## DESCRIPTION OF GEOLOGY AND MINERALIZATION INTRODUCTION & LOCATION Alpha Gold Corporation's Lustdust property lies close to the junctions of Canyon and Silver creeks, approximately 35 km east of Takla Lake in central British Dream Columbia (Figure 1). It includes a skarn-manto-vein system that is discontinuously developed over a 2.5 km strike length. This mineralization is related to an elongate, undeformed, Eocene-age composite Mo-bearing porphyry body, the Glover Stock (Figure 2). The stock lies <2 km west of the Pinchi Fault and it intrudes deformed oceanic rocks of the Cache Creek Terrane, including mid to Late Permian limestones. REGIONAL GEOLOGY The Lustdust mineralization lies in the Cache Creek Terrane (Figure 1) which represents a deformed and imbricated package of Pennsylvanian to lower Jurassic oceanic rocks (Monger 1977, 1998; Paterson, 1974, 1977; Gabrielse and Yorath, 1992). The dextral Pinchi Fault (Figure 1) can be traced for >450 km in British Columbia. It separates rocks of the Cache Creek Terrane from those of the Quesnel Terrane further east (Gabrielse and Yorath, 1992; Figure 1). from work by Evans (1996, 1997, 1998), Megaw (1999, 2000, 2001) and Ray et al. (2002) In the Lustdust district, the Quesnel Terrane comprises a Late Triassic volcanic-sedimentary arc succession that is intruded by a number of major plutons, the largest of which is the multiphase Hogem Batholith (Figure 1). The batholith ranges from Late Triassic to Early Cretaceous in age (Garnett, 1978), and porphyry Cu-Au mineralization is seen at the Lorraine, Chuchi and Mount Milligan properties (Figure 1; Bishop et al., 1995). PREVIOUS WORK Cinnabar was discovered in 1942 on the west side of Silver Creek, along the Pinchi Fault, at what was to become the Bralorne Takla Mercury Mine (Figure 4; BC MINFILE 093N 008). In 1944 claims were staked on veins approximately 1.5 kilometres west of the mine on what later became the Takla Silver Mine. MINERALIZATION These Ag-Au-Pb-Zn-Hg-bearing sulphide and sulphosalt veins became known as the "Number 1 Zone" and they are now believed to be the most southerly, distal extension of the Lustdust hydrothermal system. Sulphide-sulphosalt-arsenide - bearing quartz carbonate veins (Number 1 Zone "Takla Silver Mine") In 1968, a 300-pound bulk sample was extracted from the Number 1 Zone for metallurgical testing. A mineralogical study (Mathieu and Bruce, 1970) noted the presence of sulphide, sulphosalt and arsenide minerals, as well as high values of Au, Ag, Pb, Zn and Sb. Alpha Gold Corporation began acquiring the Sphalerite - rich mantos (Numbers 2, 3 & 4B Zones) property in 1991. Later it was optioned to Teck Exploration Limited (Evans, 1996, 1997). Since that time Alpha Gold has drilled skarn and porphyry targets north and south of Canyon Creek (Evans, 1998; Soregaroli, 1999; Megaw, 1999, 2000, 2001). Recently, the company announced intersections through mineralized skarn which cut 59 m grading 0.8 % Cu and 0.67 g/t Au (hole DDH01-44) and 37 m assaying 0.92% Cu and 0.68 g/t Au (hole DDH01-47). Schiarizza (2000) compiled the geology of the district, and Ray et al., (2002) and Dunne and Ray (2002) present details on the chemistry and fluid inclusion Garnet - dominant Cu-Au skarn (Canyon Creek Skarn Zone) data of the Lustdust system. Early Cretaceous Mitchell & MacDonald-Embryo L. batholiths ■ Lustdust porphyry-skarn-manto Areas in the Glover Stock where drilling has intersected Mo-porphyry mineralization. Early Cretaceous Germansen Batholith GEOLOGY OF THE LUSTDUST AREA ▲ Alkalic Porphyry occurrences Supracrustal rocks Late Triassic to Early Cretaceous Pinchi Fault Most of the Lustdust area is underlain by a north-northwest striking package of slatey phyllites and cherts, as well as lesser amounts of mafic tuff, composite Hogem Batholith (Cache Creek - Quesnel metavolcanics and some limestones (Figure 2). Individual carbonate units range up to 500 m in thickness. One limestone sample (GR01-38; collected at UTM Middle Jurassic INTRUSIVE ROCKS Spike Peak intrusive suite Zone 10 NAD 83 348069E - 6160847N) yielded microfossils of mid to Late Permian age (M.J. Orchard, personal communication, 2001). Some limestones are Stikine - Cache Creek EARLY TO MIDDLE EOCENE ☐ Late Permian to Early Triassic interbedded with, or grade into, thin units (maximum 40 m) of chloritic tuff containing angular to sub-rounded limestone clasts up to 40 cm in diameter. terrane boundary Sitlika Assemblage diorite Undifferentiated supracrustal rocks White, fine grained quartz - porphyry dike Figure 1. Location map of Lustdust property showing major The Lustdust mineralization extends discontinuously over 2.5 km along strike and is spatially associated with the Glover Stock and a related swarm of felsic GLOVER STOCK AND RELATED MINOR INTRUSIONS sills and dikes (Figure 2; Megaw, 2001). The stock forms an elongate, lens-like body whose main portion exceeds 1 km in length and 0.6 km in width. It is intrusions and terranes. enveloped by a 100 to 300 m wide thermal aureole. There is a mineral zoning in the hornfels with biotite tending to form more distally and pyroxene occurring Monzonitic to dioritic stock, dikes and sills Discrimination plots indicate the stock ranges compositionally from mafic diorite-monzodiorite to more leucocratic monzonite-quartz monzonite. U-Pb dating of zircons from the dioritic and monzonitic phases of the Glover Stock yield Eocene ages of circa 51 to 52 Ma (R. Friedman, personal communication, 2001). LAYERED ROCKS The stock represents a multiphase composite intrusive complex, and most of its rocks are weakly to strongly feldspar porphyritic, in addition to having ENNSYLVANIAN - JURASSIC phenocrysts of igneous hornblende and biotite. Thin (< 1 metre) zones of hydrothermal breccia cut the stock in some localities and many have "pebble" CACHE CREEK GROUP breccia textures. Basaltic flows and tuffs Two phases of deformation are recognized. The earliest (D1) was the dominant folding event and was largely responsible for the north-northwest strike of the Tuff with limestone clasts supracrustal rocks. It resulted in tight to isoclinal asymmetric F1 folds accompanied by a lower greenschist facies metamorphism and S1 slatey cleavages 6163000N (Figure 3). The F1 folds have steeply west dipping, south-southeast-trending axial planes and the fold axes and L1 mineral lineations plunge northwest with an average dip of 46 degrees (Figure 3). Phyllites, argillites and cherts The second phase (D2) resulted in tight to open F2 flexure folds as well as conjugate sets of crenulation strain-slip cleavage. The most common F2 folds have axial planes that strike north-northwest and dip steeply northeast. On average, the F2 fold axes plunge 21 degrees in a north-northwest direction (Figure 3). Locally, the F2 folds are also associated with prominent a-c joints that are generally steep dipping and easterly striking (Figure 3). Massive to poorly bedded limestone (mid to Late Permian) Much of the brittle faulting predates the Glover Stock and has been an important control on the mineralization. Most faults trend north-northwest. A less common set may be controlled by the east-striking F2 a-c jointing, and is best developed along Canyon Creek (Figure 2). MINERALIZATION AND ALTERATION The Lustdust mineralization represents a classic intrusion-related system that exhibits distinct proximal to distal zoning, both in its mineralogy and metal Fault, approximate chemistry. The Glover Stock hosts porphyry-style mineralization with molybdenite ± chalcopyrite-bearing veinlets. Mineralization is often associated with several generations of veins containing variable amounts of quartz, K feldspar, sericite, pyrite and rare tourmaline. In addition, pervasive albitic or potassic alteration is seen; the latter is represented by K-feldspar, sericite and secondary biotite. Limestones along the eastern flank of the Glover Stock host the Cu-Au (Zn)-bearing Canyon Creek skarn. Garnet is the most abundant prograde mineral and forms coarse-grained, euhedral crystals that reach 1 cm in diameter. Pyroxene is much less common. Other minerals include calcite, quartz, amphibole, biotite, chlorite, epidote, vesuvianite and wollastonite. Mineralization occurs as chalcopyrite and lesser bornite with abundant pyrite, variable amounts of sphalerite and rare arsenopyrite and stibnite, together with specular hematite, magnetite, marcasite, relict pyrrhotite and trace tetrahedrite-tennantite. The Canyon Creek skarn passes southwards into massive sphalerite-dominant mantos and carbonate replacements of the 2, 3 and 4B zones (Figure 2). The concordant bodies occur as flat-lying to gently-inclined, elongate zones developed along structurally thickened and deformed antiformal crests. Megaw (2001) notes that the manto and vein mineralization is strongly controlled by (1) the presence of carbonate hostrocks, (2) lithological contacts including dike and sill margins or limestone-tuff contacts, (3) bedding planes and faults, and (4) antiformal fold hinges. Two styles of mineralization are seen. The most common Glover comprises 10 to 50 % massive, dark brown to black sphalerite with variable amounts of pyrite ± arsenopyrite ± well-zoned pyrrhotite ± chalcopyrite ± sulphosalt minerals. The other style occurs as small (< 1.5 m thick) pods and veins of coarse-grained pyrite-pyrrhotite-dominant mineralization with trace Stock sphalerite, arsenopyrite, galena and sulphosalt minerals. The Number 1 Zone veins at the Takla Silver Mine represent the most southerly and distal part of the hydrothermal system. At least four, steeply dipping, en echelon, fault-controlled veins and tabular replacements are hosted by the recrystallized limestones or follow dike margins. The veins contain a number of sulphide, arsenides, and complex sulphosalt minerals. These include sphalerite, pyrite, stibnite, boulangerite, realgar, jamesonite, zinkenite, anglesite, Tl-bearing twinnite, miargyrite, tetrahedrite, tennantite, andorite, valentinite, arsenopyrite, covellite, chalcopyrite, and scorodite in a gangue of quartz, calcite <sup>5</sup> — L1 Plunge of L1 lineation (F1 fold axis) <sup>15</sup> L2 Plunge of F2 fold axis or crenulation folds SUMMARY AND CONCLUSIONS The Lustdust property represents one of the best examples of a zoned porphyry-skarn-manto-vein mineralized system in the Canadian Cordillera. Mineralization is related to a small, post-tectonic intrusion, the Glover Stock, and an associated swarm of felsic dikes and sills. The multiphase, composite stock includes mafic dioritic and more leucocratic monzonitic phases, and preliminary U-Pb zircon dates of circa 51-52 Ma on both phases suggest an Eocene intrusive age. The stock lies < 2 km west of the Pinchi Fault and it intrudes a deformed package of Cache Creek Terrane meta-sediments, including mid to Late Permian limestones. The north-trending Pinchi Fault separates the Cache Creek rocks from the large, multi-phase Jura-Cretaceous Hogem Batholith in the Quesnel Terrane further east. The Glover Stock hosts some Mo porphyry mineralization marked by several generations of barren and sulphide-bearing quartz $\pm$ sericite $\pm$ K feldspar $\pm$ tourmaline veins. Outboard from the Glover Stock is developed a north-trending, 2.5 km-long discontinuous belt of mineralization. This comprises proximal Cu-Au (Zn) skarn, intermediate Zn (Au, Cu, Pb, Bi) mantos and more distal, sulphide and sulphosalt quartz veins enriched in Au, Ag, Pb, Zn, As, Hg and Tl. The lack of ductile structures within the intrusion, the extensive skarn envelope and the brittle-fracture-control of the veins and some mantos are evidence that the Glover Stock was emplaced at a high structural level. This conclusion is supported by fluid inclusion studies indicating the system formed at depths between 1.1 km and 1.9 km, assuming a lithostatic regime (Dunne and Ray, 2002). The Eocene age of the Glover Stock and its REE chemistry (Ray et al., 2002) are strong evidence that the stock and the mineralization are not related to the nearby Hogem Batholith (Figure 1). Instead, the stock may belong to a widespread suite of Eocene plutons, some of which are associated with Cu MAP INFORMATION: mineralization. These include the intrusions in the Babine porphyry Cu belt (Dirom, 1995; Schiarizza and MacIntyre, 1999), situated approximately 80 km Glover he base map is from the British Columbia Ministry of Sustainable Resource Management, Terrain Resource Information southwest of Lustdust. Another possible body of this type intrudes Cache Creek Terrane rocks at Rubyrock Creek, approximately 100 km south of Lustdust anagement programme (TRIM), North American Datum 1983, UTM Zone 10. The original scale of the map was 1:20 000. (MacIntyre and Schiarizza, 1999). **Stock** The high Hg content of the Number 1 veins raises exciting chances that some of the numerous Hg occurrences along the Pinchi Fault (Figure 4) represent 6162000N distal or upper level expressions of hidden, Eocene-age porphyry systems. The long belt of Cache Creek carbonates along the Pinchi structure warrant RECOMMENDED CITATION: Ray, G.E., Megaw, P.K.M., McGlasson, J.A., Glover, J.K. (2002): Geology of the Lustdust exploration for Lustdust-type porphyry-skarn-manto-vein targets. Property, Central British Columbia (93L /11); British Columbia Ministry of Energy and Mines, Open File 2002-9, 1:5 000 scale ACKNOWLEDGEMENTS, We are grateful to George Whatley, President of Alpha Gold Corp., and his staff for their assistance during this project, and for their permission to publish this data. We thank the following: M.J. Orchard (Geological Survey of Canada) for identifying conodont microfossils; R. Friedman (The University of British Columbia) for expediting the preliminary U-Pb zircon dating; C.H.B. Leitch (Vancouver Petrographics Ltd.,) for comments regarding the ore and plutonic petrography, and I.C.L. Webster for the drafting and geological discussions in the office and field. Editing by Dave Lefebure and Brian Grant is also REFERENCES Bishop, S.T., Heah, T.S., Stanley, C.R., and Lang, J.R. 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No. 3 & 4B Zones mantos No. 1 Zone Distal Creek Porphyry & pyrite-rich rich mantos (n = 7)(n = 19)(n = 15)2824 8150 2765.5 15.2 43.8 2723 3826 >10000 162 2.8 Number 2 Zone 0.3 12642 2830 108 Number 1 Zone"Takla Silver Mine"

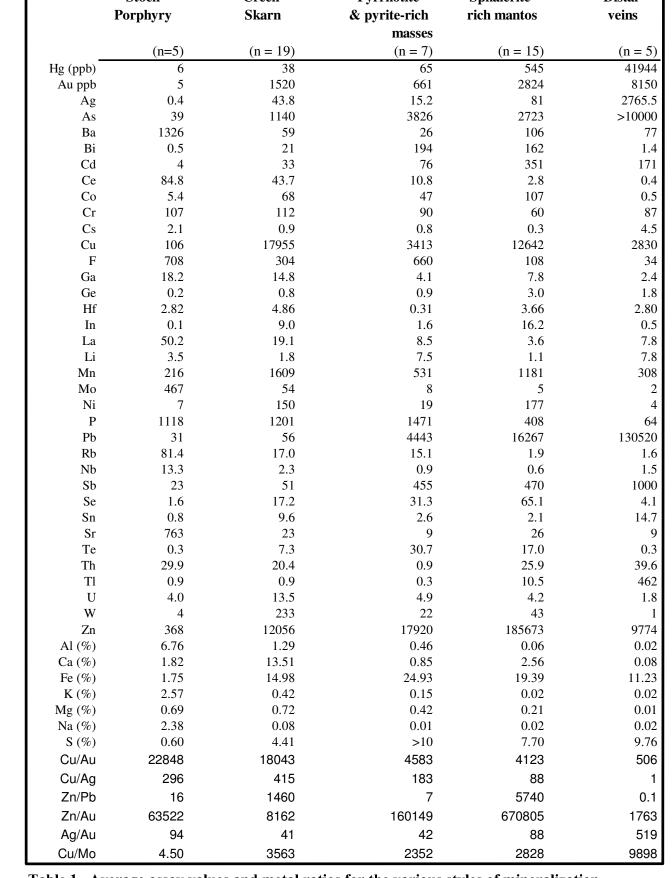


Table 1. Average assay values and metal ratios for the various styles of mineralization. Mercury occurrence Past producing mercury mine Lustdust Limestone Endoskarn. Euhedral, pale garnet crystals replacing Glover Stock porphyry. Hole LD01-32 at 330.5 feet.

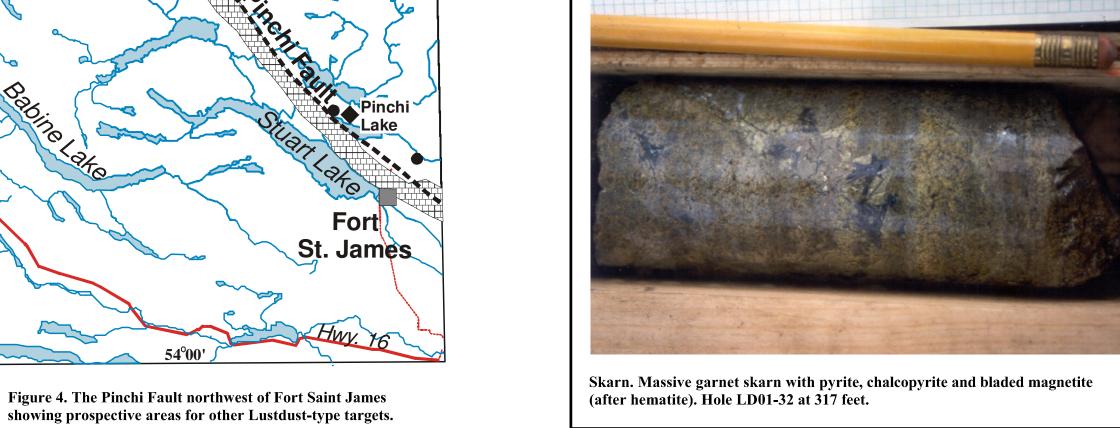
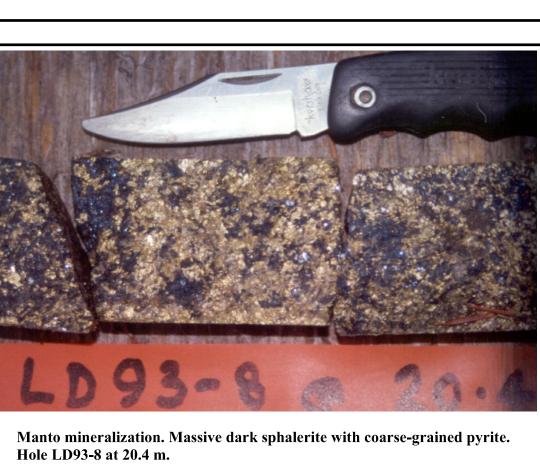
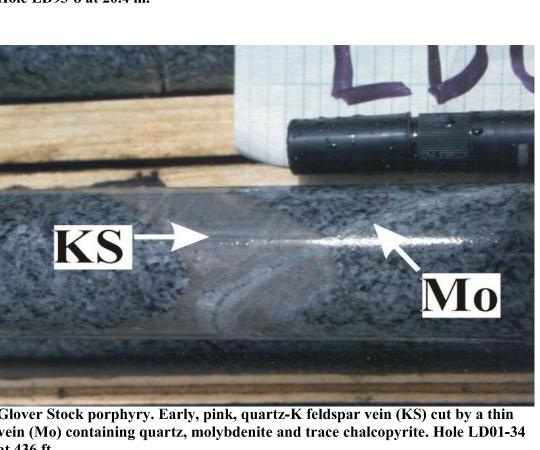
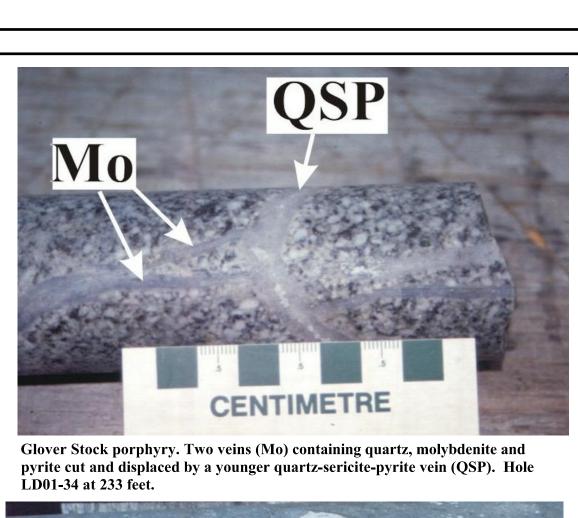


Figure 2.

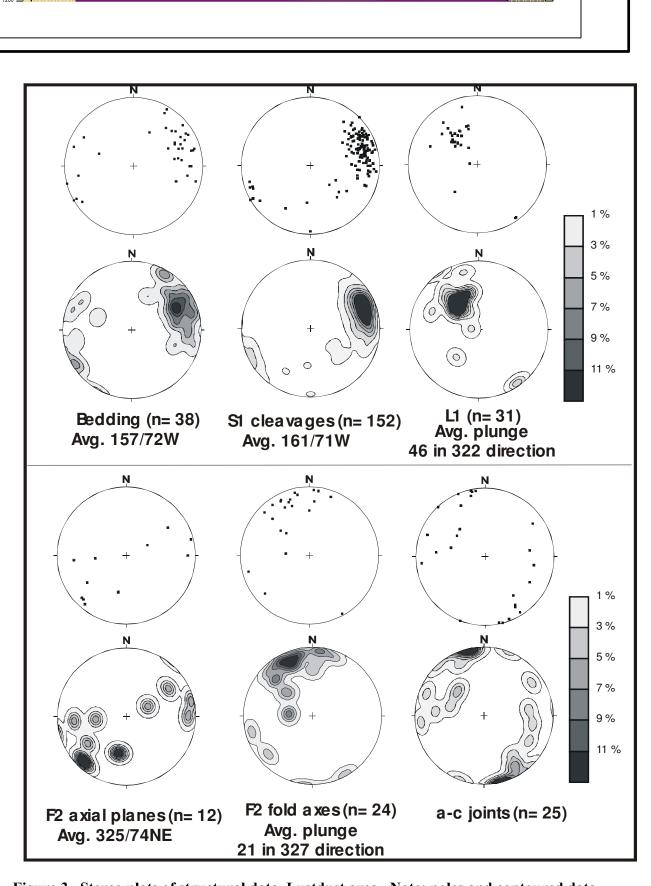






Section B-B' through the 4B Zone





Section C-C' looking through the Canyon Creek skarn

Section D-D' looking through the Glover Stock porphyry area

Open File Map 2002-9

**GEOLOGY OF THE** 

**LUSTDUST PROPERTY,** 

**CENTRAL BRITISH COLUMBIA** 

COMPILED BY G.E. RAY & I.C.L. WEBSTER

SYMBOLS

Hornfels in cross sections

Sample GR01-38

middle to Late Permian microfossils

Vertical & Horizontal Scale

Geological contact (defined, approximate)

Bedding (assumed) in cross sections

Foliation (approximate) in cross sections

Limit of hornfels aureole,

59 Dip and strike of bedding

Dip and strike of S1 cleavage

B6 Dip and strike of *ac* jointing

Dip and strike of F2 axial plane

(a/s) Antiform (a) - synform (s) directions

50 Small scale fold with plunge of fold axis

S-fold, Z-fold, M-fold (F1 or F2)

 $\longrightarrow$  Synform (F1 or F2)

Massive outcrop, subcrop

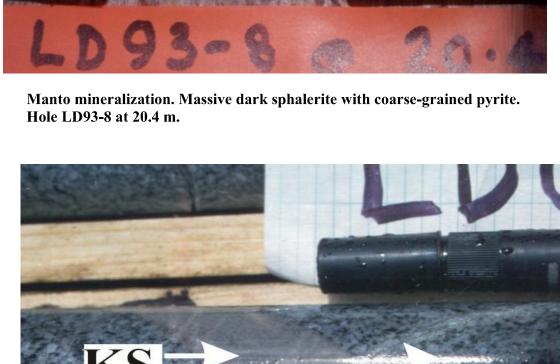
Trench or excavation

Road or exploration trail

Number 3 Zone oxidized mantos

(Sheet 1 of 1)

Figure 3. Stereo plots of structural data, Lustdust area. Note: poles and contoured data using equal area, lower hemisphere, Schmidt projection.





West - East geological cross sections looking North: A-A', B-B', C-C' and D-D"(see Figure 2 for locations and legend). Interpretation based on surface information

Section A-A' through the "Takla Silver" & No. 2 Zones

Glover Stock porphyry. Early, pink, quartz-K feldspar vein (KS) cut by a thin vein (Mo) containing quartz, molybdenite and trace chalcopyrite. Hole LD01-34