GEOLOGICAL SETTING AND MINERALIZATION

The following description of the geological setting for the Project is largely excerpted and modified from the technical report prepared by Linebarger (2014).

Local Geology

The following description of the geology local to the Project is based on historical literature and limited mapping. Rock types are comprised of faulted Upper Cretaceous granite and the Willow Creek quartz diorite-tonalite (a phase of the Talkeetna Batholith), bordered to the south by the Jurassic Hatcher Pass Schist of the Peninsular terrane. The Willow Creek quartz diorite-tonalite is intruded by a variety of dikes with chilled margins ranging in composition from aplite to lamprophyre (Cooley, 2009).

Northwest striking and steeply (60-80°) dipping faults crosscut the entire Willow Creek intrusive. Less faulting occurs in the Hatcher Pass Schist. The faults have dextral and normal movement with displacement to the east creating an en echelon pattern of vein segments, dikes, and fault blocks. Gold mineralization at the Project is hosted in shallow north-dipping mesothermal veins within shears or reverse faults in the intrusive (Cooley, M., 2006). Quaternary cover is predominantly a product of glaciation with only minor re-working.

Mapping completed in the Project area has defined the structural features related to the mineralization in the Coleman and Lucky Shot areas, and throughout the greater Willow Creek mining district (Figure 7-2).

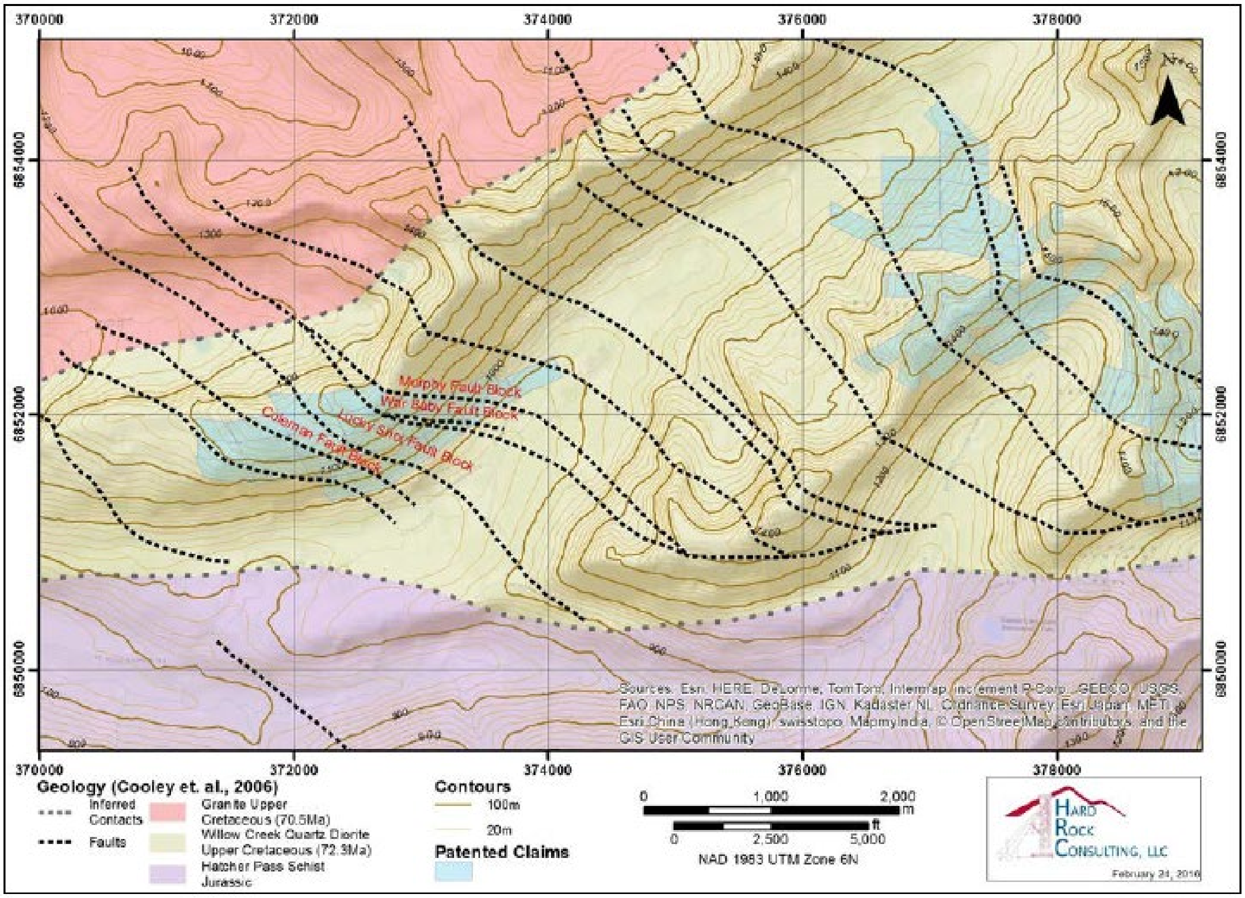

Figure 7-2 Property Geology

The structural fabric specific to the Project area was developed during the late Jurassic to early Cretaceous when the Talkeetna arc accreted to Alaska above a north-dipping subduction zone. When the Chugach terrane accreted to the south margin of the Peninsular terrane after the late Cretaceous, older suture zones between these terranes were reactivated with dextral strike-slip movement.

The Willow Creek quartz diorite-tonalite intrusive was emplaced during a brief period of extension on the Border Ranges fault. An age of 72.3Ma (late Cretaceous) has been indicated for the Willow Creek quartz diorite using uranium – lead radioactive dating.

Subduction produced south-directed reverse-faulting in the overlying brittle Willow Creek diorite. Magmatic or metamorphic fluids moving along these faults formed the gold-quartz veins of the Willow Creek area. Post mineral, dextral strike-slip faults offset of the Willow Creek gold-quartz veins into en echelon segments.

The Project area includes east-northeast faults with northwest shallow dips hosting the productive veins, and N45-50°W faults with steep dips offsetting those veins. Refer to Figure 7-3. Minor narrow gneissic layering exists as local shear fabrics in the intrusive during crystallization. Other steep northerly dipping gneissic layers may be early dikes or veins emplaced and subsequently sheared while the intrusives were still semi-ductile before cooling (Cooley, 2006). The veins of the Lucky Shot mine and the Coleman zone are significantly displaced by major northwest faults and minor faults of variable orientation. The northwest faults produce a number of vein segments within fault blocks, the largest with a displacement of a few hundred meters. These northwest faults within the intrusive displace east-west vein segments en echelon to the south and east by dextral strike-slip and normal movement.

Bends and kinks in underground workings of the Lucky Shot and Coleman mines reflect dextral displacement of the vein along northwest faults (Cooley, 2006). Post-ore movement has caused shearing and brecciation within the plane of the vein, with subsequent healing by a later phase of quartz in places. This post ore movement has caused the veins to be recessively eroded, with only rare vein outcrops in the district.

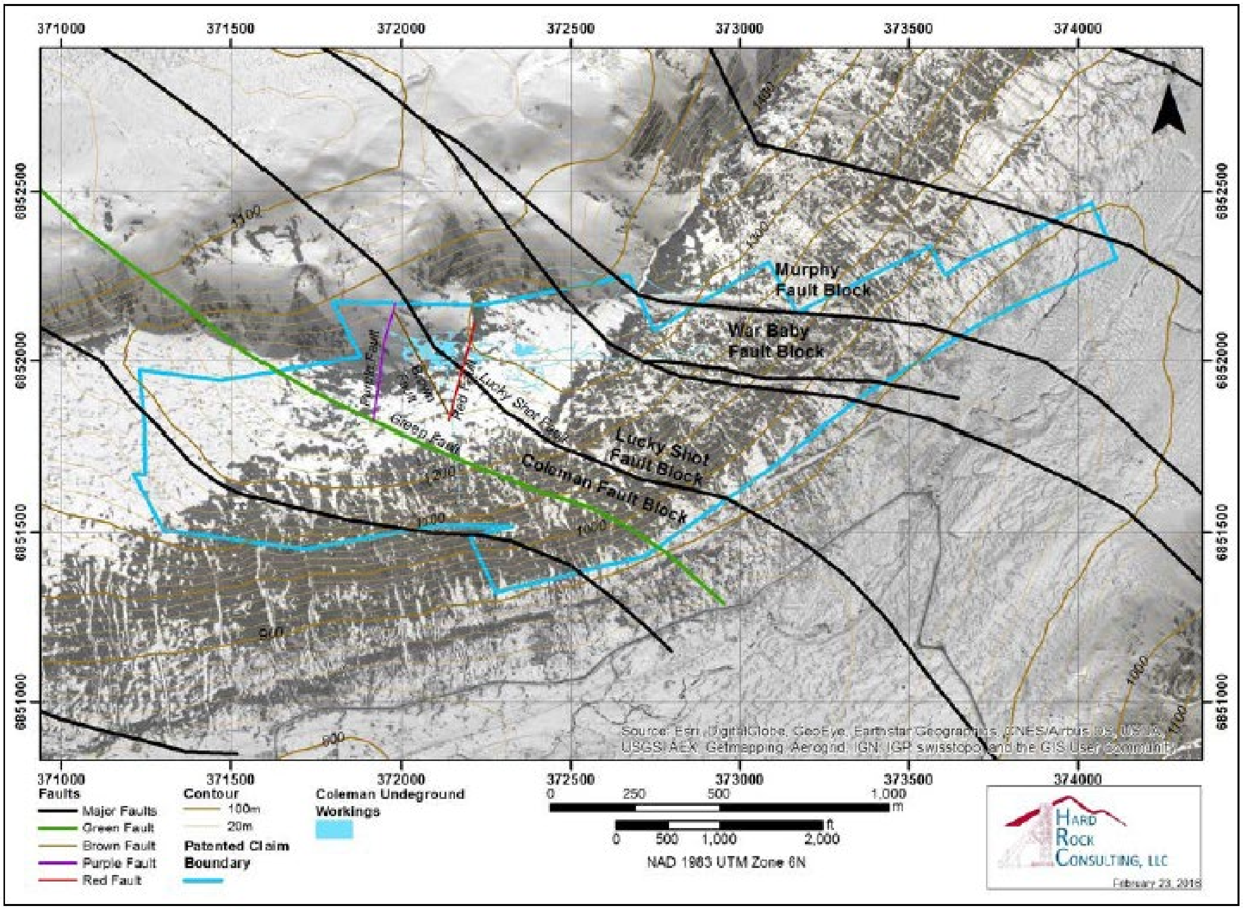

Figure 7-3 Structural Geology

Faults and foliation in the Jurassic Hatcher Pass Schist are not important to mineralization in the Project area. The schist foliation primarily dips northward at 36° but dips less than 20° near the southern contact of the Willow Creek intrusive. This may indicate a broad open fold with a sub-horizontal east northeast trending axis (Cooley, 2006) within the metamorphic rocks.

Data derived from core drilling (2005 to 2009) was used to produce a sectional and three dimensional fault interpretation of the Coleman area. M. Cooley's Coleman fault study for FMM was also incorporated into this interpretation (Cooley, 2009).

The Coleman fault block is located to the west of the Lucky Shot fault block (Figure 7-3) and is separated by a fault with significant down dip and dextral offset on its east side. The Lucky Shot vein segment is located about 30 m (100 ft.) to the east of the Coleman vein segment. The fault to the southwest of the Lucky Shot fault has significant down dip movement and strikes approximately N49°W with a steep dip, offsetting a portion of the Coleman vein by about 20 m (66 ft.)

M. Cooley's Purple fault (Figure 7-3) in section shows about 6 m of offset to the east between drillholes C09- 169 and C06-41. This fault trends N29-34°E with a steep dip. It will be important to recognize this fault for any exploration taking place to the north of the Coleman area as it could impact future mining. The N34°W Brown fault and N17°E Red fault, both with probable steep dips and lateral offsets, appear as jogs in mapped drifts (Cooley, 2009).

Gold grades are commonly elevated where veins cross, splay, and merge. The age of mineralization by 40Ar/39Ar methods, using six samples of sericite from vein selvages, ranges from 66.9 to 65.6Ma (Harlan et al., 2003). Post ore faulting is thus younger than 65.6 Ma at a minimum.

The 3,884.9 square km (1,500 square mile) late Mesozoic Talkeetna batholith includes the Willow Creek quartz diorite on its southern border. The quartz diorite is cut by a variety of faults with displacements up to hundreds of meters. The major northwesterly trending northeast dipping faults cut the Willow Creek quartz diorite into four blocks with normal and dextral displacement. The faults offset gold producing veins up to 245 m (800 ft). In the workings, the fault damage zones can exceed 30 m (100 ft.) in width, with strong cataclastic textures and gouge (Ray, 1954). Cataclastic fabric with brittle failure indicates more than one movement on these structures. Horizontal movement on the major fault to the east of the War Baby is 183 m (600 ft.). Numerous northeast striking narrow faults are reported with displacements as much as 61 m (200 ft.). Field investigations and more recent mapping (Ray, 1954 and Cooley, 2009) indicate the joint and quartz-vein patterns in the intrusive do not extend into the Hatcher Pass Schist to the south.

The coarse grained biotite and hornblende-bearing quartz diorite-tonalite intrusion has a weak to moderately well-defined planar foliation of minerals interpreted to be primary intrusion fabric. The flow fabric has a general dip to the north-northeast at roughly 53°. A few narrow zones of gneissic layering are interpreted to represent minor local shear fabrics. In some areas, the gneissic layering could represent early dikes or veins intruded and sheared while the intrusive was semi-ductile before cooling. The gneissic zones dip steeply mainly to the north, except for a rare zones dipping southward.

The historically productive west-northwest trending gold-bearing veins in the Project area generally dip about 30° to the north but with steeper dips of 45° in the shallower part of the Lucky Shot vein segment. The gold-bearing veins probably occupy reverse faults related to north-directed subduction in the late Cretaceous. The pluton intruded at steeper angle than foliation in Hatcher Pass Schist. The intruding magma created a moderately north-dipping planar intrusive fabric. Continuing north-directed slab subduction may have created a sympathetic thrusting in the overlying quartz diorite-tonalite rocks. This thrusting would have created open brittle deformation through which gold-bearing fluids could flow to deposit quartz and metals.

Lithology

Important bedrock formations in the Project area include the Hatcher Pass schist and the Willow Creek quartz diorite-tonalite. Lesser glacial and alluvial deposits are also present. The following stratigraphic units are present within the Project area, and are described in order from Jurassic to Quaternary (oldest to youngest):

Jurassic Hatcher Pass Schist

The Jurassic Hatcher Pass pelitic schist underlying the southern part of the Project is chloritic and highly fissile. Locally, it is strongly folded. The schist contains dark gray quartz, muscovite, albite and chlorite, with minor chloritized garnet, biotite and tourmaline. The chloritization of the biotite and garnet suggests the schist was originally metamorphosed to amphibolite grade metamorphic facies in the Jurassic and later subjected to retrograde metamorphism in the Cretaceous (Silberman et al, 1978). Alternatively, other workers think the original metamorphic mineral assemblage was cordierite, garnet, muscovite, and chloritized biotite. This would indicate the rocks were metamorphosed from upper greenschist to lower amphibolite facies. The chloritic schist is silver-gray with strong foliation of abundant muscovite plates. Well-developed plagioclase porphyroblasts up to 5 mm (0.2 in.) across and black tourmaline needles up to 10 mm (0.4 in.) are common. More gneissic schist with more feldspar and less muscovite occurs in someplaces (Ray, 1954).

The schist likely originated as a deep water fine-grained mudstone deposited in the oceanic trench on the south margin of the Talkeetna arc. Fragments of oceanic crust were included with trench sediments during subduction as indicated by ultramafic enclaves comprising listwanite or serpentine in the schist of the Grubstake Gulch area (Cooley, 2006). The serpentinized ultramafic bodies in the Grubstake Gulch area have talc, chlorite, actinolite, tremolite, fuchsite and opaque minerals of the serpentine group (Albanese et al., 1983).

Dikes in the schist are rare. Small discontinuous pegmatite dikes are seen rarely. The pegmatite in schist is dissimilar to the pegmatite in the Willow Creek quartz diorite. Rare dikes with fine-grained phenocrysts of plagioclase, and lessor pyrite, quartz and hornblende are reported. The dikes are usually about 0.76 m (2.5 ft) or less in thickness and can be either along or crosscutting foliation (Capps, 1915). The Hatcher Pass schist is considered to be Jurassic in age. Recent dating of detrital zircons collected from Grubstake Gulch in the south Project area had a significant population with a range in age from 160-210Ma. The schist may include sediment shed from the eroding Jurassic Talkeetna arc. Proterozoic age zircons in the Grubstake Gulch sample indicate sediment influx also from outside the Jurassic age Talkeetna arc rocks (Van Wyck and Norman, 2005).

Cretaceous Willow Creek Quartz Diorite-Tonalite Intrusive

The Willow Creek quartz diorite-tonalite is 74-73M, located near the southern margin of the larger Talkeetna batholith and hosts the mesothermal quartz veins of the Willow Creek mining district. The Willow Creek intrusive is bounded by 67-65Ma granite to the west (Csejtey et al., 1978, Madden-Mcquire et al, 1989). The intrusive is described as having primary flow structures and a gneissic texture near its southern boundary (Ray, 1954). The intrusive is medium grained except near its southern contact where finer grains may represent a chilled margin with the schist.

The intrusion is primarily comprised of plagioclase, quartz, biotite, and hornblende with the accessory minerals microcline, orthoclase, sphene, apatite, zircon, and magnetite. Two mineralogical variations are apparent: 1) conspicuous large crystals of hornblende with small plates of biotite, and 2) scattered large books of biotite and with small crystals of hornblende. These variations are gradational. Hornblende is coarser near the center of the intrusion. The quartz and plagioclase content are fairly uniform throughout. Feldspar tends to be more calcic and zoned within the central intrusive (Ray, 1954).

Plagioclase is modally more abundant (57-68%) followed by quartz (15-24%) in the tonalite. Quartz occurs interstitially between other minerals. Sometimes quartz replaces surrounding feldspar grains. A distinguishing feature of the quartz is the presence of microlites as hairline rows of minute gaseous or liquid inclusions showing slippage along small fractures. The most abundant mafic mineral is slightly bent biotite making up to 8-16% of the rock mass. The biotite alters to chlorite along cleavage planes.

Hornblende occurs as a primary mafic mineral from 3-13% by volume. Apatite and magnetite are common in hornblende. Traces of zircon and apatite are included in hornblende with epidote along hornblende cleavage planes. Hornblende can poikilitically occur in plagioclase and plagioclase poikilitically in hornblende. Magnetite is the most common accessory mineral, usually with biotite and hornblende. Magnetite is sometimes included in biotite and hornblende, and apatite is occasionally included in magnetite. The accessory minerals, microcline and orthoclase, compose less than 1 percent by volume.

Sphene is observed in mafic minerals and sporadically in plagioclase. The accessory minerals most common in the tonalite are sericite, chlorite, calcite, epidote, prehnite and leucoxene. Zircon is the least abundant accessory mineral occurring as inclusions in hornblende, biotite and magnetite. Calcite and epidote are common with seriticized plagioclase feldspar. Usually, biotite is altered to chlorite and rarely hornblende is chloritized. Leucoxene is seen bordering ilmenite or occurring as patches proximal to ilmenite (Ray, 1954).

Cretaceous Quartz Monzonite (Granite)

The Cretaceous 67-65 Ma granite is present in the western part of the district intruding the Willow Creek quartz diorite, (Csejtey et al., 1978, Madden-Mcquire et al., 1989). Also about 5.6 km (3.5 miles) northeast of the Lucky Shot mine, a small plug-like body of granite occurs on a ridge high point. The Willow Creek intrusive has granite dikes with widths up to 3 m (10 ft.). Generally, the granite is light-colored, mafic-poor, medium to fine-grained and with 7-16% anorthite plagioclase, quartz and potassium feldspar. The potash feldspar is usually microcline. Hornblende is commonly absent. The granite contains accessory biotite, muscovite, myrmekite, and microcline microperthite (Ray, 1954).

Tertiary Dikes

Dikes are variable in composition, not abundant, and difficult to map. Dike displacements are mapped in order to map faults in the area. The dikes, except for the diabase (diorite), are older than the post-ore faults in the Willow Creek area. The diabase dikes tend to follow post-ore faults and may be contemporaneous with them. Younger lamprophyre and diabase dikes tend to crosscut older aplite and pegmatite dikes. Other age relationships for dikes cannot be reliably established, but mafic dikes seem to be youngest. Lamprophyre dikes are cut by post-mineral faults in the Lucky Shot mine (Ray, 1954). The dike compositions are granite, lamprophyre, diabase (diorite), aplite and pegmatite, described below from youngest to oldest.

Granite

Granitic dikes are interpreted to be the youngest. They are coeval with the intrusion of a biotite muscovite granite pluton on the north side of the Willow Creek quartz diorite. Uranium-lead dates from the granite indicate an age of 70.5 Ma (Harlan et al., 2003). Granite near the gradational contact with the quartz diorite is steeply dipping and includes numerous xenoliths of quartz diorite (Cooley, 2006).

Diabase

The diabase is dense and black like the lamprophyre, however, the diabase is intensely sheared and lacks phenocrysts. Some, but not all, diabase dikes contain pyroxene. The diabase dikes have a width up to about 6.1 m (20 ft.) and can be traced up to a few hundred meters. They strike generally east to east northeast and dip steeply to the north dip. The most abundant mineral is laths of plagioclase feldspar. Original interstitial mafics are altered to green biotite, magnetite, chlorite and calcite. Rarely, feldspars are altered. Olivine may occur with chloritic alteration (Ray, 1954).

Lamprophyre

Lamprophyre trends northerly and dip southwest. Lamprophyre dikes are greenish-black, dense, and fine-grained, with hornblende phenocrysts. Lamprophyre is difficult to recognize in weathered outcrop. The dikes are generally parallel to southwest dipping joints in the intrusive. The dikes are highly continuous and offset by minor and major faults.

The lamprophyres are divided into two types. The first is porphyry with abundant twinned hornblende phenocrysts in a fine-grained groundmass of zoned plagioclase feldspar and minor small hornblende crystals. Its groundmass includes accessory minerals of sphene, biotite, calcite, deep chestnut-red rutile, chlorite, magnetite, and needles of hornblende microlites.

The second lamprophyre is coarser grained and mostly equigranular. The major minerals are well zoned feldspars, and hornblende altered to chlorite. The groundmass contains magnetite, chlorite, calcite, sphene, amphibole microlites, and lesser biotite, epidote, and zircon (Ray, 1954).

Aplite

Aplite dikes are common throughout the Willow Creek quartz diorite. The aplite follows southwest-dipping joints; strikes and dips are highly variable. The dikes are linear but with irregular widths, and can be traced for only about 30 m (100 ft.). The aplite can indicate minor fault offsets, but are not very useful to note major fault movement.

Aplite is strongly associated with pegmatite. They occur near each other and sometimes within the same dike with aplite as the border to a central pegmatite band or the reverse. Aplite is light-tan to pink with a fine groundmass. Most aplite dikes are less than 10 cm (4 in.) wide; a few are up to 152 cm (6 in.) wide. The dikes are composed of quartz, microcline, orthoclase and plagioclase. The plagioclase is commonly altered to sericite; the microcline unaltered. Rare biotite is altered to chlorite. Apatite, epidote, and a black opaque are common accessory minerals with secondary calcite along feldspar cleavage planes (Ray, 1954).

Pegmatite

The pegmatite has highly variable strike and dip changing within short distances. The pegmatite is typically traceable for less than 30 m (100 ft.) with variable widths tending to splay. Their widths are usually 5 cm (2 in.) to 122 cm (48 in.) in width crosscutting relationships indicate aplite and pegmatite are the oldest dike rocks in the Project area.

Coarse pink feldspar and quartz are the main mineral assemblage in pegmatite. Lesser coarse muscovite and biotite occurs with minor coarse black tourmaline needles and minor plagioclase. The radioactive minerals uraninite, cyrtolite, allanite and thorite are reported (Ray, 1954).

Quaternary Cover

The Quaternary cover includes alluvium, glacial debris, and talus (Ray, 1954). The glacial debris has very little remobilization.

Mineralization

The Willow Creek mining district's only known economic mineral is gold contained in mesothermal veins within low angle shears in the Willow Creek quartz diorite-tonalite intrusive. The important lode gold-bearing shears strike 60-80° and dip 30-60° northerly. The argon isotope method dates sericite in vein associated alteration to approximately 66.9 to 65.6Ma.

Another group of structures trending nearly due north with dips from near horizontal up to 45° to the west are also significant, but are only near to the intersections with the more important east-northeast trending veins. The productive veins have coarsely crystalline quartz with minor pyrite, sphalerite and other sulfides, telluride and visible gold. Gold deposition is a late event and only very minor amounts of gold are occluded within sulfides.

There are a number of small gold placers in the Willow Creek mining district with very minor development.

Coleman Veins

The Coleman zone contains two primary sub-parallel and some subsidiary gold-bearing quartz veins hosted by quartz diorite that strike approximately N83°W with a 25-35° dip to the north northwest. Relatively good continuity is demonstrated in the two veins. The veins can be separated by up to 20 m (66 ft.). They are located in proximity to the historic Coleman working. In the south-half of the area, the two veins merge and splay. Gold values may increase near these intersections. High gold values can occur anywhere in the system and are not restricted to any particular vein. All of the mineralized zones are sub-parallel; however, potential exists for veins in secondary or tertiary structural directions related the sense of shear of the primary structure hosting the veins. Figure 7-4 shows a 50-meter-thick cross section of the Coleman quartz vein system with drillhole intercepts.

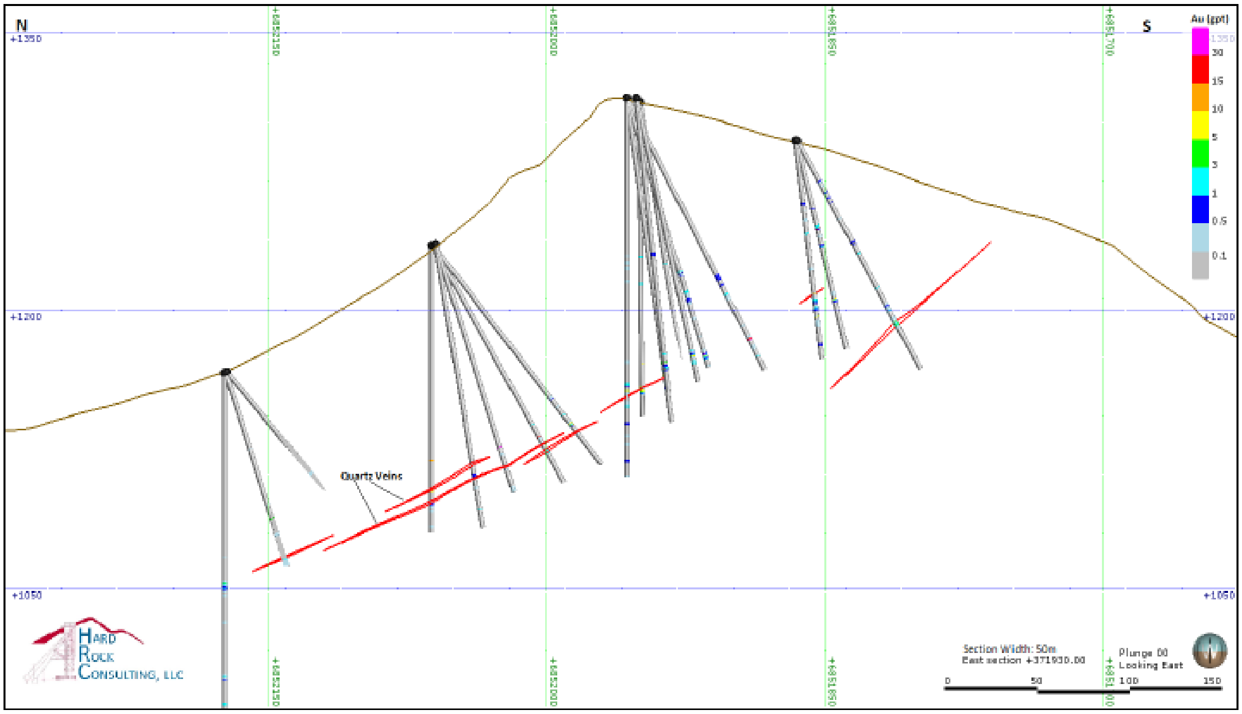

Figure 7-4 Cross Section (371930E)

Massive mesothermal quartz vein or veinlet packages with 2-3% metallic sulfides and telluride characterize the mineralized drillhole intercepts in the Coleman zone. Some zones include only one vein with a typical thickness of 0.5 m (1.64 ft.). More commonly a zone contains many quartz veins with individual widths of at least a centimeter. Disseminated visible gold, tetrahedrite and tellurides, pyrite, arsenopyrite and chalcopyrite are the primary minerals in the veins or near vein margins. Occasionally, banding and healed breccias are notable in the veins, and clay alteration or gouge. Veins and quartz diorite closer to surface have iron oxide, minor hematite, and trace malachite.

Coleman Footwall and Hanging Wall

The historic underground sample maps of the Coleman mine rarely distinguish the hanging wall from the footwall samples. This may be due to the relatively narrow average width, 0.83 m (2.8 ft.) of the veins. Selective mining may have not been practiced such that the entire width may have been mined. The drill logs from 2005 to 2009 and the re-logging completed by Ms. Candace Dykeman in 2013 did not provide information to indicate strong differences between the hanging and footwalls of the veins.

Coleman Area Alteration

Review of the drill logs indicate that both hanging wall and footwall vein alteration envelopes are highly variable along strike and dip. Generally, most alteration envelopes are <14 m (46 ft.). The alteration includes chloritization, seritization, silicification, and argillization accompanied by disseminated pyrite and arsenopyrite. Increased gold within a vein does not appear to have a direct relationship to the intensity of alteration. Discontinuous veins outboard from the primary resource veins may have strong alteration envelopes. The alteration envelopes outside the veins often carry low gold grade of less than 3 g/t). Frequently wide halos of arsenic exceed the width of alteration envelopes.

DEPOSIT TYPES

The veins of the Project are mesothermal. This vein type was referred to as mesothermal deposits by Lindgren in 1933, orogenic metamorphic-hosted deposits by Bohlke (1981), and low-sulfide gold quartz veins by the U.S. Geological Survey's classification by Berger in 1986. Medium-grade facies metamorphic rocks host ninety percent of Alaska's lode gold production (Goldfarb, 1997).

Mesothermal veins are associated with linked networks of faults and low displacement shears of crustal scale shear systems in orogenic belts of Archean to Cenozoic age throughout the world. The Phanerozoic age mesothermal veins are related to crustal breaks characterized by dismembered ophiolite between diverse assemblages of island arc, subduction complexes and continental-margin clastic wedges. The Archean age veins are well age-constrained for the Superior Province and the Canadian Shield (2.68-2.67 Ga), and the Yilgarn Province, Western Australia (2.64-2.63 Ga) and are related to major transcrustal breaks within stable cratons of remnant terrane collisional boundaries (Ash, 1996).

Mesothermal veins are usually found in regional post-peak metamorphic regimes terranes of greenschist facies, and less commonly of sub-greenschist to granulite facies (Inverno, 2002). Related deformation indicates strain in brittle to ductile (plastic) regimes. Hydrothermal alteration and mineralization can occur during shear (Cox, 1999). Geothermal gradients during subduction events cause hydrated sedimentary sequences and volcanics to contribute hydrothermal fluids. The fluids migrate long distances at variable depths to form gold-bearing quartz veins (Groves, 1997).

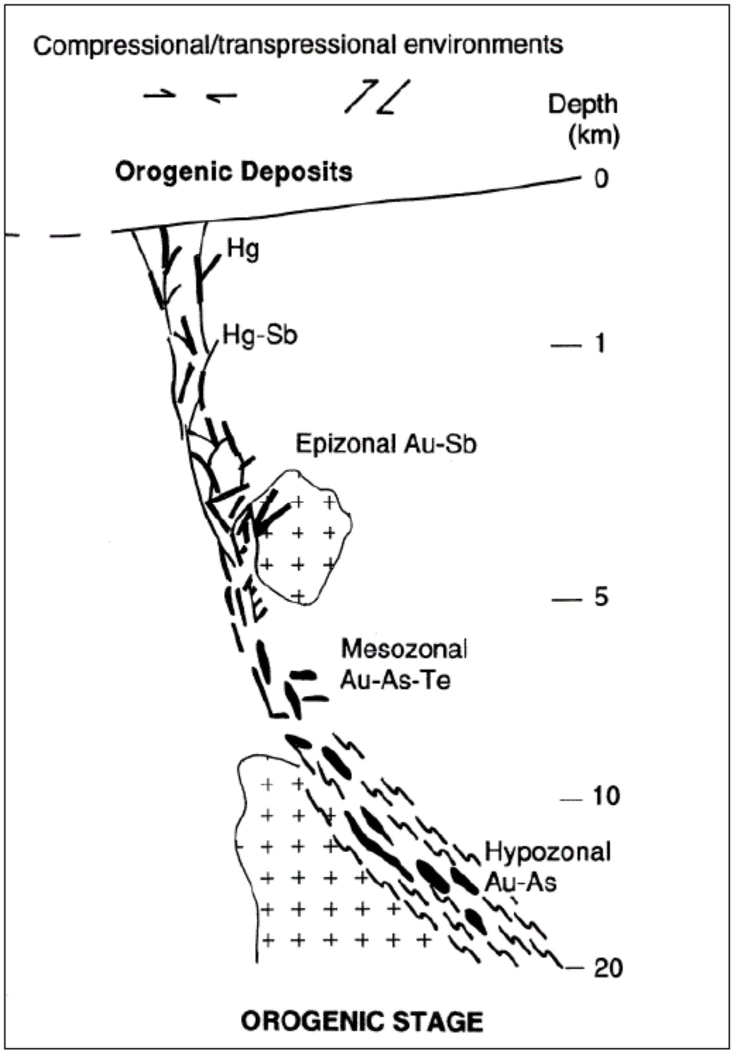

Figure 8-1 Schematic Geologic Cross Section of a Low-Sulfide Mesothermal Gold Deposit (Groves 1998)

These transcrustal breaks with highly connective shear systems can generate high, well dispersed fluid flow to scavenge metals from deeper crustal levels to develop large economic gold deposits at higher crustal levels (Cox, 1999). Vein arrays indicate the fluid responsible for mineralization and alteration is produced during episodic deformation events under supralithostatic pressure (cf. Cox et al., 1987).

Widespread laminated, banded, or crack-seal textures indicate fluid pressure fluctuations during deformational cycles. Episodic brittle or ductile slip events produce breccias and shear veins with variable alteration mineralogical assemblages in sub-horizontal extensional vein arrays. The vein displacements range from a few tens of centimeters to a few tens of meters (Cox, 1999).

Gold is typically in quartz veins and or disseminated in hydrothermally altered envelopes of faults and shears (Cox, 1999). Sometimes mineralization resides in alteration halos next to faults and shears rather than in the veins. This may result from sulfidation reactions in iron-rich host rocks causing gold to precipitate.

The predominant mineralization is quartz, native gold, pyrite, galena, sphalerite, chalcopyrite, arsenopyrite, and pyrrhotite. Locally tellurides, scheelite, bismuth, tetrahedrite, stibnite, molybdenite, and fluorite can occur (Berger, 1987). Silver, copper and antimony can be significant byproducts of mesothermal deposits (Ash, 1996). In many cases vein quartz is grayish or bluish due to the presence of fine-grained sulfides. Gangue mineralogy can include calcium, magnesium, and iron carbonate, tourmaline and graphite. Veins textures are usually massive or banded. Veins can occur in the form of discrete planes, saddle reefs, breccias, stockwork, or as anastomosing gashes and dilations. Generally, the mineralization lacks zoning or is consistent through the system (Berger, 1986; Ash, 1996).

Mesothermal vein alteration is dominated by quartz-sericite-carbonate-pyrite assemblages with minor siderite, ankerite, and albite. Silicification, pyritization and potassium metasomatism can occur within a meter from the mesothermal veins. This proximal alteration is enveloped with a broader halo of carbonate alteration including ferrous dolomite veinlets. Chromium mica, dolomite, talc, and siderite are alteration products in ultramafic wall rocks. Sericite, fuchsite, tourmaline, scheelite, and rutile are more common in granitic wall rocks (Cox, 1999; Ash, 1996; Berger, 1986).

Mineralization occurs during deformation at depths between 4 and 15 km (2.5 to 9.3 mi.) and temperatures between 250 to 450 °C. The deformation is in fluid pressure regimes of 1 to 3 kilobars and hydrothermal fluids of low salinity composed primarily water and carbon dioxide. Seismic activity provides episodic flow rates and fluid pressures in faults and shear zones producing gold deposits with multi-events.

Seismic reflection surveys in major goldfields indicate the mesothermal deposits are located in the hanging wall of large shear zones, and formed at mid-crustal depths beneath the greenstone sequences. Overpressured fluids are transported from depth to hanging wall structures in during seismic events (Cox, 1999).

Generally, the major fluid-chemical processes controlling gold precipitation in the mesothermal environment are fluid-rock reactions, phase separation due to fluid pressure fluctuation; and fluid mixing processes. Fluid-rock reactions such as sulfidation reactions most effectively control gold deposition as a result of fluid discharge from shears and faults into Fe-rich reactive host rocks. Gold grades may be poor where shears transect Fe-poor host rocks even though wall rocks are altered.

Seismic rupture events causing sudden decrease in fluid pressure can drive phase separation processes and gold deposition. This gold deposition is preferential to veins, particularly in severe pressure reduction zones like dilatant jogs. Fluid mixing processes especially between reduced wall-rock fluids and more oxidized water-carbon dioxide fluids within the faults produce gold vein deposition (Cox, 1999).

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