger intrusions. More than one caldera can form in any one area as volcanism continues; such calderas are called "nested".

CAMBRIAN: the name given to the interval or period of geological time from about 545 to 495 million years ago.

CARBONATE: a general term used to describe a rock composed of the carbonate minerals calcite and dolomite. Carbonates are common on the west coast of Newfoundland.

CEMENT: a fine-grained portion of a rock that is introduced during lithification of the rock and acts to bind for all the other fragments and crystals together.

CHALCEDONY: a very fine-grained form of quartz with a distinctive waxy look (not feel). It formed originally as a gel without crystal form but then recrystallized over time. Its color is variable: white, gray, pale blue and, less commonly, black.

CHALCOPYRITE: a brassy yellow, metallic mineral, which is an important source of Cu; mined from the Voisey's Bay Mine in Labrador and the Duck Pond and Rambler mines in Newfoundland; composition is CuFeS_2 .

CHANNEL SAMPLE: a systematic sample across a rock surface collected by means of a continuous cut with a diamond saw and/or hammer and chisel. A channel sample is more representative of the grade of a mineral showing than a grab sample.

CHERT: a very hard (siliceous) sedimentary rock made up of very fine-grained or amorphous silica. Chert has a fracture pattern that resembles that of thick glass (conchoidal fracture).

CHILLED MARGIN: edge or margin of dyke or other intrusive body, where magma has cooled quickly in contact with a cold wall or country rock; crystals in the chilled margin are much smaller than those further inside the dyke.

CHLORITE: a dark green mineral that falls between the mica and clay families of silicate minerals; chlorite contains iron, aluminum and magnesium. It is common as an alteration or metamorphic mineral formed from ferromagnesian minerals.

CLASTIC (SEDIMENTARY) ROCKS: rocks that are composed of fragments derived from older rocks by weathering and erosion, and transported from their place of origin (as opposed to sedimentary rocks that form in place by precipitation or evaporation). The fragments or clasts can be either crystals or rock fragments. Clastic rocks are categorized according to their clast size into conglomerates (greater than 2 mm), and (less than 2 mm) sandstones, siltstones and mudstones in order of decreasing clast size.

CLEAVAGE: rock cleavage: the tendency for a rock to split along parallel, in many cases, closely-spaced, planar surfaces; the best example would be the partings of slate. Mineral cleavage: tendency for minerals to split along certain planar surfaces.

COLUMNAR JOINTING: a system of polygonal fractures that result from cooling of molten magma, which splits a rock body into long columns or prism-like shapes. It is characteristic of lava flows and shallow intrusive igneous rocks.

CONCORDANT: Lying parallel to, rather than cutting across surrounding (country or host rocks) strata (see Discordant).

CONCRETIONS: A spherical or disk-like mass embedded in a host rock of different composition. They form by precipitation of mineral matter about a nucleus such as a leaf, or a piece of shell of bone. They vary in size from the head of a pin to several metres across. They are generally harder than the host or enclosing rock and, therefore, commonly weather out of the rock. Concretions can be massive or they may preserve fossils or internal sedimentary structures. They are common, locally, in Newfoundland.

CONGLOMERATE: a clastic sedimentary rock containing rounded to subangular pebbles, cobbles or boulders, commonly set in a relatively finer-grained matrix of sand or silt.

CONTACT: the planar surface separating two different types of rock.

CONTINENTAL CRUST: that part of the Earth's crust that directly underlies (or once underlay) the continents and continental shelves. On average, the continental crust is about 35 km in thickness, but can be 50 to 70 km thick under some high mountain ranges. See Oceanic Crust.

CONTINENTAL MARGIN: the tectonic region that lies at the edge of a continent. In some cases a continental margin coincides with a tectonic plate boundary, but not in every instance.

CONVERGENT BOUNDARY: boundary between two colliding plates of the Earth's crust.

CO-ORDINATE SYSTEM: See [GEOGRAPHIC LOCATION](#).

COUNTRY ROCK: the rock intruded by and surrounding an igneous intrusion.

CROSS-BEDDING: bedding that was inclined when originally deposited through water (deltaic deposits, e.g.) or wind (sand dunes, e.g.) action.

CROSS-CUTTING RELATIONS: geologic breaks that indicate the relative ages of rocks. A geologic feature is younger than the feature it cuts. Thus, a fault or a quartz vein cutting across a rock is younger than the rock.

CRUST: the upper or outermost shell of the earth; we walk on the surface of the crust. There are two principal types, Oceanic Crust and Continental Crust.

CRYSTAL: the systematic internal arrangement of atoms (a latticework of repeated 3-dimensional units) that form a geometric solid. Most minerals form one of 7 different crystal groups. Magnetite is an example of the cubic system; zircon – tetragonal system; stibnite – orthorhombic system; apatite – hexagonal; tourmaline – trigonal (part of the hexagonal Class); gypsum – monoclinic; microcline – triclinic.

CRYSTALLINE ROCK: a generic term that is normally used to describe igneous or metamorphic rocks, which are composed of crystals as opposed to sedimentary or volcanic rocks, which comprise crystals and or/ fragments of other rocks.

CYPRUS TYPE DEPOSIT: pyrite-rich, copper–zinc deposits hosted by basaltic pillow lavas within ophiolite (rocks representing oceanic crust from ancient ocean floor). The deposits contain both massive sulphide and stockwork mineralization. Typical alteration minerals include chlorite and quartz near the deposit, and sericite farther away. Black chlorite, quartz and pyrite occur in veins near some deposits. The Tilt Cove copper deposit (9 million tonnes) on the Baie Verte Peninsula is an example of a Cyprus-type deposit.

- D -

DATUM: See [GEOGRAPHIC LOCATION](#)

DAUGHTER PRODUCT: also called "daughter element"; this is the end product of the Radioactive Decay of an element: e.g., Potassium 40 decays to Argon 40; Uranium 235 decays to Lead 207.

DEFORMATION: the shape, form, and/or volume of a rock are changed through deformation processes, which include folding and faulting.

DELTA: a large body of sediment deposited at the mouth of a river.

DENSITY: how heavy the rock is – reflects how tightly packed the atoms of the crystals of the

rock are packed. Gold is quite heavy (has tightly packed atoms) and quartz is much lighter (atoms are not quite so tightly packed). Density is defined as the mass per unit volume. Water, for example, has a density of 1 gram per cubic centimeter (1 gm/cm³): water's density is used as a standard measure. See Specific Gravity.

DETECTION LIMIT: normally refers to the lowest concentration of any particular element that can be accurately measured by any one particular type of analytical instrument. (e.g., 5 ppb is the detection limit for gold, using the INAA analytical method).

DIABASE: a dark-coloured, fine-grained intrusive rock, found as dykes or sills, composed mainly of feldspar, pyroxene and/or olivine; it is the shallow intrusive equivalent of basalt and gabbro.

DIMENSION STONE: natural building stone that may be cut to specific size requirements. Dimension stone includes granite, gabbro (Mount Peyton, e.g.), anorthosite (Labradorite, e.g.), marble, slate (Random Island, e.g.) and sandstone; the stone can have a rough or polished finish.

DIORITE: a dark-coloured, fine- to medium-grained, intrusive rock that is the plutonic equivalent of andesite.

DIP: The angle, taken off the horizontal, of any inclined planar surface. Thus, a vertical dyke would have a dip of 90⁰; a horizontal sedimentary bed would have a dip of 0⁰.

DIAMOND DRILLING: a common rock drilling method used in mineral exploration. The diamond-tipped bits allow recovery of a cylindrical core of rock.

DIATREME: a breccia formed by the explosive escape of fluids, gases, and in some cases, metals.

DISCORDANT: cutting across the surrounding (host or country rocks) strata.

DISSEMINATED SULPHIDES: sulphide minerals as grains or clots scattered throughout the rock, giving a salt'n pepper texture. Economic deposits of disseminated base metal mineralization are not as high-grade as massive sulphide deposits but typically have greater tonnage. The Point Leamington deposit northeast of Grand Falls is an example of a disseminated sulfide deposit. Porphyry Cu deposits also occur in disseminated form.

DOLOMITE: a creamy-white mineral composed of calcium and magnesium carbonate and is the principal component of Dolostone.

DOLOSTONE: a sedimentary rock composed primarily of dolomite (a calcium - magnesium mineral). Dolostone look like limestone but does not react readily with hydrochloric acid (HCl). It forms when magnesium replaces some of the calcium in limestone.

DRIFT: a general term for glacial deposits laid down directly by glaciers or by the depositional action of lakes or streams that are sourced in glaciers.

DUCTILE FAULT: a fault in which rocks deform without fracturing (as opposed to a brittle fault); in a ductile fault zone, the rocks behave like warm plastic, hence plastic deformation.

DUNNAGE ZONE: that part of central Newfoundland that is characterized by thick sequences of Cambrian to Ordovician mafic and felsic volcanic rocks, associated slates and coarser-grained, marine clastic sedimentary rocks. The Dunnage Zone contains rocks that formed in the ancient proto-Atlantic (Iapetus) Ocean. The zone is bounded by the Baie Verte Line (and the Humber Zone) in the west and the Gander River Ultramafic Belt in the east; it is widest in northeastern Newfoundland. The zone is well known for its VMS deposits (e.g., Buchans) and also contains a number of epithermal and deeper-level, mesothermal gold deposits.

DYKE (or dike): a tabular body (shaped like a sheet of plywood, e.g.) that cuts across the country or host rocks. Dykes are typically steeply inclined. A common example would be a diabase dyke – a mafic (dark-colored) intrusive igneous rock consisting mainly of plagioclase and pyroxene, which is finer-grained than gabbro and diorite.

- E -

ELECTROMAGNETIC (EM) SURVEY: A geophysical survey that measures the electrical conductivity of rocks, in the hope of finding a mineral deposit. Mineral exploration EM surveys can be done by air, on the ground, or down a drill hole. EM surveys also pick up water-filled faults, graphitic shales and salty groundwater. Airborne EM surveys were of great importance in the discovery of the of the world-class Kidd Creek massive sulphide orebodies.

EPICENTRE: the point on the Earth's surface directly above the focus of an earthquake,

EPIDOTE: a bright green mineral consisting of calcium, aluminum, iron and silica; it is common in metamorphic rocks and in rocks that have been affected by hydrothermal fluids (alteration).

EPITHERMAL GOLD (and/or silver): a gold (and/or silver) deposit that forms at shallow depths in the earth's crust, typically less than 1 km from the surface (a depth of 1000 m may not sound shallow, but it is, relative to many other types of mineral-forming processes). Epithermal deposits form in hydrothermal systems that are linked to volcanic and related magmatic activity. Hot, metal- and gas-bearing fluids rise to the surface and manifest as hot springs or fumaroles, depositing metals under certain conditions on their way upwards in the crust. Epithermal deposits typically occur in volcanic terranes but can also be found in many other rock types. Epithermal deposits typically form in continental crust. Shallow intrusions are the source of heat, metals and some or all of the fluids responsible for the formation of these deposits. There are two end-member styles of epithermal gold deposits, high-sulphidation and low-sulphidation. Both types are well preserved in the Avalon Zone of eastern and southern Newfoundland, and are less common in the Dunnage Zone of central Newfoundland. The Hope Brook Mine is an epithermal (high-sulphidation) gold deposit. The presence of silica in either massive or vuggy form, the presence of banded, waxy quartz veins, and the occurrence of minerals such as pyrophyllite and alunite are all indications of proximity to epithermal style mineralization or alteration.

EROSION: the process through which rocks are worn down by the action of wind, wave and ice and moved across the surface of the earth.

ERRATIC: a glacially transported boulder. The term is usually applied when the transported material is left in an area of different bedrock composition.

ERUPTION: the process through which solid, liquid, and gaseous materials are thrown into the earth's atmosphere and onto the earth's surface by volcanic activity. Eruptions range from gentle flow of magma (commonly seen taking place in Hawaii) to the tremendously violent expulsion of pyroclastic material from volcanoes such as Mount St. Helen's.

ESKER: a ridge of sand and gravel that forms under a glacier, and is deposited by melt water from the glacier. An esker may be less than 100 meters or more than 500 kilometers long, and may be anywhere from 3 to over 300 meters high. Eskers are common throughout the province of NL and are common sources of aggregate material for concrete and building.

EVAPORITES: a mineral or rock deposited directly from a solution (commonly seawater) during evaporation, e.g., Gypsum, sylvite, halite.

EXTRUSIVE ROCKS: when molten rock or lava extrudes or comes out on the surface of the earth and cools quickly, extrusive igneous rocks form. These rocks are very fine-grained because crystals don't have time to grow. The rock may cool so fast that a glass forms, e.g., obsidian.

- F -

FAULT: the fracture or surface along which rock units break apart or rupture, and along which there has clearly been movement of the rock on either side. A fault plane can be paper-thin or it can be a zone, metres wide.

FAULT BLOCK: a section of rock separated from other rock by one or more faults. Fault blocks move relative to each other vertically, horizontally or both (orthogonally)

FAULT GOUGE: soft, pulverized clay-like or puggy material found along some faults. Fault gouge is un-cemented or unconsolidated, and can be easily dug away with your hands.

FELDSPAR: is an aluminum silicate mineral, with varying amounts of potassium (K), sodium (Na) and calcium (Ca). Feldspars are very common minerals, actually forming the most abundant group of minerals in the earth's crust, comprising about 60% of rocks. Feldspars are used to make glass, ceramics and as a filler in paints, for example.

FELSIC: refers to a rock rich in light-colored minerals, such as quartz and potassium feldspar.

FELSITE: a light-coloured, fine-grained extrusive or shallow-intrusive igneous rock with or without phenocrysts (crystals) and composed chiefly of feldspar and quartz.

FERROMAGNESIAN: refers to a mineral rich in iron and magnesium (see Mafic).

FLOW (VOLCANIC): volcanic rock formed from lava that flowed out onto the Earth's surface.

FLUORESCENCE: when certain minerals are exposed to ultraviolet light they glow. Different minerals give distinctive colors such as the blue to bluish white of scheelite. The emission ends when the exposure to ultraviolet light ends. The phenomenon was first noted with fluorite, hence the term. Fluorite typically glows a blue-violet colour but some specimens may glow cream to white.

FOLDS: these are bends in layered or stratified rocks that occur during deformation, generally compression. The rocks must be hot enough to be able to deform plastically (i.e., without breaking).

FOLIATION: a planar structure or any planar set of minerals in metamorphic rocks that formed from direct pressure during deformation. Cleavage is a type of foliation.

FOOT WALL BLOCK (FOOT WALL): the rocks that lie below an inclined fault plane.

FORMATION: a collection of rocks (typically sedimentary) that were horizontally continuous when laid down, share a set of characteristics and occur over an area large enough to be mapped.

FOSSILS: remains, traces or imprints of animals or plants that have been preserved in rocks; includes bones, shells, casts and tracks.

FUMAROLE: a vent or an opening in the crust through which various gases including hydrogen sulphide, carbon dioxide, steam etc., escape from the upper parts of a volcano. See Geyser.

- G -

GABBRO: a coarse-grained igneous rock, chemically equivalent to basalt. Gabbro consists of calcium-rich feldspar, pyroxene and sometimes olivine.

GANDER ZONE: that part of northeastern and southern Newfoundland that is characterized by (Ordovician and earlier) quartz-rich sedimentary rocks that have been metamorphosed and deformed, and intruded by large bodies of porphyritic granite. Much of the Gander Zone contains crystalline metamorphic rocks, in sharp contrast to the bounding zones (Avalon in the east and Dunnage in the west).

GANGUE: the non-economic minerals that are associated with economic mineralization. Examples of gangue include quartz, clays, micas, epidote, pyrite and pyrrhotite.

GARNET: a silicate mineral that usually occurs as small, rounded red crystals mainly in metamorphic rocks, as in SW Newfoundland (Port-aux-Basques Gneiss) or NE Newfoundland (Hare Bay Gneiss), and throughout Labrador, but is also found in granitic veins such as aplite or pegmatite.

GEOCHRONOLOGY: the field of geoscience that measures the age of rocks and provides a

temporal framework in which evidence from other aspects of geology can be interpreted in order to unravel the history of Earth. The basis: a radioactive parent element, such as uranium, is incorporated as trace amounts into certain minerals, e.g., zircon, when they crystallize in rocks. Over time that parent element will decay to a stable daughter element, such as lead, which ideally will be locked inside the mineral. By measuring the amount of the parent and daughter elements in mineral and applying the known rate of decay for that radioactive parent, the age at which the mineral formed can be calculated by geochronologists.

GEOGRAPHIC LOCATION: Location, Location, Location! Precise locations are critical for good bush work. Prospectors, geologist, etc., need to know their precise location in the bush at all times. When soil or rock samples are taken, it is critical to know the exact location: we need to know our precise position not only for safety purposes but also to be able to return to the same location, especially if it is the site of that all-important sample that assayed 1 oz/t gold! The following definitions are all part of understanding how we measure our location.

GEODESY: the determination of one's relative position with reliable accuracy at any point on the Earth's surface.

GEOMAGNETISM: we need to have some basic understanding of magnetism in order to properly use a magnetic compass in the field. Many mechanisms have been postulated to explain how the Earth's Magnetic Field (the Geomagnetic field) is generated, but the principal mechanism now considered plausible, for the generation of the bulk of the field, is analogous to a dynamo, or generator - a device for converting mechanical energy to electrical energy. The geomagnetic field is a natural phenomenon that is constantly changing and intimately effects human health and activity and the natural world in a myriad of ways. The intensity of the field changes from place to place and even in any one location it is constantly changing, and on time scales ranging from seconds to decades to eons. This field is an essential part of certain geophysical surveys in mineral exploration. The north magnetic pole has shifted over the past century. It has picked up speed and has moved more in the last 15 years than in the 50 years before that, now moving about 50 - 60 kms per year on its way out of Canada and heading towards Russia. When we open up our compasses in the bush, the magnetic needle will immediately orient itself with the direction of magnetic north.

DATUM: a datum is any reference system against which measurements may be made. Datums are, therefore, based on fixed points or levels on the earth's surface and, more recently (because of satellites), a point at the centre of the earth. Thus, datums, to be useful, have to cover the whole surface of the Earth and be useable to anybody, anywhere. Datums tend to be ellipsoid-shaped because of the irregular, non-spherical shape of the Earth. One commonly-used ellipsoid or datum is WGS84 or World Geodetic System 1984. One's position in the bush is then measured relative to this datum.

Vertical Datums are used to measure land elevations and water depths. Sea level (actually MSL – Mean Sea Level) is a good example of a vertical datum. Thus, the sea level is considered as the reference level (set at 0, say) and all land heights (and depths in the sea, called bathymetry) are then measured relative to this. There are numerous vertical datums in use for a variety of geospatial applications.

Horizontal Datums are used to measure our positions on the surface of the earth. These are

the datums that prospectors need to be familiar with because GPS units (and virtually all prospectors have GPS units!) require a datum to be set. The datums commonly used in Newfoundland and Labrador are NAD27 and NAD83. Most exploration companies use NAD83; it is the more accurate of the two datums. The Natural Resources Department, Government of NL, uses NAD27 but will be converting to NAD83 in the near future. One of the first things that you have to do when you get your GPS is to set the Datum.

There are numerous horizontal datums in use for a variety of geospatial applications.

GPS: acronym for Global Positioning System. GPS units are small hand-held devices used to accurately display your position in the bush. Most GPS receivers, by default (factory-set), display latitude-longitude values based on the WGS84 datum. Most existing mapping data reference a local (non-WGS84) datum. Most GPS receivers have built-in datum transform software, and can be re-configured to output data referenced to whatever datum the user requires.

CO-ORDINATE SYSTEM: a coordinate system defines the location of a point on a planar or spherical surface. There are two types of coordinate system used on maps: the geographic coordinate system - latitude/longitude and the rectangular coordinate or UTM systems.

LATITUDE/LONGITUDE: the geographic coordinate system of lat/long measures locations from only two values even though on the three-dimensional Earth's surface. Lines of latitude are also called parallels because a particular value of latitude forms a circle parallel to the Equator. Latitude is defined as the angle formed by the intersection of a line perpendicular to the Earth's surface at a point and the plane of the Equator. The equator has a value of 0° . There are 90 angular degrees of latitude from the equator to each of the geographic poles. Points north of the Equator have positive latitude values, while points south have negative values. A meridian, or line of longitude, is formed by the intersection of a plane that passes through the point and the North and South geographic poles, with the surface of the Earth. The longitude value is defined by the angle between that plane and a reference plane known as the prime meridian, which passes through Greenwich, London, UK. Latitude and longitude form a very useful rectilinear grid on the curved surface of the Earth but when that surface is projected onto a flat surface, these lines converge and are not very convenient to use!

UTMs: the Universal Transverse Mercator (UTM) coordinate system is an international reference system that projects the Earth's three-dimensional surface onto a relatively-accurate, two-dimensional map. It uses metres as the unit of measure, and allows users to accurately and unambiguously identify geographical locations. The Earth's three-dimensional spherical surface is projected onto a flat, two-dimensional plane by dividing the surface into 60 equally-spaced vertical segments known as zones, numbered 1 through 60, from west to east. Each zone is 6 degrees wide. These zones are shaped like the segments of an orange and each forms the basis for a separate map projection. A 1:250,000 (1:250K) scale map is 2° wide so each segment/strip/zone is 3 1:250K map sheets wide. Newfoundland and Labrador occupy 4 UTM zones: 19 (western Labrador) through 22 (Avalon Peninsula). Each zone or strip of orange has a spherical surface (the orange peel), which must be flattened or projected onto a level surface. We can visualize how this might happen by pushing down on the centre of the segment until all of it

touches the smooth surface. This flattening action results in a slight distortion of the geographical features within the zone, but because the zone is relatively narrow, the distortion is small and may be ignored by most map-users.

TOPOGRAPHIC MAPS: Once the UTM zones (the orange segments – described above) are flattened, they can be divided into convenient map sheets or topographic maps produced by Natural Resources Canada, conforming to the National Topographic System (NTS) of Canada. These maps are available in two standard scales: 1/50 000 (most commonly used by prospectors) and 1/250 000. The area covered by a given map sheet is determined by its latitude and longitude.

UTM GRID – A RECTANGULAR GRID REFERENCE SYSTEM: now that these UTM zones are defined, we need a way to find our way around in them and for this we use a rectangular grid with two axes intersecting at right angles. This grid uses lines that are standard on all UTM maps. Because they are drawn on our "orange segments" after the strips have been flattened, the grid lines are perfectly straight and undistorted. The world-wide grid for the UTM coordinate system consists of parallel vertical (*easting*) lines and parallel horizontal (*northing*) lines, each of which is spaced exactly 1,000 meters apart, to form 1,000-meter squares. All vertical lines run parallel to the central meridian of each zone, i.e., the meridian that runs down the centre of each zone exactly three degrees of longitude from either side. Vertical lines are measured from the central meridian in each zone, which is arbitrarily set at the 500000E metre line (to ensure that there are no negative easting values). The next zone, which uses another projection based on another Central Meridian, the eastings and northings are similar but will be differentiated by the new zone number. Therefore, when quoting your UTM's for a location, always quote the zone number as well.

All horizontal lines run parallel to the equator. Note that the parallels of latitude on the UTM maps are not parallel to the equator, or to each other, because they are slightly distorted by the flattening. The equator itself is not distorted by the Transverse Mercator projection.

UTMs are commonly used by prospectors to accurately define their locations in Newfoundland and Labrador. The online staking system is also based on this UTM system. Eastings are 6 figure numbers and written first by convention. In the northern hemisphere, a zone's southern boundary (and point of origin) is the equator, and it assumes the value of zero meters. Horizontal lines are designated by their distance from the equator in metres. Because Canada's southernmost point is about 4,620,000 metres from the equator, all horizontal lines in Canada have a "northing" value above that figure; Northings are 7 digit numbers.

To designate a given point by co-ordinates, one must note the zone number (19 to 22 in NL) and easting and northing. The eastings and northings numbers will be common to many zones but the designation of the zone makes the numbers unique.

TRUE NORTH: every day the Earth rotates about its North/South geographic axis, the ends of which are the True North and South poles. Meridians (lines of longitude) converge on these poles. True north on a map, corresponds to the direction of the lines of longitude.

GRID NORTH: when you look at any topographic map, it is divided for convenience into 1 km squares, with intersecting vertical and horizontal lines which make it very

easy to locate our relative position and measure distances between objects easily and quickly. The edge of all topographic maps is aligned parallel to the vertical lines of this grid. Grid north is generally very close to True North. At the centre of the zone, true north will coincide with grid north and maximum deviation will be at the edges of the zone. Where two zones meet, it will be noted that the utm grids in each are do not coincide since the grids are based on the central meridian in each zone.

MAGNETIC NORTH: when you hold your compass horizontally to take a bearing to your next prospect, the needle, which is magnetic, will align itself with the earth's magnetic field and point north; this is called Magnetic North.

DECLINATION: as indicated above, the magnetic North Pole and the Geographic North Pole do not coincide. The angle between magnetic north and true north is called magnetic declination. Because the magnetic north pole is constantly wandering, the declination is constantly changing. The declination is either east or west depending on your location. The declination can be considerably and one could easily get lost in the woods if your compass is not set correctly; for example, the declination at St. John's (May, 2014) is approx 18⁰ west. All declination values in NL are westerly (or negative).

One of the first things that a prospector must do in the field before using their compass is to set the declination properly. Topographic maps have a diagram in the margin which gives the declination for the year in which the chart was published and the annual change of declination. By multiplying the annual change by the number of years that have elapsed since the chart was published and adding the total change to the published declination value, the user obtains the present day declination. Because some of these top maps are quite old the figures may not be accurate and it is best to go this site, put in your lat/long values and get the proper declination <http://geomag.nrcan.gc.ca/calc/mdcal-eng.php>

Once you have your declination figure, set the compass by adjusting the dial as indicated. Compasses are set to read relative to magnetic north by default, but once corrected, your compass will read bearings relative to true north and your values can be plotted on topo maps.

Sources: <http://geomag.nrcan.gc.ca/index-eng.php>

GEOLOGY: the scientific study of the Earth, its origin and evolution, the rocks that make up the crust, and processes that act on it.

GEOPHYSICS: the study of the physical properties of the earth and the composition and movement of rocks. Geophysics is used extensively, either in ground or airborne surveys, in mineral exploration to detect mineralized rocks characterized by any one or more of their physical properties, e.g., magnetism, electrical conductivity (EM-16, I.P.) or gravity.

GEOPHYSICAL SURVEY: measurements of the magnetic, electrical or other physical characteristics of the Earth as a means to indicate the presence of buried economic mineralization.

GEYSER: an eruption of hot fluid, mainly steam, from vents in the earth's surface, generally occurring in volcanic areas. Most famous example would be "Old Faithful" in Yellowstone National Park.

GLACIAL STRIATIONS: the scratches and grooves on rock surfaces made by rock fragments frozen into the bottom of a moving ice sheet. Striations trend in the same direction as the ice movement and can be used to locate the source of mineralized boulders.

GNEISS: a coarse-grained foliated metamorphic rock that shows parallel or streaky bands of differing composition; granular minerals (commonly quartz and feldspars) typically alternate with bands of platy or elongate minerals (e.g., mica and amphibole).

GOSSAN: a rusty rock in which iron-bearing sulphide minerals have been oxidized by air and water. Gossans may overlie a significant sulphide body. Don't worry if your gossan sample returns low assay results; metals may have been removed by weathering. The Voisey's Bay Ovoid deposit coincides with a major gossan zone, which is clearly visible from the air.

GOUGE: See Fault Gouge.

GPS: See **GEOGRAPHIC LOCATION**

GRAB SAMPLE: randomly selected rock samples hammered (grabbed) from the outcrop. This is a normal first step in sampling mineralized rock.

GRAIN: grains can be either particles or discrete crystals that make up a rock. Particles are in turn, made up of crystals.

GRAIN SIZE: geologists refer frequently to grain size as it is commonly used to discriminate different rock types. Grain size refers to the size of particles or crystals that constitute a rock or sediment, hence, fine-, medium- or coarse-grained.

GRAM CONVERSIONS: assay results are commonly listed in ppb (parts per billion), ppm (parts per million), grams or ounces. 1 ppm is equivalent to 1 gram per tonne. The international avoirdupois oz is in common use for most everyday things whereas the troy oz is specifically used for the measurement of precious metals, gemstones, silver, etc. The conversion factor for ounces to grams is 28.3495231. If the conversion is from troy ounces, it is 31.1034768. Thus,

1 Ounce (Avoirdupois) = 28.34... grams and 1 Troy Ounce = 31.10... grams.

Mining company press releases commonly publish assays for base or precious metals as grams per tonne or ounces per ton. The tonne is a metric ton, equal to 1000 kilograms (kgs), and is equivalent to 2204.6 pounds. The ton (or Short Ton) is equivalent to 2000 pounds and is used in the USA and Canada. The Long Ton (imperial system, used in UK and other English-speaking countries) is equivalent to 2240 pounds. Since gold is always quoted in troy ounces, the conversion of grams of gold to ounces, using 31.1, would give grams per short ton. However, because the gold quote is commonly in grams per tonne, we have to use an additional factor converting from short to metric tonne (i.e. the ratio of 2000/2204). This factor is .9071.

Thus, 31.103481 grams per ton / .9071 = 34.2857 grams per tonne, i.e.

1 Tr. Oz. = 34.2857 grams per tonne.

For more info go to...

<http://www.empr.gov.bc.ca/Mining/Geoscience/MINFILE/ProductsDownloads/MINFILEDocumentation/CodingManual/Appendices/Pages/VII.aspx>

GRANITE: a light-colored intrusive igneous rock dominated by quartz (10-50%) and potassium feldspar, with lesser amounts of plagioclase feldspar. Granite is common in continental areas (obviously in continental crust) and is absent from oceanic crust.

GRANODIORITE: an intrusive igneous rock related to granite, but contains a greater proportion of plagioclase feldspar and mafic minerals; roughly intermediate in composition between a granite and a diorite.

GRAYWACKE: a variety of sandstone characterized by angular-shaped grains of quartz and feldspar, and small fragments of dark rock; commonly called a “dirty sandstone”.

GREENSTONES: an altered or metamorphosed mafic igneous rock that owes its dark color to the presence of chlorite, epidote or amphiboles. Greenstone belts are associated commonly with gold mineralization in Ontario and Quebec.

GRID LINES: a network of cut or flagged survey lines, along which sampling, mapping or geophysical surveying is carried out.

GROUP: in geologic mapping, a Group is a unit that consists of two or more Formations.

GRUBSTAKING AGREEMENT: an agreement between a prospector and a company (or individual) whereby the company (or individual), known as the grub-staker, agrees to equip and/or finance a prospector in return for an interest in any economic mineralization discovered. The grub-staker is usually given the “Right of First Refusal” - ROFR.

GYP SUM: a soft, white mineral consisting mainly of calcium sulphates, formed during the evaporation of sea water; gypsum is used in the manufacturing of “gyprock”, a wallboard, and “plaster of Paris”

- H -

HALF-LIFE: the time necessary for half of the atoms of a Radioactive element to decay into the daughter element. Uranium 238, for example, has a half-life of 4.5 billion years, which makes it useful for dating the age of the earth. Carbon 14 has a half like of 5730 years and it is extremely well used in dating organic materials.

HANGING WALL BLOCK (HANGING WALL): the body of rock that lies above an inclined fault plane.

HARDNESS: the relative resistance of a mineral to scratching, illustrated by the Mohs scale of hardness, which goes from 1, softest (talc), to hardest, (diamond) at 10.

HARDPAN: a relatively hard layer of soil at, or just below, the ground surface, cemented by silica, iron oxide, calcium carbonate, or organic matter.

HEMATITE: a grey, metallic or earthy iron oxide mineral (Fe^2O^3) which powders to a red colour.

It is the principal ore of iron. Specular hematite is a shiny, hard variety of the mineral and used for jewelry.

HERMITAGE FLEXURE: A term used to describe the large-scale regional curvature of rock units in southern Newfoundland between Hermitage Bay and Port-aux-Basques.

HORNBLÉNDE: a black or very dark green-black mineral that forms prismatic crystals; it is the most common member of the amphibole group of minerals and occurs in both igneous and metamorphic rocks.

HORNFELS: a metamorphic rock characterized by a dense, uniform grain size, typically without a foliation. Usually formed by high-temperature, low-pressure conditions associated with contact metamorphism, hornfelses are normally found near intrusive rocks.

HUMBER ZONE: the westernmost of the four main geological divisions of the island of Newfoundland. It consists of 1 billion year old crystalline rocks of the Grenville structural province, overlain by Cambrian clastic sedimentary rocks, and Cambro-Ordovician limestones and dolomites. Other clastic rocks and ophiolites are faulted against the carbonate rocks. The Humber Zone contains well known deposits of zinc, including the Mississippi Valley-type Daniels Harbour deposit. The eastern boundary of the Humber Zone is the Bay Verte line, the site of significant gold and asbestos mineralization. The zone extends the entire length of the island from St. Anthony to the Cape Ray area.

HYDROTHERMAL FLUIDS: a hot, aqueous fluid. Hydrothermal fluid formation occurs throughout the Earth's crust, from deep-down (several kms plus) to the surface (hot springs, geysers and fumaroles). Hydrothermal fluids are generated by igneous, metamorphic and sedimentary processes or a combination of these. Hydrothermal fluids form when water percolates from the surface of the Earth down through the crust, heating up as it goes. As the temperature and pressure of the fluid increase, its chemistry changes and it partially or completely dissolves surrounding rocks and may concentrate metallic elements. These fluids may mix with fluids emanating from igneous bodies rising through the crust. As these fluids rise toward the surface of the Earth, they may start to release some of these metals. Hydrothermal mineral deposits may contain a vast range of different minerals, including native elements, sulphides, oxides, halides, carbonates, sulphates, phosphates and silicates. The mineralogy of any one deposit reflects the chemistry of the fluid (controlled by its source and the chemistry of the rocks through which it has passed) and the temperature and pressure at the location of the mineralization.

HYDROTHERMAL ALTERATION: the changes in composition and textures of a rock that result from a hydrothermal fluid passing through it. These hydrothermal fluids precipitate minerals formed from elements (including metals) that are dissolved within them. The changes in mineralogy and texture of wall rocks surrounding ore (the alteration zone) are much more extensive - and in many cases, more obvious - than the ore itself. Recognizing the presence and hydrothermal alteration (and its exact nature) is an important prospecting and exploration guide to the discovery of ore bodies.

HYDROTHERMAL BRECCIA: rock formed from material that had been brecciated or broken by the passage of hot fluids and gases that are directly or indirectly related to magmas. These may

contain rounded or angular fragments of one or many rock types, and may be either matrix-rich or matrix-poor. The matrix is typically altered. Hydrothermal breccias are located near (or in some cases host) a number of different types of mineral deposits.

- I -

I. P. SURVEY: a ground-based electrical survey designed to measure rocks' electrical resistance (resistivity) to a current generated in the ground between electrodes. Some metallic sulphide minerals can hold electric charge and typically show up as a zone of anomalously low resistivity. An IP survey can identify buried sulphides by measuring if, and how long, rocks hold a specific type of electric charge. Sulphide minerals are chargeable and therefore show up well on an IP survey.

IAPETUS OCEAN: another name for the proto-Atlantic Ocean that existed between approximately 600 and 400 million years ago.

IGNEOUS ROCKS: these are rocks formed from molten rock and can be either extrusive or intrusive.

INCLUSION: a rounded or angular fragment of any (older) rock type, of any size, within an igneous rock. The term "xenolith" is often used as another word for inclusion.

INTRUSIVE ROCKS: these are igneous rocks that cool slowly in the earth's crust and crystals have time to grow. In contrast, see Extrusive Rocks.

ISLAND ARC: a curved belt of volcanic islands that formed above a subduction zone, the Japanese and the Aleutian Islands are examples of island arcs; many of the rocks in the Dunnage Zone of Central Newfoundland formed in an ancient (500-450 million year old) island arc.

IRONSTONE or CLINTON TYPE IRONSTONE DEPOSITS: these are deposits of granular or oolitic, iron-rich sedimentary rocks containing brown or red oxidized iron. Over 80 million tons of iron were produced from these type of deposits found on Bell Island and in the subsurface under adjacent Conception Bay on the Avalon Peninsula of NL. This type of deposit forms in a stable continental shelf environment, where they were deposited with shale, siltstone and limestone. Unlike the Lake Superior type iron deposits, such as those in western Labrador, these ironstones do not represent important sources of iron in North America.

- J -

JASPER: a red variety of chert. The red color comes from many tiny included hematite grains

JOINTS: a natural break in rocks – also called fractures. No movement occurs along joints. Joints may open and become fissures and be infilled with quartz or calcite, e.g.

JOINT VENTURE: a formal partnership that exists between individuals or companies for the length of a specific mineral exploration project.

- K -

KIMBERLITE: a particular type of volcanic rock characterized by the presence of diamonds.

KUPERSCHIEFER TYPE COPPER DEPOSITS: deposits of disseminated copper found in sedimentary rocks, typically at the boundary between reduced (green-grey) and oxidized (red) beds. The deposits form in ancient oxygen-starved sedimentary basins. Silver and cobalt are important by-products of this type of sediment-hosted copper deposit.

KUROKO TYPE DEPOSIT: a type of concordant massive sulphide deposit found in submarine felsic volcanic rocks in island arcs. The deposits typically contain (banded or massive) pyrite, sphalerite, galena and chalcopyrite lenses (massive or banded), underlain by low-grade stockwork zones. Barite is a common accessory. Mineralization is sited near centres of felsic volcanism that are defined by rhyolite domes or coarse-grained pyroclastic breccias ("mill-rock"). Quartz, sericite and chlorite alteration is common near (under) the deposits. A wider alteration zone of clay minerals, albite and iron carbonate can occur, farther away from the deposit. The Buchans ore bodies are a classic example of a Kuroko-type deposit.

- L -

LATITUDE/LONGITUDE: See **GEOGRAPHIC LOCATION**

LAVA: molten rock that flows out at the Earth's surface.

LITHIFICATION: the process that sediment undergoes to turn it into a rock.

LODE GOLD DEPOSIT: a general term that refers to a gold deposit that occur in association with large fault zones. In many cases, these deposits occur in smaller faults extending from the main structure. Gold may occur as veins or disseminated in the country rocks. They are typically associated with the widespread formation of iron-carbonate alteration minerals as well as pyrite, albite and sericite that form close to this type of deposit. Areas where faults are associated with large amounts of mafic volcanic rocks, small intrusions, or iron-rich rocks are especially prospective. Nevertheless, lode gold deposits can occur in any rock type that has been affected by a major zone of deformation. The Cape Ray Gold developed prospect in southwest Newfoundland is an example of a lode gold type of mineralization. Many of the Baie Verte Peninsula gold showings are lode-gold type.

LIMESTONE: a sedimentary rock consisting mainly of calcite (calcium carbonate).

LUSTRE: the way in which light reflects from a mineral, e.g., specularite has a high metallic lustre, quartz has a vitreous lustre, biotite has a vitreous/pearly lustre, diamond is adamantine, and labradorite also has a vitreous or glassy lustre.

- M -

Ma: abbreviation for “millions of years before the present”.

MAFIC: a term that refers either to minerals that contain abundant magnesium and iron or rocks dominated by mafic minerals. This is a made-up term from magnesium and ferric (Latin word for iron is ferrum and the adjective is ferric). Mafic minerals are generally dark-coloured and are heavier than lighter coloured minerals like quartz and feldspar and include pyroxene, hornblende, biotite; olivine is mafic too but varies from yellowish green to greenish black. Gabbros, basalts and diabase are examples of mafic rocks and are generally dark-coloured rocks and this helps to distinguish them from Felsic rocks.

MAGMA: molten rock, formed within the inner parts of the Earth, which crystallizes to form an igneous rock

MAGMATIC SULPHIDE DEPOSIT: a deposit - usually of nickel, copper, cobalt and /or platinum group elements - that is found in mafic or ultramafic igneous rocks (e.g., gabbro, troctolite, etc.). The metals were concentrated into ore-grade accumulations when the igneous rock was still liquid (a magma) and buried deep in the crust. Because the sulphides form at specific times as the magma cooled, they are associated with particular rock types within the larger host igneous intrusion. Unlike VMS and epithermal deposits, magmatic sulphide deposits can form without hot hydrothermal fluids, and are not associated with wide zones of hydrothermal alteration. Voisey's Bay is a classic magmatic sulphide deposit. Magmatic sulphide deposits represent important prospecting targets in several parts of Newfoundland and Labrador, including the “Nain Plutonic Suite” of eastern Labrador, and “Grenville Province” of southern Labrador and the Northern Peninsula of Newfoundland.

MAGNESITE: a white mineral composed of magnesium carbonate and an important source of magnesium; magnesite is a common alteration mineral in ultramafic rocks in Newfoundland.

MAGNETIC ANOMALY: the amount by which measurements of the local magnetic field intensity differs from the level of the global magnetic field. Measurements taken in a local geomagnetic survey must be subtracted from the global field, called the International Geomagnetic Reference Field to assess positive or negative variations in the local field. If the local field is greater, it is a positive anomaly; if it is less, the anomaly is negative.

MAGNETITE: a black, magnetic iron oxide mineral (Fe^3O^4) – an important source of iron from western Labrador.

MAGNETOMETER: a geophysical instrument used to record disturbances in the earth's magnetic field. These disturbances are caused by magnetically susceptible (magnetic) rocks. Measuring the magnetic variation in an area helps define rock units and faults but can be an important means of discovering ore with a distinct magnetic signature. Magnetometer surveys can be done from the air, on the ground, or underwater. The proton precession magnetometer is mounted on a pole and is commonly used in ground surveys in NL; it only measures the strength of

the field. Each measurement takes a second or more at a series of stations, typically 15 to 60 m apart along survey lines.

MARBLE: metamorphosed limestone or dolomite.

MASSIVE SULPHIDE DEPOSIT: a mineral deposit consisting almost entirely of sulphide minerals. The Buchans, Rambler and Duck Pond deposits are examples of massive sulphide deposits that are hosted by volcanic rocks. These deposits are typically referred to as volcanogenic massive sulphide (VMS) deposits. Central Newfoundland (Dunnage Zone) is viewed by many as the most highly prospective part of the province for VMS deposits. Not all massive sulphide deposits are volcanic-hosted. For example, the Voisey's Bay deposit contains massive sulphides, but is a magmatic sulphide deposit.

MATRIX: generally the finer-grained portion of rocks in which the coarser grains are embedded; Differentiate from Cement which is a later addition to the rock.

MELANGE: unit of rocks characterized by blocks and fragments of all sizes, typically embedded in a sheared, shaly matrix (commonly graphitic black shale). The Dunnage Melange is an example of a tectonic mélange formed in the upper portion of a Subduction Zone.

METAMORPHIC ROCKS: one of the three principal categories of rock produced through Metamorphism. See Igneous and Sedimentary rocks.

METAMORPHISM: the processes of changes over time of the mineral composition and texture of rocks caused by varying pressure and temperature. Such rocks are common on the western side of the Baie Verte Peninsula, the Gander Zone and in southwest Newfoundland and throughout Labrador.

MICAS: these are platy minerals like biotite, muscovite, chlorite and the clay minerals like kaolinite and illite. The principal distinguishing characteristic of the micas is their tendency to split into thin translucent sheets.

MINERAL: a naturally-occurring inorganic solid that has a well-defined chemical composition and in which atoms are typically arranged in a lattice work.

MINERAL DEPOSIT: a mineral occurrence of sufficient size and grade that has economic potential if circumstances such as commodity price, infrastructure, political situation, human resources etc, are favourable.

MISSISSIPPI VALLEY TYPE DEPOSIT: deposits of lead and zinc found in carbonate rocks, typically in dolomites within thicker limestone sequences. Mineralization (sphalerite and galena) is sited primarily in rocks in which a secondary porosity is well developed. There is little alteration associated with these deposits although the presence of crystalline dolomite in open pore spaces and fractures in the carbonate rocks serves as a good prospecting tool. The Daniel's Harbour zinc deposits of western Newfoundland are an example of a Mississippi Valley type deposit. This type of deposit represents an important prospecting target on the Northern Peninsula.

MUDSTONE: a fine-grained sedimentary rock consisting mainly of clay mineral particles.

MUSCOVITE: a silvery variety of the Mica family containing potassium and aluminum.

MYLONITE: a highly deformed Ductile fault rock with a planar fabric produced by extreme shearing/movement. Original rock textures are completely destroyed during the most intense dynamic metamorphism. Some fine-grained mylonites resemble either rhyolites or cherts and can be easily confused with those rock types. A fault defined by mylonite is also known as a mylonite zone.

- N -

NET SMELTER RETURN: a gross royalty based on revenue; it is a percentage (usually 1 to 3%) of the value of all mineral production from the mineral property that is shipped from the smelter. NSRs are an important part of Option Agreements between prospectors and exploration companies.

NORITE: a mafic intrusive rock similar to gabbro. Norites contain more of the mafic mineral hypersthene (an orthopyroxene).

NORMAL FAULT: a fault (brittle or ductile) where the hanging wall block is offset downward relative to the foot wall block. Movement occurs down the dip of the fault.

- O -

OCEANIC CRUST: that part of the crust underlying the ocean basins. It is usually composed of basalt and gabbro and is about 5 km thick.

OLIVINE: a green, iron-magnesium silicate mineral found particularly in basalt, gabbro and ultramafic rocks such as Peridotite, a rock which is very common in Western Newfoundland. The gem variety is known as peridot.

OPHIOLITE: a suite of mafic and ultramafic rocks and associated marine cherts (and their metamorphic equivalents), that together represent a cross-section through parts of an ocean's crust and upper mantle; a fossilized piece of oceanic crust. The ophiolites in Newfoundland are fault slices of the oceanic crust below the ancient Iapetus Ocean.

OPTION AGREEMENT: a legal and binding agreement that outlines the terms under which the optionee (e.g., a company) explores or develops the mineral property of the optionor (a prospector), and the terms under which they can increase their interest in the property. The agreement outlines the amount and scheduling of cash payments, the exploration expenditure commitments and the royalty agreements, and clauses outlining how the property can be maintained, bought out or dropped.

ORDOVICIAN: the name given to the interval of geological time from about 495 to 440 million years ago.

ORE: natural occurring mixture of minerals (or a mineral) that can be mined and sold for a profit, or from which one or more minerals can be profitably extracted.

ORE RESERVES: that part of a mineral deposit that can be mined for profit. Reserves are defined after all the geological, engineering factors are reviewed and economic and environmental parameters that might affect profitability of the operation are clearly understood, normally after an comprehensive feasibility study has been carried out. See [Resources/Reserves](#) below.

OREBODY: commercially viable mass of mineralization, the mass, grade and limits of which have been determined

OROGEN: intensely deformed crustal-scale belt, linear to arcuate in plan, normally containing a mountain chain. It is typically formed by the collision of two or more of the earth's large lithospheric plates. Orogens contain internal zones characterized by rocks produced by metamorphism and igneous activity, and include thick and complex successions of a wide variety of sedimentary rocks, formed in differing tectonic environments.

OROGENY: a collective term that denotes plutonism, metamorphism and deformation occurring over several tens of millions of years, usually within a mountain belt (or orogen), at or somewhere near a tectonic plate boundary in the earth's crust.

OROGENIC GOLD: gold that is associated with quartz veins that formed deep in the Earth's crust (about 10 km); quite common in the Central Newfoundland Dunnage Zone. This type of gold is also called mesothermal gold. These deposits are formed from hot water that precipitates gold under high temperatures and pressure. In these deposits, high gold grades tend to be continuous over large vertical ranges. The Pine Cove Gold Mine is situated on the Baie Verte Peninsula. This gold is structurally-controlled and is typical of orogenic-style gold mineralization associated with orogenic and greenstone belts worldwide. The Baie Verte area is analogous to the Californian Mother Lode Gold Belt and the Bralorne-Pioneer District in B.C. Nearly 80% of B.C.'s gold production has been mined from mesothermal veins, which includes Almaden's Elk Gold Mine.

OUTCROP: When bedrock (crust of the earth) is exposed or crops out, it is called an outcrop.

OVERBURDEN: all loose material (for example: soil, sand, gravel, peat and weathered rock) that lies above bedrock.

OXIDATION: process by which iron or other metallic elements in a rock / till / soil react with oxygen and water to form new (residual) oxide minerals, particularly hematite, which, locally, takes the form of ochre, a very soft red earthy material used by native peoples for decoration. A rock that is oxidized will become a [Gossan](#) if the process continues for long enough.

-P-

PANNING: this is the separation of heavier minerals such as gold, magnetite and sulphides from lighter grains in stream sediment, loose soil or crushed rock using a pan-shaped container and lots of water for flushing. Panning is a well-proven prospecting technique that is cheap and effective.

PEGMATITE: an extremely coarse-grained rock that typically occurs as veins in granite or gabbro or other plutonic rocks. Can be an attractive rock for prospectors as pegmatites can contain enrichments in rare elements such as lithium, boron, niobium etc. and are also the source of many gem-quality precious or semi-precious minerals.

PERIDOTITE: a dark-coloured, igneous rock composed mostly of olivine and pyroxene. Peridotite is a characteristic layer of the deep Oceanic Crust and is famously exposed in Western Newfoundland where it has become a geo-tourist attraction.

PHENOCRYST: a relatively large, conspicuous crystal (feldspars, e.g., can be up to several cms across; a good example would be the Deadman's Bay Granite in NE Newfoundland) in a Porphyritic igneous rock.

PHYLLITE: a metamorphosed mudstone with a silky lustre, coarser-grained than a shale or slate but less coarse-grained than a schist.

PILLOW LAVA: rounded, pillow-like masses of volcanic rock, usually basaltic that were formed by the extrusion of lava into water.

PLACER DEPOSIT: a surficial deposit of heavy minerals or native metals (e.g., gold) formed by their mechanical concentration from weathered rock. A paleo-placer is its lithified equivalent. Some of the largest gold deposits in South Africa are paleo-placers.

PLATE TECTONICS: a theory concerning the global movement of crustal plates that makes up the Lithosphere. The whole lithosphere is in constant motion, not only those segments composed of continental or oceanic material. An earlier version of this theory was called continental drift.

PLUTONISM: when molten igneous rock cools kms down in the crust of the earth, coarsely crystalline plutonic rocks such as granite and gabbro are formed. These igneous bodies are called plutons.

PORPHYRY COPPER (\pm molybdenum \pm gold) DEPOSIT: intrusion-hosted copper (\pm molybdenum \pm gold) deposits where mineralization occurs in thin quartz veins (stockworks), fractures and breccias, localized in the intrusions and in adjacent country rocks.. These deposits are typically low-grade but high-tonnage. Pyrite and chalcopyrite (\pm molybdenite) are the main sulphides; they occur with lesser amounts of bornite and magnetite. Typical host rocks are quartz diorite, granodiorite and quartz monzonite, which may or may not be porphyritic. Alteration minerals include quartz, sericite, biotite, K-feldspar, albite, anhydrite, magnetite, actinolite, chlorite, epidote, calcite, clays, and tourmaline. Hydrothermal alteration of the host rock intrusions

and wallrocks is prevalent, extensive and zoned. Potassic alteration (K-feldspar and biotite) occurs in the core of porphyry deposits. This alteration can be ringed by chlorite-rich (propylitic) alteration and quartz-sericite-pyrite (phyllic) alteration. Some porphyry deposits are overlain by epithermal (high-sulphidation) type deposits. Aeromagnetic maps are useful tools in prospecting for porphyries, as the (Cu-Au) ore zones can be associated with magnetite-rich rocks. The more intense quartz-pyrite-sericite (phyllic) alteration zones produce magnetic and resistivity lows. The Rencontre Lake, Frenchman's Cove, Colchester and Butlers Pond prospects are all examples of porphyry style mineralization. Porphyry deposits represent important prospecting targets in much of the Dunnage, Gander and Avalon Zones of Newfoundland

PORPHYRITIC: a texture found in igneous rocks where larger crystals (Phenocrysts) are surrounded by fine-grained glassy material (matrix).

PORPHYRY: an igneous rock that has porphyritic texture.

PROTO-ATLANTIC OCEAN: equivalent to Iapetus Ocean: the ancient ocean that existed between about 400 and 500 million years ago, separating the continents that later collided (as a result of plate tectonic motions) to form the Appalachian orogen. Relics of the old ocean floor of the proto-Atlantic are preserved within ophiolites of the Dunnage Zone. Many of the VMS deposits of central Newfoundland formed within island arcs in the same proto-Atlantic Ocean.

PYRITE: a metallic, bronze, cubic mineral (FeS_2), commonly known as fool's gold.

PYROCLASTIC: material thrown from a volcano; pyro refers to fire and clastic refers to fragments. The material ranges from very fine-grained ash to "bombs" metres across.

PYROPHYLLITE: pyrophyllite is a hydrous aluminum silicate mineral $\text{Al}_2\text{Si}_4\text{O}_{10}(\text{OH})_2$, occurring in phyllite and schistose rocks and in hydrothermal deposits; it is quite common in rocks on the Avalon peninsula of NL. Pyrophyllite and talc have the same platy crystal structure and therefore, similar physical properties. The only difference is that talc is magnesium based and pyrophyllite is aluminum based. Pyrophyllite has a pronounced pearly lustre and has flexible (but not elastic) properties. When heated, the mineral exfoliates and swells up to many times its original volume, hence the name pyrophyllite, from the Greek pyro (fire) and phyllos (a leaf). The color is white, pale green, greyish or yellowish; very soft and greasy to the touch. Pyrophyllite has an abundance of aluminum which gives it a high heat resistance and as a result, it has been widely used in the manufacturing industries such as Fiberglass, Plastics, Pulp & Paper, Agriculture, Ceramics, Paint and Coatings, Rubber, Personal Care, Refractory and Foundry as an alternative to talc and kaolin. Trinity Resources Ltd is actively involved in mining pyrophyllite from the Manuels area, Avalon Peninsula.

PYROXENE: a common, dark green/black, silicate mineral containing iron and magnesium; it is a common constituent of gabbro, anorthosite and some ultramafic rocks such as peridotite, and in some metamorphic rocks.

PYROXENITE: an ultramafic intrusive rock composed mainly of the ferromagnesian mineral pyroxene.

-Q-

QUARTZ: probably the most common rock-forming mineral in the continental Earth's Crust, consisting of SiO₂. Quartz is slightly harder than stainless steel, is glassy and comes in many different colours but normally is vitreous to white.

QUARTZ-CARBONATE VEIN GOLD DEPOSIT: a gold deposit in which gold occurs (usually without other metals) in quartz and carbonate veins associated with faults and shear zones. These deposits (a type of lode gold deposit) occur in deformed and metamorphosed volcanic, sedimentary, and granitoid rocks. Gold occurs in the veins or disseminated in altered wall rocks immediately adjacent to the veins. Major fault structures occur throughout metamorphosed terranes in Newfoundland and Labrador and represent prospective ground for these type of deposits.

QUARTZITE: a granular sedimentary rock formed mainly of quartz (sometimes called a quartz arenite), or its metamorphosed equivalent.

-R-

RADIOACTIVE DECAY: this is the process whereby many naturally-occurring elements break down into other elements. Thus, a radioactive parent element breaks down to a daughter element by releasing sub-atomic alpha and beta particles and neutrons and gamma radiation (energy). The immediate daughter element can be either stable or unstable – in the latter case, it will break down again and the process continues until a stable element is reached. This process occurs at measurable rates, which are constant. Once the decay rate is known, the age of a rock can be estimated (see Geochronology). Some examples of radioactive parents and daughter elements are Uranium 238 to Lead 206, Carbon 14 to Nitrogen 14: the number quoted is the mass number of the atom which is the total number of neutrons plus protons.

RADIOMETRIC SURVEY: a land-based or airborne survey, using Spectrometers to measure the intensity of gamma radiation from the surface of the earth with the objective of mapping the distribution of radioactive elements, typically, K, U and Th. The measurements are also affected by radionuclides, nuclear fallout, radon in the air, and cosmic radiation. Mineral exploration companies principally use these surveys in the search for buried uranium or thorium deposits and for areas of potassic alteration.

RECRYSTALLIZED: an adjective used to denote a rock affected by the growth of new mineral grains. The material for the new growth comes from pre-existing grains.

REDBED-TYPE COPPER DEPOSIT: disseminated sediment-hosted copper deposits that occur primarily in reduced (as opposed to oxidized) rock units within sequences of continental red-beds. Mineralization occurs at the transition (vertical or sideways) between grey-green and red varieties of sandstone, siltstone and quartzite. Silver can be an important by-product. Many parts of the Avalon Zone contain rocks that are prospective for several types of redbed copper deposits.

REGOLITH: a layer of unconsolidated broken rock material covering solid bedrock.

RESOURCES and RESERVES

The following is taken from the CIM Standing Committee on Reserve Definitions
Adopted by CIM Council on November 27, 2010

Mineral Resource: a concentration or occurrence of diamonds, natural solid inorganic material, or natural solid fossilized organic material including base and precious metals, coal, and industrial minerals in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge.

Measured Mineral Resource: that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production, planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough to confirm both geological and grade continuity.

Indicated Mineral Resource: the part of a Mineral Resource for which quantity, grade or quality, density, shape and physical characteristics can be estimated, with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed.

Inferred Mineral Resource: the part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling, and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes.

Mineral Reserve: the economically mineable part of a Measured or Indicated Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified. A Mineral Reserve includes diluting materials and allowances for losses that may occur when the material is mined.

Probable Mineral Reserve: the economically mineable part of an Indicated and, in some circumstances, a Measured Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified.

Proven Mineral Reserve: the economically mineable part of a Measured Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction is justified.

Qualified Person: Mineral Resource and Mineral Reserve estimates and resulting Technical Reports must be prepared by or under the direction of, and dated and signed by, a Qualified Person. Qualified Persons preparing public Mineral Resource and Mineral Reserve reports in Canada must follow the requirements of National Instrument 43-101, available on the following website, e.g., www.osc.gov.ca.

A “Qualified Person” means an individual who is an engineer or geoscientist with at least five years of experience in mineral exploration, mine development or operation or mineral project assessment, or any combination of these; has experience relevant to the subject matter of the mineral project and the technical report; and is a member or licensee in good standing of a professional association.

REVERSE FAULT: a fault (brittle or ductile) where the hanging wall block is shifted upward relative to the foot wall block. The movement occurs up the dip of the fault.

RHYOLITE: a felsic or silica- (and potassium-feldspar) rich volcanic rock. Rhyolites are the extrusive equivalents of granite. They are typically light colored but can be dark red or brown - because of oxidization - if they were erupted in a subaerial environment.

-S-

SANDSTONE: a sedimentary rock formed by cemented grains of sand. The sand fragments can be set in a fine-grained matrix of silt or clay

SCHIST: a foliated, crystalline metamorphic rock that can be readily split into thin flakes or slabs commonly characterized by micas.

SCREE SLOPE: a steep slope consisting of loose, broken rock fragments; also called talus slope.

SEDIMENTARY ROCK: rock formed by accumulation and cementation of loose sediment (e.g., sandstone), the deposition of chemical compounds held in solution in water (e.g., limestone) or by the accumulation of animal or plant debris (e.g., coal).

SEDEX DEPOSIT: “sedex” is an abbreviation for “sedimentary exhalative sulphides”. These are stratiform sulphide deposits of zinc, lead and silver that are concordant or parallel with their host sedimentary rocks. They form at or near the floor of submarine marine sedimentary basin, where the metals are deposited from hot, metal-rich (hydrothermal) fluids. These fluids originate from the sediments themselves. Sedex deposits form near “normal faults” that were active at the time the sediment were being deposited into an opening basin. (syn-sedimentary faults). They form in areas of “extensional tectonism” and “high heat flow”. Ancient examples of similar extensional basins

occur in Newfoundland, and are locally coincident with areas of anomalous lake sediment (e.g., Carbonar and Fermeuse areas of the Avalon Peninsula; the Humber Arm north area of west Newfoundland, and large parts of Notre Dame Bay). The Sullivan Mine in B.C. is a world-class example of a Sedex deposit.

SERPENTINITE: a rock consisting mainly serpentine-group minerals, derived from the alteration of mafic minerals such as olivine and pyroxene.

SHALE: a fine-grained sedimentary rock composed of clay or mud particles.

SILICA: silica is Silicon Dioxide (SiO_2); a pure crystalline substance commonly called quartz.

SILICATE: a silica-rich igneous rock or mineral, e.g., granite and feldspar. All silicate minerals have SiO_2 as integral part of their atomic structure.

SILICEOUS: refers to a rock rich in silica. Siliceous rocks are typically difficult to scratch with steel. Coarse-grained siliceous rocks have free quartz.

SILL: a sheet-like or tabular igneous body that has intruded (as a magma) along the layering of sedimentary or metamorphic rocks.

SILTSTONE: a clastic sedimentary rock similar in composition to mudstone, but slightly coarser grained

SILURIAN: a name given to the interval or period of geological time from about 440 to 415 million years ago.

SKARN: skarn deposits are one of the more abundant ore types in the earth's crust and can form in rocks of almost all ages. Skarn is a relatively simple rock type defined by a mineralogy usually dominated by calc-silicate minerals such as garnet and pyroxene. Most are found adjacent to plutons but can also occur along faults and major shear zones, in shallow geo-thermal systems, on the sea floor, and at lower crustal depths in deeply buried metamorphic terranes. Although the majority of skarns are found in lithologies containing at least some limestone, they can form in almost any rock type during regional or contact metamorphism and from a variety of metasomatic processes involving fluids of magmatic, metamorphic, meteoric, and/or marine origin.

SLATE: a compact, fine-grained metamorphic rock - originally a shale, siltstone or fine-grained sandstone - that splits into slabs and thin plates, along evenly spaced, parallel cleavage planes. Most slates form from deformation and (low-grade) metamorphism of shale.

SMELTING: the process of removing metal from the ore.

SPECIFIC GRAVITY: specific gravity (sp. gr.) refers to the ratio of the density of a rock compared to the density of water. Water has a density of 1 (gram per cubic centimeter) and a specific gravity of 1. Materials with specific gravity less than 1 are lighter than water and will float. Rocks with specific gravity more than 1 are heavier than water and will sink.

SPECTROMETER: an instrument that measures the abundance of gamma rays with different energy levels and, therefore, can discriminate between different elements causing the radiation. The gamma-ray spectrum is measured using crystals that scintillate during a gamma-ray interaction. Photomultipliers convert the scintillation to a voltage that is directly proportional to the energy of the gamma ray. The survey, e.g., might measure only gamma rays above 1.3 MeV for potassium, uranium and thorium; only gamma rays above 1.6 MeV for uranium and thorium; only gamma rays above 2.5 MeV for thorium. See Radiometric Surveys.

SPECULAR HEMATITE or SPECULARITE: a type of hematite that has a grey metallic lustre and is used in jewelry.

SPHALERITE: a mineral composed of zinc, sulphur and iron and is one of the main sources of the metal zinc. Sphalerite was mined from the Daniel's Harbour Mine of the Northern Peninsula from 1975 to 1989.

STOPE: an underground opening in a mine from which ore has been or is being extracted.

STREAK: the colour of a mineral in its powdered form, usually obtained by rubbing the mineral against an unglazed porcelain tile to see the mark it makes.

STRIATIONS: scratches formed on a rock surface by rock fragments frozen into the bottom of a moving glacier.

STRIKE: the compass direction (as measured in degrees from true north) of the horizontal line formed by the intersection of horizontal line marking the intersection between a horizontal plane - namely, the Earth's surface - and the inclined plane (for example: a geological structure such as fault, foliation, ore bed, etc.).

STRIP MINING: open pit mining, typically for coal.

STROMATOLITES: a generally dome-shaped, laminated, calcareous sedimentary structure, formed in a shallow-water environment under the influence of a mat or assemblage of sediment-binding blue-green algae that trap fine, silty detritus and precipitate calcium carbonate and that commonly develop colonies.

SUBDUCTION ZONE: narrow, elongated region of the crust where one lithospheric plate, generally the Oceanic Plate descends beneath the Continental Plate.

SULPHIDE MINERALS: (or "sulphides") minerals in which the metallic elements (Cu, Ni, Mo, Zn, etc.) are chemically bound to sulphur. Arsenopyrite (arsenic), chalcopyrite (copper), pyrite (iron), sphalerite (zinc) are all examples of sulphide minerals.

SYENITE: a granite-like intrusive rock containing alkali feldspar, with minor plagioclase and mafic minerals. It is distinguished from granite by the very small proportion or absence of quartz.

SYNCLINE: a type of bowl-shaped fold that is, or once was, concave upward, with its limbs

dipping towards its axis (core or centre). The youngest rocks in an syncline occur in its central part or core.

-T-

TACONITE: a bedded ferruginous chert containing at least 25% Fe; taconite forms one of the iron ores in western Labrador.

TAILINGS: washed or milled ore that is too poor to be further treated.

TALC: a platy, soft (1 on the Mohs scale of mineral hardness) mineral with a characteristic greasy feel and creamy to light green colour. It is very commonly used as a medium for sculpture and has many industrial applications, such as, pulp and paper, paints, plastics and putties.

TALUS SLOPE: See scree slope.

TAR SANDS: sand containing tar or asphalt, from which the hydrocarbons may potentially be extracted by distillation.

TECTONICS: a general term that refers to the large-scale movements and deformation of the Earth's crust.

TENSION GASHES: fissures created in rocks by tension or pull-apart forces. They are commonly filled with quartz and locally are associated with gold occurrences, e.g., in Central Newfoundland.

TEXTURE: the general appearance of a rock as shown by the size, shape, and arrangement of the materials composing it.

THRUST FAULT: a reverse fault on which the dip angle of the fault plane is 15° or less.

TILL: an unconsolidated sediment containing all sizes of (typically rounded) fragments from clay to boulders carried by an ice sheet, and then deposited as the ice sheet melts and retreats.

TILLITE: a rock formed by consolidation of glacial till.

TONNAGE: the quantity of ore that makes up an ore body.

TOURMALINE: a silicate mineral that contains boron and usually occurs as long, black, three-sided, striated crystals; tourmaline is common in granite pegmatite veins and some metamorphic rocks. Gold at Marathon Gold's Valentine Lake Project in Central Newfoundland is intimately with quartz-tourmaline-pyrite veins.

TRACHYTE: a fine-grained, porphyritic volcanic rock, consisting mainly of alkali feldspar and minor mafic minerals; the extrusive equivalent of syenite. Trachytes have a distinct texture defined by the presence of large bladed crystals of plagioclase feldspar.

TRAVERTINE or TUFA: variety of limestone which forms stalactites and stalagmites and other deposits in limestone caves (dripstone) and the mouths of hot and cold calcareous springs.

TROY: precious metals such as gold and silver are measured in troy ounces 1 troy ounce = 31.1034768 grams or 480 grains
1 ounce = 28.3495231 grams

TUFF: a consolidated volcanic rock composed of a variable mixture of pyroclastic rocks fragments, crystals, pumice and fine ash.

TURBIDITE: a clastic sedimentary rock deposited in a marine environment (normally a continental shelf or arc-related basin, but also in lakes). Turbidites typically show graded bedding and well developed sedimentary structures on the undersides of the sandy beds.

- U -

ULTRAMAFIC ROCK: an igneous rock composed chiefly of mafic (ferromagnesian) minerals such as olivine and pyroxene. Dunites, peridotites and pyroxenites are all examples of ultramafic rocks

UNCONFORMITY: a geological boundary or contact between two or more rocks of significantly different ages. Unconformities define a gap in the geologic record. When there is a difference in the dip of the rocks above and below the unconformity, the boundary is called an angular unconformity.

UTMs: See **GEOGRAPHIC LOCATION.**

- V -

VEIN: a thin, sheet-like body of igneous rock or of minerals such as quartz, calcite or barite e.g., deposited in a fissure or fracture in rock.

VESICLE: a cavity in a volcanic rock formed by a bubble of escaping gas when the lava was still fluid.

VOLCANIC REDBED DEPOSIT: concordant deposits of copper (typically as chalcocite, bornite and native copper) found in volcanic rocks deposited in sub-aerial conditions. The typical host rock is basalt. Mineralization may be disseminated, in veins, in amygdules or flow breccias. The deposits form in association with redbed copper deposits in some areas. These deposits can be difficult prospecting targets because they have no alteration associated with them. The Avalon Zone contains examples of volcanic redbed copper mineralization and is currently considered a highly prospective region for this type of copper deposit.

VOLCANO: a vent in the surface of the Earth, from which lava, ash, and gases erupt, forming a

structure that is roughly conical.

VOLCANOGENIC MASSIVE SULPHIDE (VMS) DEPOSIT: a mineral deposit that formed at or near the sea-floor, by the deposition of metals from hot, metal-rich fluids formed by heating salt water that percolates downward, deep into the volcanic rocks under the sea-floor. Hot intrusions below these volcanic rocks heat the waters, which then circulate back up to the sea-floor.

- W -

WALL-ROCK: rock enclosing a vein or mineral deposit; the rock intruded by and surrounding an igneous intrusion (see country rock).

WEATHERING: process by which Earth materials change when exposed to conditions at or near the Earth's surface and different from the ones under which they formed.

WELDED TUFF: a pyroclastic rock in which glassy clasts have been fused by the combination of the heat retained by the clasts, the weight of overlying material, and hot gases.

- X -

XENOLITH: see Inclusion.

- Y -

- Z -