DETAILED ALTERATION CORE-LOGGING, PETROGRAPHIC STUDY, AND A STRATIGRAPHIC-STRUCTURAL CONTROL OF MINERALIZATION HYPOTHESIS AT THE BROMIDE DISTRICT, NEW MEXICO-DDH B-1

APRIL 6, 1978

SUMMARY

Two ore mineral assemblages were identified during the course of the study of DDH B-1, a sulfide assemblage made up of pyrite, pyrrhotite, chalcopyrite, and bornite, and an oxide assemblage composed of native copper and cuprite. Generally, the sulfide assemblage was localized concordant with foliation and in association with carbonate-hydrothermal chlorite stringers. The localization of the oxide assemblage is along fractures and foliation surfaces where groundwater could penetrate.

An attempt to correlate rock-type and mineralization showed that higher copper values were associated with agglomeratic, felsic units. These units may or may not have been the primary carrier of values, but subsequent metal mobilization may have localized values here due to the more porous nature of the rock.

Generally, chlorite, sericite, biotite and epidote are the most important alteration minerals. Microscopic studies revealed the widespread character of sericite, the replacement of early chlorite and biotite of metamorphic origin by latter hydrothermal chlorite, and epidote as a replacement product of plagioclase and not uncommonly disseminated in the deeper portions of the drill hole. Other alteration phases observed were serpentine, stilpnomelane, and cordierite. The juxtaposition of an altered unit over an unaltered unit, indicating possible inverted stratigraphy, suggests the identification of a marker unit to identify the top of a single mineralization episode.

By plotting top and bottom indicators down the drill hole, cartooning overturned isoclinal folds, and superimposing anomalous copper values on the picture, there is suggested a possible structural-stratigraphic control for mineralization. Altogether, the evidence suggests further search either up-dip in the same stratigraphic unit, or down strike.

ORE MINERAL ASSOCIATIONS

Whether the ore components were present at the time of deposition of the alternating sequences of andesites, agglomerates, sediments and ashflows during the Precambrian or not is of academic importance with respect to their observable, present-day distribution. Generally speaking, mobilization and re-deposition in favorable localities characterizes the sulfide-oxide ore mineral assemblage, resulting from both hydrothermal and supergene mechanisms.

Sulfide Assemblage. Pyrite, pyrrhotite, chalcopyrite and bornite make up the assemblage of ore minerals deposited as a result of hydrothermal processes active late in the greenschist metamorphic episode or following it. The zones of weakness (foliation) which localized the sulfide minerals pre-date their deposition, indicating a relative age for mineralization. The ore minerals are very commonly in association with quartz-carbonate stringers which rarely cross-cut the pervasive structural grain of the host rock. In instances of obvious post-metamorphism shearing, accompanied by subsequent quartz-carbonate healing, remobilization of the copper and iron sulfides has not occurred, leaving the fault zones quite barren.

The typical association of ore and host materials consists of any single sulfide phase intergrown with, or sheathed by a secondary, bright green variety of chlorite, commonly associated with calcite. In rare instances, chalcopyrite and bornite occur together, while on occasion pyrrhotite was observed to replace magnetite. Generally, pyrite is the most common ore mineral and occurs in the upper portions of the hole, while pyrrhotite, possibly resulting from late de-sulfurization of pyrite, predominates in the bottom 300 feet.

Oxide Assemblage. Native copper and cuprite make up the supergene assemblage of ore minerals. Controls for the distribution of these phases are most commonly planes of foliation, and sympathetic fracture surfaces which acted as conduits for meteoric water in the subsurface. Native copper occurs as thin plates on limonite-coated surfaces. Cuprite is more closely associated with blebs and veinlets of silica, and is restricted to the bottom half of the hole.

CORRELATION OF ROCK TYPE AND MINERALIZATION

The consideration of ore grade as it is related to lithology is an aspect that should not be overlooked since an obvious guide to mineralization may become evident through such correlation. Fifteen assay samples from DDH B-1 whose copper values were in excess of 250 ppm were noted along with footages associated with each sample. Matching the assay interval with the alteration log interval yields an interesting corelation of rock and assay value, and implies a genetic relationship as well as suggesting a source of heat to mobilize and redeposit copper, chlorite and carbonate of hydrothermal affinity. In addition, implication of location laterally displaced from higher grade zones may be put forth.

A striking correlation of higher mineral values with agglomeratic, fragmental, or brecciated materials is immediately obvious from the following table. It may be suggested that these units not only carried initially anomalous concentrations of copper (syngenetic), but also that the more porous character of a rock of this sort would be more receptive to the migration and re-deposition of mobilized primary copper. Perhaps it may not be too far out of line to suggest these materials as being "millrock" equivalents.

A noteworthy interval from 350 feet to 510 feet exhibits anomalous copper over its entire length. It is suggested as one possibility that heat from a nearby intrusive rock, evidenced by observed, small apophyses of later trap material into this sequence, may have been responsible for localizing copper values and imparted the hydrothermal character to the distribution of chlorite, carbonite, and sulfides. A second, equally plausible explanation suggests that these units are laterally contiguous with, or equivalent to higher grade units of an ore-depositing episode. Therefore, exploration drilling stepped out along the strike of these beds may show greater promise.

MEGASCOPIC PHYLLOSILICATE DISTRIBUTION:

From megascopic observation of split core from DDH B-1 it was observed that these phyllosilicate phases predominate: sericite, chlorite, and biotite. The distribution of these minerals appears to be governed by two controls, the rock type and the alteration/ metamorphism intensity.

The initial 330 feet down-hole is dominated by sericite, with subordinate amounts of chlorite. It is believed that the upper 75 to 100 feet of the section is characterized by supergene sericite resulting from surficial weathering effects. Deeper into the hole, significant amounts of sericite mixed with chlorite occur within all rock types. Narrow intervals, usually of meta-andesitic composition, in which chlorite is the dominant sheet silicate, occur at irregular intervals down-the-hole.

Between 330 and 660 feet chlorite is the chief mineral resulting from metamorphism/hydrothermal alteration. Minor amounts of sericite, except in a sericitized meta-ashflow unit, together with the initial appearance of biotite, are also part of the mineral assemblage. Chlorite of metamorphic origin is easily discernible from that originating by hydrothermal processes. The metamorphic type is generally pervasive in its distribution, and is very dark green to blackish-green in color. Most commonly it is quite fine grained. In contrast, later hydrothermal chlorite is bright lime green and coarser grained. The distribution of this generation of chlorite is usually controlled by veinlets in association with quartz, carbonate and occasionally sulfides. Not uncommonly, it is observed as thin laminae concordant with the foliation of the metamorphic rock. In zones where concentrations of this secondary chlorite are high, the probability for ore materials is greatest.

Biotite and sericite ± chlorite dominate the lowest portion of DDH B-1 (660 feet to 830 feet). Biotite is usually localized in laminae and near veinlets as medium to fine-grained books aligned parallel to foliation. Its presence indicates increased metamorphic intensity, therefore higher P-T conditions. Winkler (1967) suggests that coexisting muscovite (sericite) and chlorite react to form biotite and aluminum-rich chlorite or muscovite. The light grey, plately mineral common in the deeper sections of the drill core is possibly

TABLE 1. INTERVALS WITH COPPER ASSAYS · 250 ppm

SAMPLE NO.	ASSAY INTERVAL	LOG INTERVAL (S)	CU	ROCK TYPE
B-1-2	77-97	71.5-81 81-88.5 88.5-97.5	270	Agglomerate-andesite porphyry
B-1-8	158-168	155-165	265	agglomerate
B-1-29	350-360	348.5-356 356-374.5	260	andesite-sediments
B-1-32	380-390	379.7-385	275	andesite-agglomerate
B-1-33	390-400	385-398.5	265	andesite
B-1-37	430-440	398.5-439	275	andesite with pebbles near intrusive
B-1-39	440-456	439-473.5	810	" " "
B-1-40	456-470		315	" " "
B-1-44	500-510	494.5-512.5	420	agglomerate-qtz vein
B-1-49	546.5-560	547-559.9	260	ashflow
B-1-51	570-580	559.9-579.5	305	ashflow with fregs
B-1-52	580-590	579.5-592	255	andesite
B-1-56	620-629	614-625 625-629.3	285	andesite
B-1-57	629-633	629.3-641	305	agglomerate
B-1-75	788-789	770.2-803	6000	andesite with autoliths

this latter reaction product and accounts for the low chlorite observed once biotite appeared.

MICROSCOPIC-PETROGRAPHIC INVESTIGATION

Among the important results of the microscopic study of selected sample intervals from DDH B-1 drill core were the paragenetic interpretation and alteration phase distributions, and the identification of a marker unit that may signify the top of a metallogenic episode in the volcanism.

In terms of paragenesis, replacement textures in which phases interpretted to be hydrothermal replacing the "primary" metamorphic minerals are deemed most important, since it is this hydrothermal event that is thought to be associated with the ore mineral mobilization and relocation. Starting with rocks initially containing quartz, plagioclase and mafic minerals, usually inequigranular in character, an alteration assemblage composed primarily of sericite, chlorite, epidote and calcite, with minor amounts of serpentine, stilpnomelane and cordiente, was superimposed on a chlorite, plagioclase, biotite, sericite metamorphic assemblage.

Sericite was observed to be much more widespread than originally perceived megascopically, and was noted to replace plagioclase with varying degrees of pervasiveness, cordierite to a minor degree and chlorite-1 (metamorphic origin) in small amounts. Chlorite-2 (hydrothermal origin) was observed to replace biotite, chlorite-1, and in a moderate manner, plagioclase. Additionally, veinlets and quartz-carbonate pods tended to localize chlorite-2. Epidote was sparse near the top of the drill hole, but the extent of its distribution increased significantly below 550 feet to a maximum of 20-25% of the entire rock. Generally, epidote was restricted to plagioclase replacement, but occasionally it was disseminated as small grains throughout the rock, locally concentrated along inter-unit contacts. Calcite was very common as a veinlet mineral in association with quartz and chlorite-2. However, it was not uncommon to observe calcite to replace plagioclase phenocrysts in a splotchy manner.

Serpentine was usually observed in groundmass location and probably was formed as a result of replacement of earlier mafic grains. Cordierite, exhibiting its characteristic interpenetration twinning, was rarely observed.

Stilpnomelane, a member of the brittle mica family, was observed along several large calcite veinlets and probably was generated by the late hydrothermal activity.

Metamorphic biotite was first noted at 543 feet, indicating increased metamorphic intensity at great depths. Coarsely crystalline sericite, megascopically interpreted as argillization, was noted at 462 feet. This corresponds quite well with the high copper assay values. It is suggested this may be a recrystallization product associated with the hydrothermal event.

Near the bottom of the drill hole a lightly altered andesite porphyry was observed to stratigraphically underlie a highly altered sequence. This would again suggest the overturning of units with mineralization being stratigraphically lower in the sequence. This andesite has the potential to be a marker unit since it has discernible plagioclase phenocrysts replaced by epidote set in a very fresh, all plagioclase groundmass. If there has been only limited sulfide mobilization, this unit possibly marking the top of a mineralization episode, will be useful.

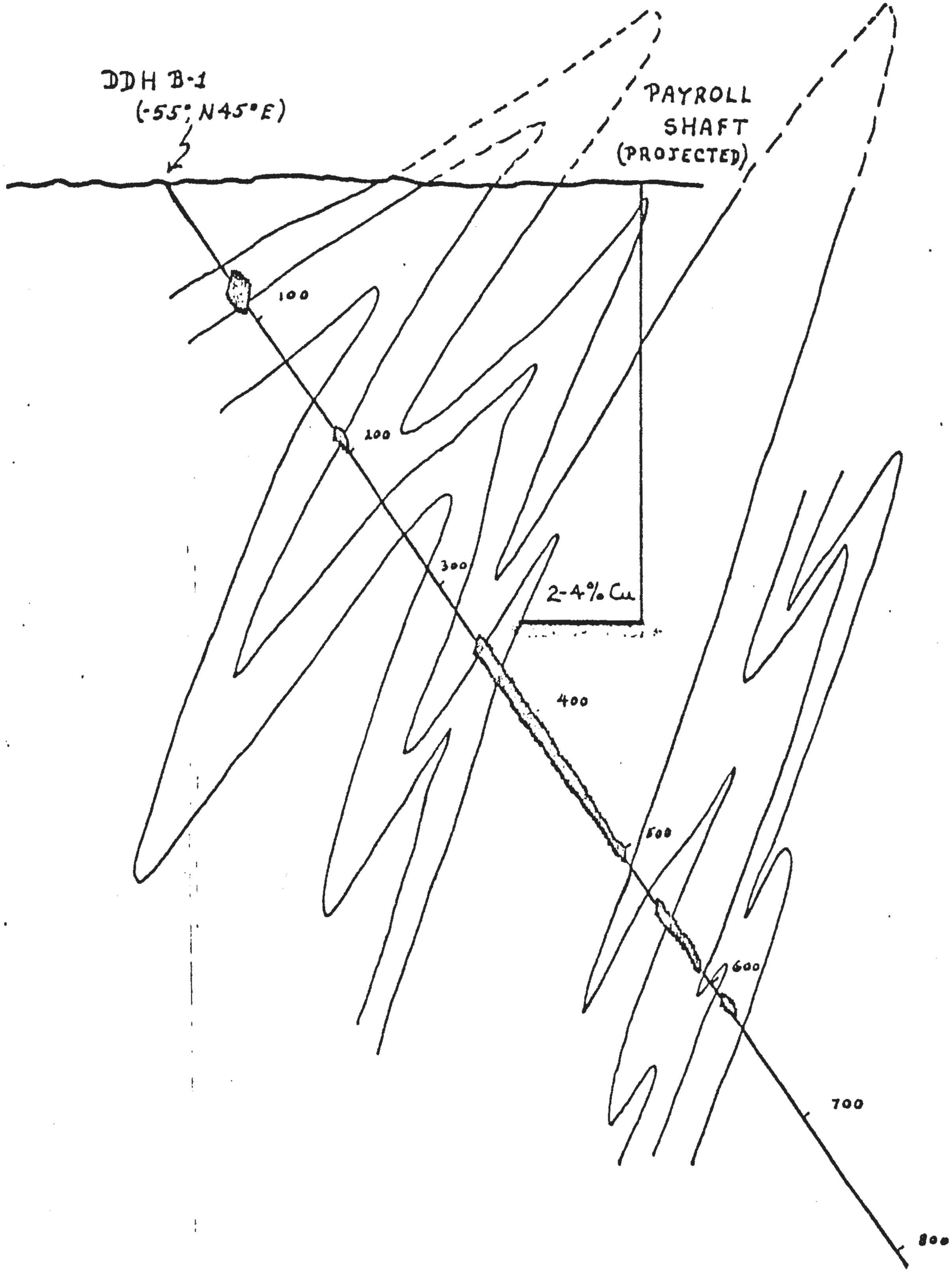
BEDDING ORIENTATION & POSSIBLE INTERPRETATION

Study of the drill core from DDH B-1 revealed conflicting evidences for the determination of tops and bottoms of the defined rock units. As a result, the author suggests the possibility of folding within the sequence. By cartooning the evidence observed in the drill core for bedding orientation, the following figure was derived. By superimposing the anomalous Cu values from Table 1 at the appropriate footages, an interesting effect became noticeable. The high copper values (>250 ppm) seemed to correlate well with the overturned limbs of the hypothetical folds, each time quite close to a proposed crest.

The "tightness" of the folds was inferred by the fairly constant dip observed in the bedding and the frequency at which top and bottom indicators were noted, suggesting an isoclinal folding pattern. It also seems worthwhile to note that the copper anomaly seems to be restricted to a particular unit.

If this hypothesized stratigraphic-structured relationship in any way reflects the natural situation, the suggestion for ore localization might be as pods or rod-like bodies within agglomeratic felsic units near fold crests. The correlation of values from the Payroll Shaft seems to corroborate this model quite well. Further investigation up-dip toward the hypothetical fold crest and along the strike of the units seems to be merited.

Robert W. Schafer



▬ Cu ASSAY >250 ppm

HYPOTHETICAL SECTION
THROUGH DDH B-1
(LOOKING N45°W)

BROMIDE PROJECT
RIO ARRIBA COUNTY,
NEW MEXICO

SCALE 1 inch = 100 feet

7 APRIL 1978 R.W.S.

U.S. BORAX EXPLORATION — DIAMOND DRILL LOG

HOLE SURVEY Detailed Alteration LOG

Footage	Bearing	Inclination

Property BROMIDE PROJECT — Hole No. B-1

Location Rio Arriba Co., New Mex — Total Depth

Date Started — Collar Elevation

Date Completed — Incl. & Bearing

Logged By R.W. SCHAFER — Core Size

Footage From	Footage To	Int.	Rec. %	Alteration* Chl	Alteration* ser	Alteration* cal			Mineralization T.S.	Mineralization Ore Min.	Mineralization Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
0	10	10									Fe-oxides	10	SURFACE PIPE (0-70 CORE BOARD)	
10	20	10		5	60							20	60% Sericite - 25-30% quartz - 5% Chlorite SCHIST - accessory magnetite (2-4%) - Limonite along schistocity (hematite-rich) after mag; tr. pyrite - moderate oxidized - meta-andesite -	
20	30	10		5	60							30	SAME AS ABOVE - sericite is LT. green to white - Lightly oxidized - possibly sericite is supergene in origin	
30	40	10		30	30							40	Chlorite - sericite - quartz schist - CHLORITE & SERICITE ABOUT EQUAL - Limonite pseudomorphs after pyrite (hematite-rich) - magnetite remains accessory meta-andesite	
40	50	10		30	30							50	SAME AS ABOVE - Limonite picking up a little more jarosite (hem 85, jar 10%) - coarser, bull are fragments (vein?)	

Footage From	Footage To	Int.	Rec. %	Alteration* Chl	ser	cal	FLR		Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description: Rock Type, Structure, Etc.	Assays
50	60	10		45	15						Fe-oxides	60	CHLORITE-SERICITE-QUARTZ SCHIST - Limonite localized along schistocity (jarosite rich) - hematitic limonite after mag, PY (?) - higher chlorite - magnetite is euhedral to subhedral octahedra	
60	70	10		45	15							70	SAME AS ABOVE - less oxidized	
70	71.5			20	45	1-2	TR			DISS PY-Fe OXID	mag → 2-5 %.		W. QTZ STRINGERS, OFTEN LOCALIZING PY; SLIGHTLY ROTATED plag PHENOS - cataclastic rim healed by QTZ, TRACE FLUORITE (?) in CAVITY v. fine grained ser-chlor-qtz phyllite	THIN SECTION B-1-71
71.5	81	9.5		55 ↓ 40	15 ↓ 30	4-6				tr. PY	mag → 8-9%	80	CHLORITE STRINGERS W/ ASSOC magnetite - euhedral CHL. MAG ASSOC w/ CHLOR STRINGERS coarser than diss. mag. vein controlled Lim-Hem, qtz lenses, few relict plag phenos - meta-andesite TO meta-agglomerate qtz veinlets often have mag DUST HALO - BLEBS OF QTZ-calcite, DISS calcite - inverted graded bedding at 78', following a SUBTLE TRUNCATION - qtz-chlor. may pseudomorph after biotite (?) - pebbles of agglomeratic intervals stretched along foliation direction at 78', more oxidized mag → hem common and higher sericite content (~30%) ASSOC with agglomeratic interval TO 81'	B-1-75
81	88.5	7.5		40 ↓ 15	30 ↓ 55	2					Lim along schistocity mag DUST in CHLOR mag → 6-8%	90	agglomeratic UNIT, DOMINANTLY SERICITE, CHLORITIC LENSES; ROTATED QTZ PHENOS, some with CATACLASIS qtz phenos lack sharp boundaries, rather blending into QTZ-SER-CHLOR matrix, - calcite stringers, blebs & disseminated - MUCH MORE QTZ-RICH WITH DEPTH (TOP of UNIT ?) same with ser., yellow calcite commonly w/ QTZ	
88.5	97.5	9		5-10 ↓ 15-20	60 ↓ 55	4					coarser mag, diss & veinlets 2-4 % UP TO 7-8 % -trace ilmenite with LEUCOXENE 1-2 % AT 90'	100	Dominantly qtz-ser-mag unit, contact relationship indicates probably earlier than preceeding interval, some lenticular chloritic zones LOCALLY PORPHYRITIC	THIN SECTION B-1-89
97.5	108	11.5		25	35	16					magnetite DUST AND a few coarser XSTALS 3-5%	110	Ser-CHLOR-QUARTZ PHYLLITE, possible LT. green FLUORITE as late open space filler, concordant qtz lenses and micro-stringers, OFTEN LIMONITE STAINED a few qtz eyes, also veinlets of limonite-hematite-qtz a few relict "GHOSTS" of hornblende (?) phenos replaced by very fine chlorite and magnetite LOCALLY AGGLOMERATIC	
108	123	15		30 TO 45	35 TO 60	TR W VEINS					acc. magnetite 2-3% OXIDIZED ALONG SCHISTOCITY PLANES TO LIMONITE - (Hem to goe 30 [illegible] 10) trace ilmenite w/ leucoxene along rims & FRACS		meta-agglomerate - MOTTLED, STRETCHED PEBBLES composed dominantly of sericite and quartz surrounded by chlor-ser-qtz matrix, variable [illegible] of chlor & sericite some qtz veinlets with limonite halos (after mag ?) INFREQUENT CLOTS OF CHLOR-[illegible] (AFTER PHENO ?)	

From	To	Int.	Rec. %	CHL	Ser	Cal	FLR	EP	T.S.	Ore Min.	Gangue
3	141	18		60 TO 45	15	6-7					2-3% mag lightly oxidized on rims and commonly pseudomorphically replaced by hematite-martite (disseminated)
H	145	4		20 ↓ 40-45	10	8					HEm. after mag-martite 1-2%
5.5	149	3.5		20	30-35	5-6					mag dusty lger diss grains jarosite limonite
9	150.3	1.3		60-40	5-20	5-7					1-2% mag
3	153	2.7		20-15	35-60	2-3					mag, hem 3-4%
3	155.5	2.5		60-15	5-10	1-2				TR PYRITE assoc w/ QTZ	PY oxidized to hematite

CONTINUED NEXT PAGE

Graphic Log Ft.: 130, 140, 150

General Description — Rock Type, Structure, Etc.	Assays
Fluorite is late stage, texture becomes finer with depth - loses agglomerate character and becomes more equigranular flow like body	
CHLORITE - QUARTZ - SERICITE PHYLLITE - Homogeneous texture - equigranular. Limonite stained quartz and disseminated yellow calcite and clots that cross-cut schistosity. - Disseminated calcite may be replacing plag. meta-andesite	THIN SECTION B-1-12
Meta-qtz diorite - andesite, stretched phenos mafics (hornblende?) replaced by chlorite. - CHILLED margin, pheno population increases away from contact (with depth), becoming equigranular. qtz-cal veinlets. Calcite also in plag sites with qtz and relict plag. - Lightly oxidized, becomes relatively equigranular and more stretched at depth - Dike (?) - a few xenoliths near contact at depth (maybe formerly a diabase?)	
Cataclastized qtz-chlor vein, healed by calcite	
meta-sedimentary texture, veinlet qtz. Chlorite rim around stretched pebble. QTZ-CHLOR-ser argillite w/acc magnetite. Magnetite incr w/ depth (heavies settling out ∴ right side section). - at 148 ± or Cu, oxidized pyrite. - Chlorite occurs as conformable stringers and replacements for stretched grains and rimming qtz, high limonite content at contact. - GRADED BEDDING, coarser frags w/ depth. - next unit has intrusive, or later emplacement date - veinlets intrude sed textures	THIN SECTION B-1-146
CHILLED margin, v. fine grained chlorite, becomes porphyritic toward interior - replaced by QTZ-cal, more sericite toward center - [illegible]-cal vein - [illegible] -	
QTZ-SERICITE-PLAG-MAGNETITE-CHLORITE meta-sed rock, becomes more sericite & magnetite rich w/ depth, correlates w/ 145-149 interval	
Chlor-QTZ-meta-andesite, becomes "porphyritic" in final 15' w/ cal-qtz lenses conformable to foliation, more QTZ-rich w/ depth, stretched chlor pseudomorphs after mafics - Normal graded bedding?	THIN SECTION B-1-155

Footage From	Footage To	Int.	Rec. %	Alteration * % CHL	SER	Cal	FLR	EP	Mineralization T.S.	Ore Min.	Gangue
155.5	165	9.5		20 ↓ 30 ↓ 35	45 ↓ 35 ↓ 30	TR-1				TR Pyrite along veins & w/ QTZ grains; OXIDE Cu stringer @ 164.5	Hem after mag 2-3% Dust & granules
165	168.1	3.1		30	15	1-2				Hem after PY in veins	3-5% Hem after mag, Locally up to 8%, TR ilmenite
168.1	172	3.9		45	65	1-2					3-5% Hem, TR ilmenite w/ leucoxene
172	183.3	11.3		15 ↓ 15	55 ↓ 60	1-2					Hem after Mag - Diss. 5-8%
183.3	185.5	2.2		35	30	2-4					2-4% Hem after mag
185.5	187	1.5		55	15	1					3-4% Hem after mag
187	189.5	2.5		35	30	2-3					TR mag DUST
189.5	194.9	5.4		30 ↓ 10	25 ↓ 45	4-5 ↓ 1		TR			Fresh magnetite ~1% grains plus DUST - oxidized mag near lower contact
194.9	203	8.1		25 ↓ 30 ↓ 10	30 ↓ 30 ↓ 15	4-6 ↓ 1-2				TRACE Cp; 1 occurrence of Bn on Cp	FRESH mag 1-2% INCR TO 4-5%

Graphic Log Ft.: 160, 170, 180, 190, 200, 210

General Description: Rock Type, Structure, Etc.	Assays	
HIGH QTZ-Ser CONTENT IN INITIAL 6" OF UNIT, OXIDIZED INITIALLY SCHISTY, BUT Becomes more Agglomeratic and less defined foliation, STRETCHED PEBBLES Sericite lenses, SERICITE RICH CLAST WITH CHLORITIC matrix (maybe AUTOLITHIC?) and a few QTZ frags - stretched, carbonate vein stockwork locally, mag-Hem DUST generates DARK COLOR, CLAY (?) assoc with Cal & qtz lining veins at 163'		
meta porphyritic andesite - stretched phenos, of QTZ-cal in CHLOR matrix, grades to finer equigranular CHLOR-Ser SCHIST WITH QTZ-Cal Stringers		
CONTACT SHOWS FRAGS OF OVERLYING UNIT IN A BASAL conglomerate (?) i.e. inverted; Dominantly QTZ-Ser Schist w/ Stringer CHLOR; at 169 FT A Sericite (80%) qtz SCHIST w/ 8% mag (ASH OR SED UNIT), THEN a few CHLOR Stringers in a Ser-CHLOR-qtz SCHIST (meta dacite?), Becomes v. sericite rich at lower contact (70%)		
CHLOR-Ser-qtz-mag SCHIST AT BASE, stretched frag replaced By sericite, alternating CHLOR and QTZ-Ser Lenses w/ clots of $CaCO_3$ (Ser Dominates) Ser Becomes mixed w/ a yellowish clay (?) fraction - approaching mineralized zone at 177'; Becomes qtz-ser w/ ~5% CHLOR, 20% QTZ, Clots of Cal-mag - concordant, greater QTZ content w/ Depth (meta RHYOLITE? OR QZ-SEDIMENT?) - fairly coarse ser	THIN SECTION	B-1-178
fine grain mix OF CHLOR-Ser WITH QTZ as fine grains and small "eyes", rare clot of sericite stringer QTZ w/ intergrown fine chlorite, meta andesite		
Frags of meta andesite in a ser-qtz-CHLOR SCHIST (meta dacite?) i.e. dacite is Later.		
CHLOR-Ser v. fine grained SCHIST, mostly intermixed, w/ occasional sericite lens, Cal veinlet, Sm qtz eyes; GRADES to Ser-qtz SCHIST AT Depth (meta-dacite capped by meta pelite?)		
Begin meta andesite sequence over again, with [illegible] at Lower contact, CHLOR stringers concordant, QTZ-Cal veinlets, QTZ-Ser sheaths occasionally around Chlorite stringers; Dominantly fine grained QTZ-Ser-CHLOR Schist, Calcite is also Disseminated-megascopic Picks up stretched pebbles - mostly QTZ-Ser or QTZ-CHLOR at 193'; overall CHLOR content Decr w/ Depth and Sm qtz eye population increases [illegible] AT LOWER CONTACT		
QTZ-Ser-CHLOR SCHIST Near TOP, DISS Calcite, alternating CHLOR-Ser and Ser ZONES, a few stretched pebbles, CHLOR incr as approach gradational contact WITH INTRA-Unit Conglomerate, Sericite appears as LOCKS OF BLOND HAIR, qtz eyes, Lge CLASTS, SLIGHTLY STRETCHED, Dominantly CHLOR-qtzite (?) w/ mag - (maybe ARKOSE FRAGS in pelitic unit?), CLASTS composed of coarse [illegible] frags in chloritic matrix, sericite halo around some Lge CLASTS	THIN SECTION	B-1-201

Footage From	To	Int.	Rec. %	Alteration * chl	ser	cal	FLR	ep	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
03	212	9		15 ↓ 15	30 ↓ 5	1-2 ↓ TR		TR		TR Py	mag → 8-9% Locally oxidized	210	Qtz-ser-CHLOR SCHIST, SHARP CONTACT, a few Sm qtz eyes, at 204' Begins to pick some small qtz-chlor-mag CLASTS, epidote in CLASTS as Rims around qtz, at 207' Becomes a meta conglomerate of arkosic (?) frags in CHLORITE matrix, decr in SERICITE w/ Depth as matrix is ~completely CHLOR only TRACE Mag in conglomerate. SERICITE kicks up a little near lower contact	
2	230.2	18.2		10 ↓ 30 ↓ 15	25 ↓ 20 ↓ 35	1-2 2-3		TR		TR PY	2-3% mag/Hem	220 230	TOP OF UNIT is ~1' qtz-CHLOR SCHIST (meta graywacke?) w/ a qtz-cal vein; Underlain by fine conglomerate (sm clasts); qtz-ser-CHLOR → Limonite STAINED Dominantly Lim-STAINED sericite w/ CHLOR as matrix, Limonite stain decreases marked AWAY From contact a few feet, picks up a few coarser pebbles w/ depth, magnetite Localized in pods, CLASTS are either qtz-mag or CHLOR-mag ± qtz, at ~221 grain size Begins to DECREASE and Chlor-ser content increases, only a couple small stretched pebbles by 226; mostly v. fine grained qtz-CHLOR-ser, at 228 meta-andesite porphyry (?) – fine grained qtz-ser-chlor groundmass WITH qtz – PLAG (?) phenos – some Replaced by epidote around edges, a few clots of Qtz-cal.	
30.2	235.6	5.4		10	40	6-8					fresh mag 6%		Ser-QTZ-CHLOR SCHIST, fine grained few sm qtz eyes, Diss mag, sm lenses of cal conformable to bedding, and filling fractures, few CHLOR stringers, a few fresh plag laths w/ calcite Along fracs. – ma	
35.6	248.5	13.1		15 ↓ 25 ↓ 20	30? ↓ 30 ↓ 40	8 ↓ 5		-1/- TR		TR Cp in Qtz-cal vein	mag DUST, MUCH OXIDIZED TO Hematite ↓ mag grains 4-5%	240	CONTACT – TRUNCATED BEDDING (ANGULAR UNCONFORMITY) ZONE contains ROUNDED qtz frags and pebbles ∴ NOT Shear contact, Underlying Unit is porphyritic andesite w/ stretched phenos – Replaced by calcite groundmass is Dominantly qtz-ser cal-chlor, a thin meta-sed unit coarser sericite/qtz, CHLOR, overlying andesite w/ Numerous qtz-cal stringers, at 242 picks up mag/hem grains, at 243 Begins picking up stretched pebbles, vein CHLOR is coarse – agglomerate (?), Numerous sm. qtz eyes – sericite Rich zones are limonite stained	
85	254	5.5		30 ↓ 35	20 ↓ 30	2 ↓ 4		TR			mag/hem – DISS grains 2% – picks up DUST w/ Depth	250	fine grained CHLOR-ser-QTZ SCHIST, DISS mag, slightly limonite stained, Rare plag grains, DISS and stringer calcite, coarse CHLOR replacing mafics, fine CHLOR-ser qtz in groundmass, Degree of SCHISTOCITY variable – Dependent on Amt of Labile material present (?) – Shear zone @ 251'	
54	257	3		25	35	5-6					OXIDIZED mag grains		pebble-BRECCIA UNIT – STRETCHED, CHLORITE along CLAST Boundaries → healed-Shear?	
57	267	10		30 ↓ 80 ↓ 25 ↓ 15	20 ↓ TR ↓ 40 ↓ 45	3 1				Rich Cp zone Lower 5' of unit; TR – .5% Cp usually conforming to foliation assoc. w/ Chlor v. fine grained	mag DUST, diss [illegible]; mag DUST 10%	260	CALCITE STRINGERS & Replacing PLAG – QTZ-CHLOR-ser SCHIST w/ RELICT PLAG, DISS mag, CHLOR LOCALLY making up to 80% of Rock in lge Lenses, w/ a couple CHLOR-ser stretched pebbles, grades to fine gr. Chlor-ser-mag schist – mag gives overall grey color, at 263' Becomes agglomerate w/ stretched pebbles w/ CHLOR stringers [Fine near top of sequence, Basal agglom, underlying fine]	THIN SECTION B-1-25

Footage		Int.	Rec.	Alteration *					Mineralization			Graphic Log	General Description	Assays
From	To		%	CHL	SER	cal	FLR	EP	T.S.	Ore Min.	Gangue	Ft.	Rock Type, Structure, Etc.	
													CHLOR-SER-QUARTZ PHYLLITE – v. fine grained, slightly foliated, calcite stringers w/ CHLOR-mag haloes – Cp assoc.	THIN SECTION B-1-268
67	269	2		30	20	TR-1				TR Cp	mag DUST / DISS grains 1-2%			
69	311	40		10 ↓ 15 ↓ 10 ↓ 15 ↓ 10 ↓ 25 ↓ 20 ↓ 40 ↓ 30 ↓ 45	40 ↓ 35 ↓ 40 ↓ 30 ↓ 45 ↓ 30 ↓ 35 ↓ 10 ↓ 20 ↓ 15	TR-1 ↓ 2-3 ↓ 4-6 ↓ 10 ↓ 3-5 ↓ 8-10 ↓ 2-3 ↓ 4-6	TR	TR		TR – Cp assoc w/ CHLOR in stringers 1 grain Po may be some fine DISS Cu° – w/ depth get evenly DUST Cp (.2%) – mag grain w/ Py core – – possibly DISS Cu° in Qtz-Ser – Cu_2O in veins w/ cal, qtz – TR Cp in 2nd cal zone Cp-Py zone at 300' CONCORDANT TR Cp	mag DUST Hem along cal-CHLOR lens (may be Cu_2O) limonite along fracs Locally mag up to 7-8% generally 3-4% mag DUST mag grains – fresh	270 280 290 300 310	QTZ-SER-MAG SCHIST w/ CHLOR-CAL STRINGERS, quite fine grained, mag in leaves, RARE QTZ EYES; TRACE cal is ROCK, MOST in STRINGERS; RARE STRETCHED frags near top of UNIT, GRADING DOWN to a pebbly unit (agglomerate?) WITH STRINGER CHLOR-(cal-Cp) between Ser-QTZ frags w/ mag dust, CHLOR CLOTS IN QTZ-SER probably as mafic replacement, in addition to CHLOR stringers – CHLOR is coarse & euhedral in QTZ-Cal-CHLOR veins, Becomes evenly grained dominantly QTZ-SER w/ CHLOR-cal STRINGERS – SULFIDES ASSOC WITH CHLOR EXCLUSIVELY, LOCAL more SCHISTOSE UNITS (2-6" thick) are higher in CHLOR (25-30%), but generally remains QTZ-SER and no incr in SULFIDE content, general incr in carbonate stringers from 287 to 290.5, and from 292.5 to 298.5' – cal-chlor stringer w/ oxidation halo – no mag – general dark color due to DISS mag & fine grained nature of minerals, ZONE OF more intense Cp ENDS at 290'; a few v. small qtz eyes; – SCHISTOCITY INCREASE in 2nd ZONE OF cal STRINGERS (due to high chlor content?), also a few STRETCHED qtz pebbles – WITH CHLOR-SER in fractures, pebble population increases WITH DEPTH, ROTATED somewhat DISRUPTING FOLIATION, Cal-CHLOR-RELICT plag(?)-qtz clasts, Some serpentine along fracture CROSS-CUTTING foliation (308'), more apparent foliation from 302 to 305 WITH greater Ser: CHLOR Some plag w/ minor cal; a few small, stretched pebbles, Lge frag at 306 sitting in v. fine grained qtz-CHLOR phyllite, frag is compositionally similar to interval 298, contains Cp – SURROUNDING ROCK DOES NOT, CHLOR HALO; becomes a QTZ-CHLOR-ser phyllite WITH a few plag laths partly replaced By calcite, CHLOR content incr, as does schistosity	THIN SECTION B-1-298
1	332	21	AVG	35 ↓ 20 ↓ 45 35 ↓ 30	TR ↓ 10 ↓ 30 ↓ 10 25 ↓ 10-15	10 ↓ TR ↓ 2-3 4				TR PY, Cp	FRESH mag – a few grains, mostly DUST	320 330	SHEAR CONTACT, SLIGHT drag on SCHISTOCITY; CHLOR-CAL-MAG SCHIST, cal REPLACING plag and as veinlets; Becomes finer w/ Depth, more EQUIGRANULAR w/ SERICITE BECOMING more NOTICEABLE, SHORT INTERVAL of fractured, fine grained CHLOR-ser-QTZ phyllite's w/ CHLOR healing fractures, then goes back to a fine gr. cal-CHLOR phyllite – this pattern of CHLOR-Cal and CHLOR-ser-cal phyllites alternates ~ every 2 ft., CHLOR-cal stringers in ser-qtz-(CHLOR) ROCK, LOCAL HALOES AROUND CHLOR-CAL-MAG PSEUDOMORPHS, some stretched QTZ-SER concentration at 325, – may be after plag or pebbles	

Footage From	Footage To	Int.	Rec. %	Alteration * CHL	SER	Cal	FLR	EP	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
				20	15	1							Qtz-py-chlor vein at 327 w/ sericite halo cutting chlor qtz phyllite; toward 330'-334 1/2, get high calcite stringer zone in dark chlor-qtz ser phyllite and stretched granules (mostly qtz)	
332	333.5	1.5		25	35	1-6					mag.		Agglomeratic or qtzite pebble conglomerate with pods of qtz-cal and cal; sericite pods in chlor-mag matrix - possibly basal unit to overlying section, coarsening with depth	
333.5	348.5	15		30 ↓ 15 ↓ 45	10? ↓ 25 ↓ 10	1-2 1 2-3				TRACE PY	mag DUST	340	v. fine grained qtz-chlor-cal phyllite, conformable lenses of calcite, some pods w/chlorite haloes - a few pseudomorphs of chlor after h-blende (?) ∴ meta-andesite, a few qtz eyes, any sericite is too fine to ID; mottled appearance of tan, dk green and dk gray - conformable ∴ maybe interfingering of seds (tan), meta-andesite (green & gray), some fresh (?) plag grains, sed (tan) component incr w/ depth to 340' (v. high in qtz-fine gr), and becomes a v. fine gr. chlorite-cal phyllite w/ a few h blende pseudomorphs, maybe some v. fine gr. biotite; a basal contact conglomeratic unit ~6" thick, truncated bedding w/ depth & right side up	
348.5	356	7.5		15 ↓ 40 ↓ 35	25 ↓ 10 ↓ 20	1-2 ↓ 3		1/.		TR PY	mag DUST locally oxide to Hem.	350	very fine ser-chlor-qtz phyllite, calcite strings and a few cal-qtz clots (after plag ?), also epidote, a couple h-blende xtals, becomes more chlor-rich w/ depth, stringers of PY w/in foliation rare qtz eyes, some calcite pods have chlor halo, remains v. fine grained, thin lamina of magnetite, near bottom contact sericite incr	
356	374.5			35 ↓ 45 ↓ 60 ↓ 35	10? ↓ 5 ↓ TR? ↓ 20	1-2		TR TR		TR PY, Cp	DUST-mag	360 370	fractured fine grained chlor-qtz-ser phyllite with chlor healing fractures (frags not rotated) a few sm. qtzite (?) pebbles - stretched, having pinkish, arkosic character, green & black chlorite stringers of cal-qtz, grades with depth to meta-arkose (?) - pink qtz, mag, chlor frags w/rare sulfide, grades down to v. fine grain chloritic phyllite, a few altered plag phenos, and pebbles (v small), local clots of calcite, becomes highly chloritic w/ few cal stringers, shear zone at 364', picks up a little sericite toward lower contact w/ more plag (replaced Pxl qtz-cal-ep, diss qtz grains	N0 MORE SAWED SECTION.
374.5	379.7			20 ↓ 40	35 ↓ 15	3-4				TR Cp	fresh mag in lenses: and DUST	380	Meta agglomerate, dominantly sericitized with lenses and pods of black chlorite, pink quartz and feldspar pseudomorphs and relicts, stretched pebbles, at matrix becomes green chlorite with partly altered lg plag frags w/ epidote & calcite replacement, locally brecciated in green chlor zone	THIN SECTION B-1-3

CON'T ON NEXT PAGE

Footage From	Footage To	Int.	Rec. %	Alteration * CHL	Ser	Cal	FLR	EP	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
379.7	385	5.3		55	15	1-2				TR PY	mag DUST		EQUIGRANULAR, meta-andesite, qtz lenses, DOMINANTLY CHLORITE, minor sericite / qtz, a few CHLOR-Cal veins, a few SULFIDES along foliation planes, Rare qtz eyes, veinlet CHLORITE is bright green, ROCK CHLORITE is black	
385	398.5	13.5		50 ↓ 35 ↓ 20	15 ↓ 30 ↓ 40	5-6 ↓ 1-2 TR	TR			TR Py tr Bn	granular mag - euhedral octahedra and tetrahedra	390	Agglomeratic unit, pods of calcite in with stretched and rotated qtz-ser frags set in BLACK CHLORITE matrix, pink PLAG (twinned) phenos, lightly replaced by cal, CHLOR halo (LT. green), sm qtz eyes - rare, a few CLASTS HAVE well rounded qtz eyes (v. small), mafics are CHLOR repl. and PLAG by calcite in part, Py is v. finely diss and localized on foliation. PLAG w/ halo in stretched pebble, some ROTATION - SNOWBALL texture, LOCAL CLOTS of ~80 % sericite, chl cal veinlets; BECOMES SERICITE-RICH near LOWER contact - higher SEDIMENT input ?, Euhedral mag assoc w/ SERICITE, TR FLUORITE ASSOC w/ qtz eye, FRAG of meta-SED (?) in underlying unit, underlying unit was F..	
398.5	439	40.5		50 ↓ 40 ↓ 65 ↓ 60 ↓ 60 ↓ ↓ 40 ↓ 65 ↓ 55	15 ↓ 20 ↓ 5 ↓ 15 ↓ 20 ↓ ↓ 25 ↓ 5 ↓ 15	1-2 ↓ 3-4 ↓ 5-6 ↓ ↓ 1-2 ↓ 3-4 ↓ 1-2		TR		TR Cp, Bn	mag DUST; sm. CLOTS; vein controlled	400 410 420 430 440	Fine grained, EQUIGRANULAR BLACK - DK green CHLORITIC phyllite, pod of qtz, mag, some sericite (minor) in lamina w/ qtz, SHORT intervals richer in sericite (25%); higher qtz content and finer grain nature of CHLOR leaves unit at 408' less well foliated, calcite - qtz stringers, some with CHLOR (coarse, green) haloes and pods; a few relict plag phenos (rare), mostly replaced or rimmed by calcite, SULFIDE picks up at 430', as does sericite, Becomes slightly more coarse grained & better foliation and a few plag lathes; conjugate set of calcite stringers Intense calcite veining at 435' - stringers CLOTS AND veins in v. fine CHLOR-QTZ-SER phyllite; goes back to fine grained BLACK- DK green CHLORITE phyllite w/ minor QTZ, TR SER; LOWER contact is AN intrusive contact with a fine grained CHLOR-SER phyllite marked by fracturing and truncation of textures AND STRUCTURES - this unit is <u>older</u>, higher SULFIDE content, sericite too	THIN SECTION B-1 4

CONTINUED

Footage From	Footage To	Int.	Rec. %	Alteration * CHL	SER	CAL	FLR	EP	T.S.	Mineralization Ore Min.	Gangue	Graphic Log Ft.	Log	General Description Rock Type, Structure, Etc.	Assays
39	473.5	34.5		25 ↓ 35 ↓ 40 ↓ 30 ↓ 40	35 ↓ 5 ↓ 5 ↓ 20 ↓ 10	1-2 ↓ 3-4 ↓ 2-3		TR		TR PY v. finely diss. and veinlet controlled, foliation contrl	DUST & CLOTS OF mag	450 460 470	cal zone; cal; Arg	SERICITE - CHLOR - QTZ phyllite, QTZ-calcite stringers, Bright green chlorite and DK chlorite Lighter chlorite controlled by veinlets & stringers ∴ Later than black - DK green chlor. Calcite pseudomorphs after plag phenos, BR. gr. chlorite pseudomorphs after mafics (porphyritic Andesite), Becomes higher in sericite a couple feet into unit (45%), BUT By 442' Becomes Bl. chlorite - QTZ and cal stringers w/ trace ser, Quite rich in QTZ. PY RICH ZONE AT 451' assoc w/ QTZ-cal stringers w/ gr. chlor.; 453.5' to 455.5' Brecciated, calcite stringer zone w/ stretched clasts, high pyrite locally - little veinlet squirts of trap-like material - proximal to a dike (?) - post metamorphic; phyllite becomes more sericitic beyond shearing w/ incr in mag. Questionable is gray, black chlorite stilpnomelane? very fine grained; at 462 incipient argillization assoc with high pyrite and qtz - cal veining clay after v. fine plag (?), possibly a contact phenomena, a few cherty pebbles near contact w/ Lens-like concentrations of BL chlor & QTZ within green chlor.; then chlor content increases (black) trace epidote after plag w/ calcite, Rare small qtz eyes.	question - see T.S. B-1-4; THIN SECTION B-1- (argillization?)
473.5	487.7	16.2		65 ↓ 20 ↓ 45 ↓ 65	5 ↓ 30 ↓ 15 ↓ 10	1-2 ↓ TR ↓ 2-3				TR PY	TR mag mostly sm euhedral grains	480	Arg; Arg	meta- porphyritic andesite - chloritized mafic phenos in a QTZ - calcite (after plag) - chlor ground mass / silky chloritic schist, a few QTZ-cal stringers; some argillic type particles after plag - all chlor is tiny lt green type, trace sericite and in localized pods, becoming prominent between 479-481, then becomes more chloritic again, appears to be 1 or 2 more silicic units interbedded with meta andesite (in these ser = 45, chlor 20); Locally lightly sheared, a few cal-gr chlor stringers	Some of serici[te] material ma[y] Be talc
487.7	494.5	6.8		40 ↓ 35	20 ↓ 30	1		TR		TR PY, Cp	mag DIST	490 500		meta andesitic agglomerate - INCH-SIZED clasts of chlor-ser set in a chlor matrix, minor calcite pods w/ Br green chlorite halo - coarser grain, sericite becomes more concentrated in center of unit, A relict plag & small; chlorite is black - DK green green variety w/ Depth. clasts are fairly undeformed	

CONTINUED NEXT PAGE

Footage From	Footage To	Int.	Rec. %	Alteration* Chl	Ser	Cal	Flr	Fp	Mineralization T.S.	Ore Min.	Gangue	Assays
494.5	512.5	18	17.8	60 ↓ 70 ↓ 40 ↓ 60	10 ↓ 5(?) ↓ 25 ↓ 10	TR ↓ 15 ↓ 5				tr Cp in foliation planes w/ Py	mag dust & tetrahedra ~10%	THIN SECTION B-1-500
512.5	515.5	3	—	55	15	5				TR Py	fine mag tets	
515.5	528.5	13		45 ↓ 45-50	15 ↓ 5	3				TR Py	mag ~5% mostly sm euhedral xstals	(stilpnomelane ?)

Graphic Log (Ft.): 500, 510, 520, 530

General Description — Rock Type, Structure, Etc.

CONTACT w/ agglomeratic UNIT, Ser-green CHLOR - black chlor-qtz SCHIST → mineral phases are segregated into bands, slightly folded & offset, stretched pebbles, Becomes Dominantly green & Bl CHLOR after 4' from contact WITH pods of sericite (after plag (?)), CLASTS are RICH in calcite (10-20%) WITH QTZ, all are Rounded & elongated, Range up to 3/4" in diameter, Becomes increasingly green chlor rich vs black CHLOR, WITH v. bright green CHLOR Haloes around CLASTS, w/ depth population of CLASTS increases, BUT Ave. size DECREASES, a few cal-QTZ veins, a few relict plag grains, CHLOR actually Begins massive replacement at ~504' of entire mineral assemblage; 504'-510' thick QTZ veining with calcite, fewer pebbles across vein system (shear zone?) → may indicate graded bedding Bright green chlor halo around veins, w/ DK green-black CHLOR and Ser mixed WITH green CHLOR in wallrock, Becoming BLACK CHLOR - green mixture w/ further depth; a few qtz eyes, obvious offsetting; only a few stretched CLASTS Beneath shear zone → CAL-QTZ-Ser, Becomes quite fine grained at BASE.

ANOTHER UNIT OF agglomerate, Dominantly green CHLOR w/ sericite, QTZ, Cal; also cal veins & Replacement pods, very similar to last unit sequence, BUT THINNER, a Narrow shear zone at   , at which point CLASTS are fairly NUMEROUS w/ calcite replacement and qtz veins fine grained Lower contact - sm. Replaced phenos (?) in green CHLOR; texturally Upper unit truncates Lower

meta volcanic unit, small CLASTS replaced by QTZ-cal - a small cross-cutting lens of v. fine grained BLACK ROCK → BASALTIC composition (?), POST metamorphism; CHLOR (gr) calcite-qtz unit WITH numerous phenos; a few calcite-RICH, stretched CLASTS, phyllitic texture rather than SCHIST also sm CHLOR pods; occasionally Looks Like a meta-CLASTIC UNIT (sed.) near Lower contact

CONTINUED NEXT PAGE

Footage From	Footage To	Int.	Rec. %	Alteration * CHL	SER	Cal	FLR	EP	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description: Rock Type, Structure, Etc.	Assays
													BRECCIA UNIT – Lge CLASTS OF UNDERLYING UNIT together w/ chunks of v. fine grained MASSIVE CHLOR UNIT WITH a CHLOR matrix – maybe some <u>talc</u> also present; QTZ-cal ASSOC WITH fractures; CLASTS are fairly well-rounded	
285	530.5	2		65	5	5				TR. cuprite	No mag	530		
30	536	5.5		45	30	2				TR py	Hematite		medium grained CHLOR-QTZ-cal phyllite meta-volcanic (andesite?) with LT grey sericite is some PHENOS; BRI green CHLOR REPLACES mafics, Relict and cal-qtz-ser replaced plag and qtz, a little clay (?); faint contact separating a lower CLAST-poor metavolcanic from overlying CLAST-RICH metavolcanic UNIT (DIFF flow flows?)	
36	542.8	6.8		35	15	3		TR		—	Hematite & magnetite	540		
428	547	4.2		20 ↓ 30	TR ↓ 25	1-2		TR			—		Maybe metased or meta-volcaniclastic unit; Similar to last unit, green CHLOR-LT grey sericite, QTZ-calcite; rounded, slightly elongated QTZ-cal pebbles, some evidence for slight rotation of pebbles; small lenses of mag, CHLOR; QTZ eyes become common near lower contact of unit suggesting more of SED origin (meta greywacke?), mag rich near base	
47	559.9	12.9		45 ↓ 20	35 ↓ 55	Tr ↓ 2-3		TR		TR py; at 558, trace Bn	Cubic mag 4%	550	Very fine grained CHLOR-QTZ-PLAG-mag-cal "Hornfels" – very little evidence for long range preferred orientation of grains; QTZ ~ 45%, PLAG ≈ 25% near upper contact; w/ ser & CHLOR increasing near lower contact; maybe some biotite (need T.S.), a thin meta-andesite unit near upper contact AT 446' narrow intrusive ~ 1' thick	Thin Section B-1-54
59.9	579.5	19.6		65 ↓ 35	TR ↓	8 TR $MnCO_3$?		TR		TR Cu_2O?	mag cubes dist ~6%	560, 570	fine grained SER-CHLOR phyllite, <u>NO</u> calcite, Small rounded CLASTS; all is replaced by CHLOR-SER, the CLASTS are slightly richer in CHLOR, some zones appear to be serpentine, calcite only in PLAG sites, a few sm. qtz eyes, maybe a meta-ASH FLOW + slightly stretched "pumiceous" frags, a lot of sugary QTZ; at 557' a thin andesite flow unit ~ 6" thick (~ 10% CHLOR, TR ser, 5% cal); numerous qtz-ser, rounded frags – maybe recrystallized micro-spherulites , Breccia finger w/ Basaltic matrix at , oxidized; CHLORITE pseudomorphically replacing pyroxene, some CHLOR replacing mag; Contact w/ overlying unit shows that upper unit is earlier ∴ upside down sequence; ROCK UNIT is initially meta andesite giving way to more ASH-flow. Baked margin on MH unit, also xenolith of ASH FLOW in andesite, CHLOR in BL green, TR. epidote after PLAG, w/ cal, QTZ . andesite is ~ 6" thick giving way to ASH. RELICT PLAG, Pots of alunite? gypsum? $MnCO_3$ w/ cal in veins (cont'd)	Thin Section B-1;554 Thin Section B-1-560

Footage from	To	Int.	Rec. %	Alteration * CHL	SER	Cal	BIO	EP	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	Log	General Description: Rock Type, Structure, Etc.	Assays
[illegible]9.9	579.5	19.6 (cont.)		65 ↓ 40 ↓ 40 ↓ 40	10 ↓ 25 ↓ 35 ↓ 25	6 ↓ 6 ↓ 6 ↓ 2-3	10	TR … 2-3		TR Cu°	clots of mag-hem	570	argil	CHLOR replacing magnetite, milky, massive appearing CHLOR-pale, assoc w/ QTZ (20%), cal; mixed w/ br. green CHLOR., some clay mineral development near plag and along veinlets of QTZ-cal, at 567' ash flow picks up a few stretched pebbles - look like andesitic frags, (age relationship when compared to other andesites?) a few ghosts of plag phenos, picks up more sericite at 568', w/ more qtz eyes and pinkish calcite (rhodochrosite), see halo on a few plag grains, a few pods of br. green CHLOR. a few lamina of mag-hem ± sulfide cutting through at 572'; a few stretched pumiceous frags gaining more QTZ-plag-frag - alur unoriented, diss. Biotite(?) - black, platey, at 577', fine grained, ragged, assoc w/ chlor. QTZ-cal-CHLOR-mag at 578';	Thinsection B-1-571 incl met grad
579.5	592	12.5		35 ↓ 35 ↓ 35	10 ↓ 25 ↓ 15	1	5 ↓ 10 ↓ 15	TR			Subhedral mag xstals ~1-2%	580		Contact is irregular, no effects of reaction evident, Rock is CHLOR-Bio-plag-QTZ-ser phyllite - porphyritic andesite (?), some round qtz eyes - CHLOR replaces mafic phenos and is in very fine gr. groundmass) Bio is localized along fracs mixed w/ gr. chlorite and disseminated as unoriented flecks,	
592	598	7		15 ↓ 35	25 ↓ 15		15	4-5		TR Cu° in scattered flecks	mag only in xenoliths	590		plag is partially altered to cal-epidote. - groundmass chlorite is lt-grey to black - strip? w/ lenses of br. green CHLOR, local zones (1-2" thick) w/ high qtz eye ± plag; Bio gets richer w/ depth, rare QTZ-cal-CHLOR veinlets - concordant, near lower contact fine plag laths, oriented, somewhat argillized, w/ diss biotite in a talc-appearing matrix (lt green chlorite)	
598	610.2	12.2		15 ↓ 35	45 ↓ 15	TR	15 ↓ 25 ↓ 15	3-4			mag dust	600		upper part is poor in phenos, becoming richer w/ depth Bio-QTZ-CHLOR schist - quite crystalline, w/ QTZ-cal-CHLOR veinlets and stretched plag phenos, epidote localized in plag and along a few veinlets, gives plag a green tinge, many of the phenos are being resorbed due to alteration into matrix (meta andesite), a qtzite pebble (?) - (orange-qtzite) w/ mag, becomes richer in green CHLOR near lower contact	
												610		Bio-ser-QTZ-(CHLOR) phyllite - poorly developed schistocity. fairly equigranular - appears to be replacement of intrusive igneous rock, cal localized in veinlets, oriented plag - dominantly epidote replaced - rock is fine grained - dike? → finer grained near border - chilled? Becomes more Bio-rich also w/ a little plag relicts, br green CHLOR along fracs w/ a little cal, → lower contact shows this unit is later than underlying rock → truncated plag phenos, CHLOR along contact	

Footage From	Footage To	Int.	Rec. %	Alteration* CHL	SER	CAL	BIO	EP	T.S.	Mineralization Ore Min.	Gangue	General Description: Rock Type, Structure, Etc.	Assays
610.2	613	2.8		?	?	10	20	20		tr. Bn	mag DUST	PHENO-RICH andesite porph – plag phenos repl. by cal-ep-CHLOR; v. fine grained groundmass with widely scattered Bio, but generally too fine to recognize others; a couple pods of xstalline calcite	(THIN SECTION B-1-61:
613	614	1		5	?	TR		15				DISS BIOTITE, Mag-hem DUST, CHLOR after hornblende, lightly argillized; REDDISH-BROWN v. fine grained CLOTS (small) - RUTILE (?); a few QTZ eyes, probably another fine-grained dike – felsic	
614	625	11.	–	10 ↓ 10 ↓ 55 ↓ 50	20 ↓ TR ↓ TR ↓ 5	TR ↓ 1-2 ↓ ↓ 1-2	30 ↓ 55 ↓ 20 ↓ 10	5 ↓ 3 ↓ 5		TR Bn ... TR Bn	DISS mag w/CHLOR replacement	Bio-QTZ-CHLOR SCHIST, sparse metacrysts of PLAG, a few pods of calcite &/or chlorite mixed with Biotite, LT grey sericite (STILP?) makes up much of rock, phenos increase w/ depth, Br. green CHLOR assoc w/ calcite in pods & lenses; EPIDOTE Repl. plag phenos and Bio incr, phenos are elongated – meta Andesite porphyry → if a xstal settling phenomena then sequence is upside down; at 618'(3") a very thin unit – phaneritic Dike w/ sharp contact, made up of CHLOR-Bio-ep-QTZ-plag → porphyritic, back in porph andesite, local high pheno accumulations, WITH high BLACK CHLOR content, very fine grained matrix, sericite localized in some of plag phenos, DISS Bio, due to replacement, many of plag phenos are v. faint Calcitic stockwork w/ assoc green CHLOR. and Bio decreases, some pinkish carbonate ($MnCO_3$), Bornite near lower contact assoc w/ calcite, RHODOCROSITE along lower contact, many QTZ-plag frags & phenos near contact.	
625	629.3	4.3		30	25?	5	10	3		—	a few mag xstals	Stringers of calcite, pods of green CHLOR after mafic, DISS and stringer controlled Bio; grey Sericite (STILP?) matrix, Cal-ep-QTZ replaced plag phenos (relict), Bio picks up a little near lower contact, slight argillization	
629.3	641	11.7		40 ↓ 40	—	3-4 ↓ 1-3	3-4 ↓ 20	1-2 ↓ 15		ABUNDANT Cu^0 near u contact, minor Cu_2O	Small xstals of mag in clusters	Cu^0-RICH meta agglomeratic UNIT – soft sed deformation (?) SCHISTOCITY & FRACTURE CONTROLLED Limonite, dominantly br green chlorite w/ a few qtz eyes, lenses of calcite, relict plag (ep-cal), grades down to meta porph andesite, w/ much higher Bio, w/ Cu^0; ABUNDANT gr. CHLORITE, ep-cal after plag in phenos, w/ black chlorite, a few pheno-poor zones, occassional Bio halo around plag phenos (earlier CHLOR halos might Retrograde) Becomes fine grained near lower contact → laminated phenos of underlying unit to later; individual EP grains	

Graphic Log Ft.: 620, 630, 640

CONTINUED

Footage From	Footage To	Int.	Rec. %	Alteration * Chl	Ser	Cal	Bio	Ep	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description — Rock Type, Structure, Etc.	Assays
41	669	30		40 ↓ 35 ↓ 30 ↓ 55 ↓ 10 ↓ 15	— ↓ 10 ↓ — ↓ ↓ 45 ↓ 30	1-2 ↓ 2-3 ↓ 1-2 ↓ 1-2 ↓ 1-2	15 ↓ 15 ↓ 25 ↓ 15 ↓ 25 ↓ 40	25 ↓ 25 ↓ 25 ↓ 5		TR Cu° Cu_2O, Bn TR Bn	1-2% mag	650 660	Irregular contact – chunks of andesite porph in underlying unit over initial 1' of unit → agglomerate, centers of epidote replacement w/in plag phenos, lge lithic frags, a few andesite frags – 2 types porphyritic & aphyric, mostly chlor-ep matrix w/ Bio, a few concentrations of sericite – maybe gneissic frags w/in agglom (?), small "snowflake" plag clusters w/ a few cal-ep-chlor veinlets, possibly some of frags are albite-oligo – plag-rich (similar to propylization); at ~654' lge pebbles of black phyllitic rock w/ local concentrations of 2° biotite w/ brecciated matrix between, also local concentrations of Bio-ep-cal in vicinity of former plag phenos; arkite (arkosic) pebble and porph andesite, fine cal-ep stringers, many of the dark clasts (originally basaltic ?) replaced ~ 10% by biotite; at 661' local high density qtz-cal veining, w/ a biotite-green chlor host rock, becomes more Bio-ser rich at 665', w/ sm pods of cal-sericite-biotite → mini pegmatite? Depositional contact between 2 agglomerate units at 669', lower contact of this unit is very fine grained muds – chem seds? underlying unit is older (truncated clasts)	THIN SECTION 3-1-6.
669	693			25 ↓ 10 ↓ 10 ↓ 20 ↓ 30	10 ↓ 15 ↓ 25 ↓ 10 ↓ 25	1-2 1-2 3-4	30 ↓ 55 ↓ 45 ↓ 45 ↓ 30	10 ↓ 2-3 ↓ 15 ↓ 10		TR Bn	a few scattered mag xtals	670 680		
												690	initially fine grained qtz-Bio-chlor-ep-cal phyllite – poor schistocity – very fine gr. Bio & ser (?), well recrystallized, a few small cal veinlets w/ mixed qtz → biotite schist agglomerate – little ep – nothing available for it to replace, occasionally in veins; chlor incr about 178', a few ep blebs & qtz eyes, at 681' a thin lens 2-3" of meta seds high in sericite w/ diss Bio; then back to meta agglomerate rich in Bio-chlor-qtz, ep replacing plag and in ore veinlets, a lot of qtz & sericite in matrix between frags, a few lge frags of andesite porph in agglomerate (693)	

Footage From	To	Int.	Rec. %	Alteration * CHL	SER	Cal	Bio	EP	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.		General Description: Rock Type, Structure, Etc.	Assays				
69	723.8	59.8		15 ↓ 10 ↓ 10 ↓ TR ↓ 10 ↓ 35 ↓ 1.0	5 ↓ 20 ↓ 5 ↓ 40 ↓ 10 ↓ 5 ↓ 15	3 ↓ 1-2 ↓ 3-4 ↓ 1 ↓ 3 ↓ 2	45 ↓ 45 ↓ 45 ↓ 10 ↓ 35 ↓ 15 ↓ 45	10 ↓ 5 ↓ 1-2 — 5 ↓ 1-2		TR Cu° TR Ba, Po Tr Ba, Po in foliation	Scattered widely mag crystals	700 710 720	fault	at 694' – a weird platey reddish-brown mineral, assoc w/ Bio-ep-cap-qtz (Hematite?), a few qtz eyes, in a dominantly Bio-ser-chlor schist w/ Epidote with qtz-cal concentrations in a few clasts, occassionally loses much of schistose character when qtz content increases; at 708' a light grey ser-qtz hornfels (just not very schistose) - stilpnomelane Between 709'-711' → qtz-chlor-cal shear zone - oxidized - retrograde mct → chlor after Bio, local silicification around shear into wall rock - cuts meta-andesite region of agglomerate, goes back to Bio-chlor. meta agglomerate, ep. replaces plag in andesite phenos - dominantly a mix of qtz, fine lt grey bio-stilp? & larger Bio flakes, a few small pods of cal-qtz and green chlor stringers, a couple thin (2-3") interbedded porph andesite units near lower contact, stringer zone of qtz-hem-limonite veinlets, a little $MnCO_3$, and clay, goes back to Bio-qtz schist with conjugate shears filled w/ calcite and sericite replacing plag (?)					
238	728.8	5		5	25	2-3	15				mag dust			meta-ashflow (?) - Sharp contact with a Hematite band; Variegated brown-grey-tan qtz-sericite,-Biotite, minor chlor, a few widely scattered qtz eyes, a few scattered red, qtz-rich pebbles, calcite pods; figures of intrusive dike (?) at 725', a few plag phenos in units at middle of section, becomes more qtzitic with depth - v. fine grained; v. faint contact with underlying unit - pebbles more numerous near contact.					
288	758.3	29.5		10 ↓ 5 ↓ 5	10 ↓ 25 ↓ 10	2-3	20 ↓ 20 ↓ 25				Sm pod-like concentrations of mag	730 740		meta-agglomerate - stretched pebbles, v. fine grained Biotite, and couple fresh-looking plag laths, chlor in foliation planes; dominantly qtz; stringer cal. chlor also diss as v. small flecks within qtz-Bio matrix, local increases of sericite at 735' limonite & chlorite along fractures, a few small qtz eyes, clasts of pumiceous material (?) - stretched w/ high calcite					
740'																			

Footage From	To	Int.	ec. %	Alteration * Chl	Ser	Cal	Bio	EP	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
(740)	758.3			2-3 ↓ 15 ↓ 20 ↓ 10	40 ↓ 30 ↓ 25 ↓ 15	1 ↓ 2	20 ↓ 15 ↓ 25 ↓ 25				mag DUST, DUST & widely scattered mag Xstals	750	at 740' ser. increases, w/ QTZ eyes cal in stringers, w/ chlor halos - most of sericite is light grey (STILP?), stretched clasts become widely dispersed, but matrix remains fairly constant ∴ same unit, ~750' CHLOR increases a bit but still is QTZ-SER RICH; Becomes Banded - Lamina of Bio, ser, fine qtz, sm pods QTZ-Cal; at 753.7' a thin shear zone - QTZ. filled, and Border Brown-gr Biotite; W/ Bio - CHLOR-SER SCHIST. Further down, more silicified near lower contact	
758.3	770.2	11.9		TR ↓ 10 ↓ 10	20 ↓ 20 ↓ 10	1 ↓ 1	— ↓ 15 ↓ 50	TR -			mag grains ~1-2% mag incr to 4% - octahedra	760	Upper QTZ-feldspar-ser gneiss (?) WITH local clots of mag grains, no Bio, CHLOR (after SEDS ?), locally sericite get fairly coarse. a few pink qtzite pebbles w/ a few cal stringers, mag clusters, and diss, CHL follows a few of stringers, picks up a volcanogenic component w/ qtzite ~761', - Salmon pink, - volcanic frags are qtz-rich w/ Lt grey sericite - OXIDIZED zone - Limonite on all fractures. - Becomes Richer in Biotite ~764', w/ assoc LT. grey sericite, calcite after plag & in fracs, Rare QTZ eyes, - pink, acicular xstals, fizz → zeolite (?), and Bio is altered to chlor by oxidation near lower contact	THIN SECTION B-1-7
770.2	803	32.8		5 ↓ 15 ↓ 5	20 ↓ 10 ↓ 20 ↓ 5	1 ↓ 2 ↓ 2-3	20 ↓ 20 ↓ 30	— ↓ 2-3		tr Po in foliation Hem or CuSO assoc 2" Band of Cp at 788'	mag grains 1-2%	770 780		
	783												QTZ- Bio- Ser schist, (meta andesite), some Retrograde CHLORITE, trace cal except in a few scattered wisps; locally OXIDIZED zones altering Bio to chlor, a few autolithic frags within meta-andesite, local qtz eye concentration (2-3" thick) (Looks like Bird's Eye Porph), some coarser Bio flakes along foliation & stringer zones, Carbonate assoc w/ QTZ eyes - Both Cal & Rhodo - qtz eyes in v. fine grained mag - bio - CHLOR ZONE w/ a few relict plag & mafic-crysts, CHLOR picks up at 776', w/ epidote Replacing plag partially, a little cal-stockwork w/ Coarser Bio around veinlets & Rare SULFIDES, occasionally a "depletion" halo around stock. work. Lt grey sericite picks up ~781'; and picks up more porphyritic AUTOLITHS(?) between 779-783; Higher Biotite in these areas	

Footage From	To	Int.	Rec. %	Alteration* CHL	SER	Cal	BIO	EP	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
783	799	32.8		TR ↓ TR ↓ 25	10 ↓ 35 ↓ 15 ↓ 5	TR ↓ 3 ↓ 5	30 ↓ 10 ↓ 35 ↓ 30	—		TR Po w/ assoc CuO	mag & hem in small clots	790	QTZ-BIOTITE SCHIST, lamina of QTZ-cal (concordant veinlets) locally oxidized, minor sericite, chlor is trace amts, occasional pebbles of felsic volcanic — Rounded and partly assimilated grain boundary. Small pods of coarse Bio set in a light grey QTZ-fine Bio-qtz-ser matrix w/ diss mag texture appears to be possible relict sedimentary, local high ser concentrations - looks sugary; the trace chlor is all Bright green (late) variety, a few cal stringers and reddish qtz-Bio-Hem? pebbles, Biotite is both dk black-brown and greenish (stilpnomelane?) in color, a few small qtz eyes, near lower contact picks up more chlor, loses ser; chlor is bluish-green, w/ assoc Bio and zones of high carbonate, Becomes somewhat agglomeratic	
799	803	4		5	20	3-4	25			trace Po	mag dust	800	meta andesite (?) porphyry w/ replaced phenos of cal-qtz locally hematite stained. - Cal is after qtz as indicated by replacement textures set in fine grained Bio-qtz-Lt grey ser (stilp?) matrix, bright green chlor assoc w/ cal pods → (this may be pebble conglomerate), sharp contact w/ underlying unit	
803	807.5	4.5		25	5	1-2	35			TR Cu°			pebble conglomerate or agglomerate (?) Some pebbles have fine-grained Biotite reaction rims, but generally appears to have a sedimentary character, lightly mottled (oxidation) w/ coarser Bio-QTZ-cal-chlor. Cal is mostly in thin lamina w/in foliation; Locally become v. qtz rich (? meta graywacke?)	
807.5	809	1.5		15	—	1-2	40					810	meta andesite porphyry (or conglomeratic unit?) stretched qtz-cal rich pebbles in a chlor-Bio-qtz matrix, w/ interbedded fine grained Bio-qtz units, cal stockwork, QTZ phenos; bl green chlor assoc w/ calcite pods, sharp lower contact, a few pods of coarse Biotite	

CONTINUED

Footage From	Footage To	Int.	Rec. %	Alteration* Chl	Ser	Cal	Bio	Ksp	T.S.	Ore Min.	Gangue
809	810.1	1.1		5	–	1-2	35	–		Po	mag DIST
810.1	821.5	11.4		20 ↓ 15 ↓ 5 ↓ 5	5 ↓ – ↓ 10 ↓ 15	TR ↓ TR	25 ↓ 40 ↓ 40 ↓ 30	5 ↓ 5 ↓ 1-2		TR Po, Cp -Po Rimming mag grain ~1% Po	DISS mag
821.5	825.5	4		5	40	5	25			TR Po	
825.4	830	4.6		15 ↓ 30	40 ↓ 15	3 ↓ 1-2	10 ↓ 10	1-2		TR Po	Hem after mag in CLASTS

Graphic Log Ft.: 810, 820, 830

General Description — Rock Type, Structure, Etc.

BASAL part is fairly high Po, coarse Biotite, fine QTZ-BIO matrix, minor BR green CHLOR a few interBEDS of fine grain QTZ-BIO UNITS (SILT-STONES?), Locally CHLOR RICH Near fine grained units (20%). QTZ eyes w/ Biotite halo, STRUCTURES from underlying unit are truncated; right-SIDE UP.

meta-agglomerate BIO-CHLOR-QTZ, coarse Bio set in fine qtz, Bio-CHLOR, EPIDOTE RIMS around some of Po grains and replacing feldspar, local zones of v. fine grain BIO-qtz w/ trace cal, Br. green CHLOR sheath around cal pods, also local CHLOR-ep. lamina, Po lens and diss. twinned plag replaced by cal-ep., BLEB of Cp at 815' and rock is more BIO RICH, "pinkish" qtz, 1" thick Breccia zone w/ intrusive Dike material as matrix at 816' then continues with Bio-QTZ-Kspar (?) (pink granular); w/ lt grey sericite (STILP?) minor CHLOR, partly replaced plag laths (ep-cal-CHLOR on borders), pebbles RICH in CHLOR (prob andesite) - Becomes quite pebbly, w/ some QTZ eyes, some retrograde CHLOR replacing Bio, local oxidation zones turning QTZ, cal orange; BLUISH-grey v. fine grained MUD? unit ~ 1/4" thick at lower contact

finer grained agglomeratic UNIT, little Bio, mostly grey sericite, numerous pods of cal, tr ep after plag, Narrow Breccia zone ~ 3" thick at 822', Rock predominantly iron stained QTZ w/ CHLOR, cal - fairly late event - cuts off limonite fracts from older unit, CLASTS of porph andesite - Bio RICH, BIO follows fractures in Rock (coarse) w/ v. fine Bio Repl. CLASTS, qtz-RICH at Base, SHARP contact - possibly texture Truncated by underlying unit

pods/lenses of calcite in unoxidized fine grain qtz grey ser, CHLOR BIO SCHIST w/ a few QTZ eyes (gr. CHLOR halo around cal), LOCALIZED BIO-RICH zones. Pink carBonate ($MnCO_3$?), QTZ eyes ep after PLAG, texture more CLASTIC w/ depth, LOCAL effretting, volcanic conglomerate, High CHLOR, [illegible] BIO

Assays				

BROMIDE PROJECT DDH-B-2

SUMMARY:
Drillhole B-2 of the Bromide, N.M. project penetrates metavolcanics, metasediments and intrusive igneous phases similar to those of DDH B-1. However, the rock units intersected generally have been metamorphosed to a slightly greater degree than those observed in the previous drillhole. The greater abundance of biotite and epidote in the metamorphic mineral assemblages near the surface, along with the possible occurrence of garnet at greater depths are evidence of this effect.

The sulfide mineral assemblage is similar to that of DDH B-1 (phrrhotite, pyrite, chalcopyrite, bornite) with the exception that a new mineral, possibly niccolite (NiAs), was observed in association with pyrrhotite near the bottom of the hole. In addition, framboidal pyrrhotite was observed on several fractures and foliation surfaces, suggesting biogenic activity following the metamorphic event(s). The oxide ore mineral assemblage consists almost exclusively of native copper; cuprite was observed only once.

New structural features were observed to corroborate suggestions made in the report for DDH-B-1. Overturned isoclinal drag folds were noted in shallow portions of the drill core to support the regional structural picture constructed from evidences of overturning in DDH B-1 core. Another fracture seen in sawed core sections was a lineation of the platey minerals that is not only at an angle to the primary bedding foliation, but also varies in its orientation down the hole. It has been interpretted from those features that another system of folds may be superimposed on the earlier set, not distorting the first, but rather occurring as a response to the closer proximity of these rock units to an intrusive body.

ROCK UNITS
A variety of metamorphosed volcanic, volcanoclastic and sedimentary rocks are observable down DDH B-2, along with later unmetamorphosed igneous intrusive units. The greatest volume of rock is composed

of meta-agglomeratic units and andesitic units. Porphyritic flow phases and intrusive phases are also present, and those such as ones occurring at 355-363 feet or 395-400 feet appear to correlatable to similar rocks in DDH B-1. Intervals from 390-395 feet and 525-560 feet are fragmental in character, of felsic nature, and may be rock units termed "millrock."

Other rock types making up significant, but lesser portions of the section in this area are ash flows and greywackes, both metamorphosed, as well as later dikes (Lamprophres) and fresh biotite diorite intrusive at 1113-1131 feet.

SILICATE MINERAL ASSEMBLAGES

The mineral assemblages which dominate the length of DDH B-2 are: 1.) biotite-chlorite-sericite, 2.) biotite-sericite-epidote, and 3.) biotite-chlorite-epidote, although short intervals in which any two of chlorite, sericite, epidote, or biotite co-exist exclusively were noted. One interval exceptionally rich in chlorite resulting from the retrograde metamorphism of biotite has been recorded at 930-1040 feet. Between 1180 and 1185 feet a very fine-grained metamorphic mineral resembling garnet was observed. Petrographic study would be needed to confirm the identity of this red mineral.

Table 1 lists the dominant minerals present in various intervals down the hole. Greater description of the mineral relationships are available in the DDH B-1 core-logging report.

ORE MINERAL ASSEMBLAGES

Sulfide. Pyrite, pyrrhotite, bornite, and chalcopyrite are the most commonly observed sulfide minerals seen in the B-2 drill core. Generally, pyrrhotite and bornite are the most common of the group and usually co-exist. The fact that those, rather than pyrite-chalcopyrite as in B-1, are the most common may be due to the higher metamorphic grade developed in the B-2 core.

TABLE 1.

Footage	Mineral Assemblage
66-124	Chlorite-sericite-epidote
124-288	Biotite-sericite-chlorite
288-338	Chlorite-sericite-epidote
338-349	Chlorite-sericite
349-365	Sericite-biotite-epidote-(chlori
365-471	Chlorite-sericite-biotite
471-496	Chlorite-sericite-biotite
496-530	Chlorite-sericite-biotite
530-612	Sericite-biotite-epidote
612-621	Biotite-chlorite-epidote
621-693	Biotite-sericite-biotite-epidote
693-705	Chlorite-sericite-biotite-epidot
705-726	Biotite-sericite-epidote
726-730	Biotite-chlorite-epidote
730-855	Biotite-sericite-epidote
855-860	Chlorite-biotite-epidote
860-864	Chlorite-sericite-epidote-biotit
864-873	Sericite-epidote-biotite
873-876	Biotite-sericite-epidote
876-878	Chlorite-sericite-biotite
878-915	Biotite-sericite-epidote
915-920	Biotite-sericite-chlorite-epidot
920-930	Biotite-sericite-epidote
930-933	Chlorite-sericite-epidote-biotit
933-1018	Chlorite-epidote
1018-1026	Chlorite-sericite-epidote
1026-1027	Chlorite-epidote
1027-1036	Biotite-chlorite-epidote
1036-1060	Chlorite-sericite-epidote-biotit
1060-1072	Biotite-chlorite-epidote
1072-1075	Chlorite-epidote
1075-1085	Chlorite-epidote-biotite
1085-1100	Chlorite-biotite
1100-1104	Sericite-biotite-epidote

TABLE 1. (Cont'd)

Footage	Mineral Assemblage
1104-1113	Biotite-chlorite-sericite-epidote
1113-1130	Chlorite-biotite
1130-1160	Biotite
1160-1165	Biotite-chlorite-epidote
1165-1178	Chlorite-sericite-epidote-biotite
1178-1190	Biotite-sericite-chlorite
1190-1223	Biotite-sericite
1223-1226	Biotite-chlorite
1226-1250	Biotite-sericite-epidote
1250-1256	Biotite-epidote
1256-1270	Biotite-chlorite-sericite
1270-1277	Biotite-sericite-epidote
1277-1295	Biotite-sericite-chlorite
1295-1299	Biotite

The interval with the highest total sulfide content observed was from 1030 to 1072 feet.

At 1146 feet a new mineral was first noted which has been tentatively identified as niccolite (NiAs), based on its association with pyrrhotite and its observed physical characteristics. It was found in assay reports that the interval containing the mineral had ten times the concentration of Ni than the general nickel background concentration of less than 10 ppm.

Framboids of pyrrhotite were also observed in the drill core from deeper portions of the hole. These later-formed concentrations of iron sulfide occur on fracture and foliation surfaces and imply a biogenic input for the reduction of sulfur and sulfide crystallization. Another unusual morphogical feature of some of the sulfide minerals includes euhedral and subhedral pyrite cubes 1/8 to 1/4 inches on an edge disseminated in a meta-agglomeratic unit from 951 to 1006 feet. These are probably also late in the paragenetic sequence.

Oxide native copper is by far is the major secondary oxide mineral, with traces of cuprite present only at one point. The copper is present in small amounts on fracture and foliation surfaces near the top of the drillhole. Higher concentrations are localized at 260 and 340 feet, and probably marks the position of earlier water tables. The last evidence of native copper is at about 500 feet.

STRUCTURAL FEATURES

Down DDH B-2 there were not so many top and bottom indicators as were observed in DDH B-1, possibly a result of the slightly higher metamorphic grade. However, two features were noted indicating structural complexity at Bromide.

Very small (about 1-2" amplitude, 1" wavelength) scale overturned, isoclinal drag folds were observed at 101 feet and 339 feet. These microfolds have an orientation similar to that proposed from evidence in DDh B-1. Since minor structures often times reflect regional trends, these small folds <u>may</u> aid in the understanding of the Bromide area.

In sawed sections of the core, in addition to the original bedding plane foliation, it became apparent that a second, less visible, preferred orientation of platey minerals exists. The lineation of biotite, and occasionally chlorite, that does not coincide with bedding surfaces suggests a later, minor folding event, possibly associated with the intrusion of igneous materials nearby.

A graphic explanation of this feature is shown in cartoon form in Figure 1. The interval of concern is between 422 and 425 feet. Because the vast majority of the core below this level is split rather than sawed, continuous monitoring of changes in this L2 lineation could not be accomplished. However, again at 1181 feet L1 and L2 were observed.

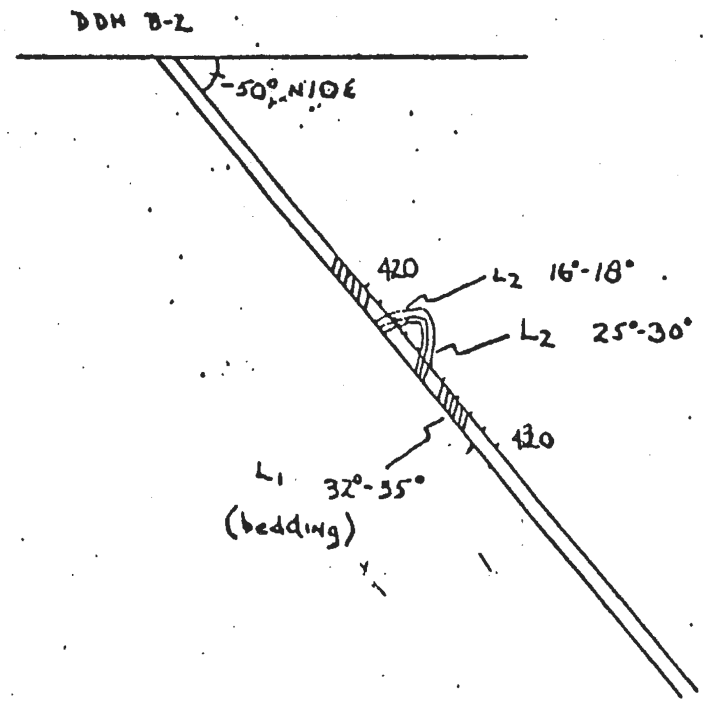


Figure 1.

—— L1
...... L2

R.W.S.
18 June 1978

U.S. BORAX DIAMOND DRILL LOG

EXPLORATION – Detailed Alteration Log

HOLE SURVEY

Footage	Bearing	Inclination

Property: BROMIDE
Hole No.: B-2
Location: Rio Arriba, N.M.
Total Depth: 1299 ft.
Date Started:
Collar Elevation: ~97
Date Completed:
Incl. & Bearing: -50°,
Logged By: RWS
Core Size: NX

Footage From	Footage To	Int.	Rec. %	Alteration* CHLR	Alteration* SER	Alteration* EP	Alteration* Bio	Alteration* cal	Mineralization T.S.	Mineralization Ore Min.	Mineralization Gangue	Graphic Log Ft.	Graphic Log	General Description: Rock Type, Structure, Etc.	Assays				
0	10	10										0–10	X	SET SURFACE PIPE; HAMMER DRILLED TO 66 feet					
10				30	70							10–20		OXIDIZED, SERICITE-CHLORITE-magnetite SCHIST, magnetite is generally granular, euhedral to subhedral, some is LIMONITIZED and LOCALIZED in CHLORITE-RICH ZONES, BOTH Bright green hydrothermal and black metamorphic chlorite, sericite is v. white – possibly meta sediment as NO EVIDENCE for former phenocrysts, etc. CHLORITE BECOMES MORE DOMINANT WITH DEPTH, A LITTLE hematite pseudomorphic after magnetite					
												20–30							
												30–40							
				40	60							40–50							

Footage From	Footage To	Int.	Rec. %	Alteration * CHL	Ser	EP	Bio	cal	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	Log	General Description Rock Type, Structure, Etc.	Assays
	66											60		Becomes more "talc-like" in appearance	
66	86	20		45 ↓ 40 ↓ 50	5 ↓ 15 ↓ 5	10 ↓ 10 ↓ 5	↓ 2 ↓ 10	5 ↓ 4 ↓ 4		diss Cu°, fine plates	minor mag, some replaced by hem. ~5% mag	70, 80		interlayered porphyritic andesite and fine-grained equigranular volcanic flow material Dominantly chlorite-epidote w/ calcite replacing plag w/ epidote, limonitic veinlets, a few lge calcite pods - most are concordant. w/ hydrothermal chlorite halo, minor sericite, a few qtz eyes - phenos become v. elongated -at 69' metamorphic Biotite, finely disseminated within chlorite-sericite-epidote schist picking up in abundance w/ depth, 1 small xenolith at 71', and becoming Agglomeratic for about 2 foot interval, then back to porphyritic andesite w/ cal. stringers - clasts are usually sericite rich - along calcite stringers - chlorite, and Biotite increases (78'), Cu° assoc w/ porph andesite usually w/ magnetite within agglomeratic clasts most plag is completely cal-ep replaced, very hematite-rich at ~85' and becomes Agglomeratic	
86	88			35	25	5		15			Hematite				
88	99.4	11.4		40 ↓ 45	15 ↓ 10	10 ↓ 7	10 ↓ 15	5		streaks of Cu°	mag-hem ~10%	90, 100			
														FAULT ZONE, quartz-calcite-limonite, high sericite and hydrothermal chlorite w/ epidote	
														finely laminated chlor-bio-ser-ep schist w/ relict flow structure, interlayering of porphyritic and equigranular units ~1" thick, solution voids where pyrite has been oxidized. a few QTZ eyes concordant calcite stringers, locally Biotite is fairly coarse, significant hydrothermal chlorite chlor-ep after plag, a few sericite laminae	

Footage From	Footage To	Int.	Rec. %	Alteration * CHL	SER	EP	Bio	cal	Mineralization T.S.	Ore Min.	Gangue
99.4	102	2.6		50	5	15	3	5			mag octahedra and DUST
102	105	3		30	45	5	TR	3			~2% euhedral magnetite
105	112.5	7.5		20 ↓ 10 ↓ 20	35 ↓ 55 ↓ 35	2 ↓ 2 ↓ 1	—	4 ↓ 8		—	5% magnetite
112.5	124.2	11.7		40 ↓ 55 ↓ 15 / 15	25 ↓ 15 ↓ 45 / 45	— / — / — / —	1 / TR / 2	3 / 5 / 5		Nat Cu°	magnetite DUST; coarser mag
124.2	138.5	14.3	1	5 ↓ 5	55 ↓ 35	— ↓ 1-2	15 ↓ 30	1-2 ↓ 1-2		tr Nat Cu	Diss fine mag
139	~~139~~										

Graphic Log Ft.: 110; ΔΔΔ; 120; Agg.; 130; Agg.

General Description — Rock Type, Structure, Etc.

V. faint CONTACT, PORPHYRITIC CHLOR-SER-mag-calcite SCHIST, Limonite probably after pyrite along foliation, minor imbricate thrust faulting (WRT core the fault's dip 40°-50° ∴ v. low angle faults WRT HORIZONTAL) some rekotallized chlorite - hydrothermal. Locally high concentrations of sericite → Isoclinal-microfolds, truncated by later faulting at 101'

SERICITE-CHLORITE-magnetite-calcite SCHIST locally rich in either sericite OR CHLORITE RICH, Some metamorphic BIOTITE going to vermiculite and Fe-oxide after pyrite (?), Becomes more CHLORITE RICH w/ depth

magnetitiferous, porphyritic Latite (?) - MUCH QTZ, 2ndary CHLORITE, SERICITE, Hematite veining, ZONED plagioclase → possibly an ASH FLOW, Becomes more sericitic w/ Depth picks up pink Barite (?) pods assoc w/ calcite near lower contact (111) w/ lenses of br. green CHLOR. and becomes more QTZ RICH near base, also magnetite lenses and generally coarser overall.

meta-agglomerate, CHLORITE-SERICITE-QUARTZ WITH Minor BIOTITE, a few qtz eyes, relict plag replaced by sericite & Calcite, stretched pebbles Limonite along foliation planes and in pods, Hydrothermal chlorite along fractures, at 116' Local BRECCIATION with higher chlorite content - completely rotated fragments, healed by cal. v. finely laminated, becomes sericitic again after shearing w/ higher magnetite, Native Cu at 119.5', w/ cal & sericite pods, Lge andesitic CLAST at 121', with higher CHLORITE locally.

grey, fine grained Bio-sericite SCHIST w/ magnetite, scattered plag phenos replaced lightly by SER & Cal., a few concordant calcite stringers, a couple v. thin (3") intervals of Agglomerate at 127', 132'. Local Hydro chlorite along cal stringers, minor epidote in plag sites, near lower contact picks up a few more sericitized plag

Breccia of intrusive frags; some w/ graphic texture Light epidote alteration of plag, Kspar Rims on mag - INTRUSIVE DIKELET?

Footage From	Footage To	Int.	Rec. %	Alteration * CHL	SER	EP	BIO	Cal	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
													Lens of metasediments(?), clastic appearing qtz-feldspar w/ chlorite (lithic tuff?) a few pods & stringers of cal-qtz-chlor trace Bio, esp near lower contact	
139	140	1		15	25	—	1	3		TR Bn		140	meta-agglomerate - biotite-sericite- minor chlorite, a few plag & qtz clusters. Stretched pebbles, locally disrupted by small scale faulting, oriented sericite pseudomorphs after plag., pods of cal-qtz	
140	143.5	3.5		5	55	—	20	5		TR cuprite on fracs	mag dust			
143.5	166	22.5		5 ↓ 15 ↓ 5	40 ↓ 35 ↓ 30	—	15 ↓ 15 ↓ 25	5 ↓ 3 ↓ 3		Tr Cu°	Mag dust w/ pods of fine mag too; mag octahedra	150, 160	Bio-Ser-Qtz-plag w/ minor chlor and cal pods, small lense of ashflow at 144.5' - a different meta-agglomerate, biotite is localized along foliation planes, cal stringers and sparsely disseminated, becomes pebble-rich after a few feet with more chlorite and limonite staining locally. a few mag pods - truncated plag along bedding ⇒ upside down - a few small pods of hydrothermal chlor w/ calcite, some chlor after mag. Bio get somewhat coarser. By 156' pebbles become abundant with higher biotite, localized in matrix, 2" ash unit at 158.6'; w/ small frags of agglom w/in ∴ upside down w/ qtz eyes, goes back to agglomerate then w/ greater crystallinity, hydrothermal chlor assoc w/ cal pods & strings.	
166	174.2	8.2		5 ↓ 30	50 ↓ 25	—	10 ↓ 15	+		Diss Cu° in oxidized zone 173' to 174		170	meta dacite or latite - high ser-bio w/ scattered plag phenos, qtz-cal-chlor pods, some secondary Bio replacing plag. Local normal faulting w/ 1/4" offsets, becomes more mafic w/ depth → Andesite? more Bio mag, chlor - inverted volc. sequence, Cu° 173' followed by fine-grained zone w/ high Bio.	
174.2	175.5	1.3		10	35	4	10	2		Cu°	High mag			
	1[illegible]	[illegible].2										180	Bio-epidote-chlor-ser-plag, most chlor is hydrothermal, andesitic porphyry (?) abundant Cu°, cal-ser after plag, a few cal pods w/ chlor halo, stringers, less Bio near lower contact	

Footage From	Footage To	Int.	Rec. %	Alteration * CHL	SER	EP	BIO	cal	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
175.5	180.5	5		5	50	tr	15			Cu°	mag dust & xstals	180	fine grained Bio-Ser-Qtz-plag; tr cp. Some lge pebbles set in oxidized matrix, Cu° along foliation planes, a few cal pods and stringers → Cu mostly in oxidized portions (limonitic stain), chlorite becomes coarse, Bio is v. fine grained in matrix	
180.5	191.5			tr ↓ 10	45 ↓ 40	—	7 ↓ 7	1 ↓ 4			scattered mag	190	finely laminated (due to metamorphism) meta agglomerate w/ scattered stretched pebbles mostly qtz-sericite-biotite-magnetite v. sparse limonite clots probably after pyrite a few cal-chlor pods, locally lightly oxidized to give lt. green tinge w/ higher carbonate and chlorite, a few small qtz eyes. Lower contact is oxidized, sericite rich, local small offset (normal) in foliation small frag of higher unit set in lower unit as xenolith & upside down.	
191.5	195.1	3.6		5	45	—	15	7		tr Bn	sm mag xtals		QTZ-Ser-Bio-cal schist, v. minor chlorite. Regular, small QTZ-cal pods occassionally w/ 2° chlor, local cal pseudomorphs of plag (oxidized at base)	
195.1	201	4.9		20 ↓ 40	35 ↓ 15	—	3 ↓ 8	2		Cu°		200	highly contorted agglomerate w/ andesitic matrix having v. small white plag phenos., hyh chlor, cal, QTZ, ser a few cal pods, trace Bio., miny grasers, Bio. increases w/ depth, some hydrothermal chlor, sericite occurs as wisps of golden colored bands, minor isoclinal structures a few scattered stretched pebbles.	
201	203	2		5	40	—	12	2		tr Bn	mag dust		QTZ-Ser schist w/ minor chlor, a QTZ-mag veinlet. Bio localized near veinlet hydrothermal chlor, v. few scattered plag & QTZ phenos, local oxidized zones, stretched sericited plag phenos.	

Footage From	To	Int.	Rec. %	Alteration * CHL	SER	EP	Bio	Cal	Mineralization T.S.	Ore Min.	Gangue	General Description Rock Type, Structure, Etc.	Assays
203	211.4	8.4		25 ↓ 15 ↓ 15	30 ↓ 60 ↓ 30	—	5 ↓ 7 ↓ 7	3 ↓ 3 ↓ 3		Cu°	mag DUST	Laminated QTZ-SER-BIO SCHIST w/ mag & Hydrothermal CHLOR, a few CLASTS OF CHLORITIC material (metamorphic), Calcite veinlet parallel WITH foliation w/ HYDRO. CHLOR halo and outer BIOTITE, ~207' Becomes v. pebbly agglomeratic w/ RHYOLITIC(?) frags - sericite rich and QTZ eyes - Agglomerate	
211.4	212.8	1.4		5	35		2	2				QTZ-SER-mag ASHFLOW (?) minor CHLOR locally Limonite Stain, minor Bio,	
212.8	214.3	1.5		.75	TR	5	2	3			few xstals		
214.3	216			15 ↓	45 ↓	—	4	2		Cu°	lge clots & mag DUST	SHARP CONTACT, Underlying unit is younger Porphyritic andesite DIKE. - CHLOR - QTZ - cal - minor BIO, Scattered lge mag XSTALS a few epidote rich lenses, Becomes fine-grained equigranular in center	
216	219	mis	latc	hing									
219	226	11.7	8.7 / 11.7	10	55		2	3			~8%		
226	241	15		65 ↓ 50	5 ↓ 20 ↓ 20	– ↓ 1 ↓ 1	4 ↓ 2 ↓ 2	3 ↓ 2		TR Cu°	v minor Hematite	Resume agglomerate - ASHFLOW, High sericite, SPLOTCHY Biotite, minor CHLOR, local Limonite STAIN, CLASTS set in high sericite matrix. gives way to meta-sediments Sericite-CHLORITE-qtz SCHIST w/ Mag. small hydrothermal cal-CHLOR Pods, few in number. Bio increases toward BASE of unit, As DOES magnetite WHILE Sericite becomes coarser.	
241	259	18		55 ↓ 15 ↓ 45	15 ↓ 40 ↓ 10	— —	12 ↓ 2 ↓ 5	1 ↓ 5 ↓ 3		trace Pyrite (Po?)	subhedral mag xstals and mag DUST	Meta-andesite - high CHLOR - Cal - Bio - qtz with Limonite veinlets, minor sericite, Both coarse Hydrothermal & metamorphic CHLOR picks up a little epidote at 229' w/ more sericite, few plag Xstals w/ Bio localized in zones, trace Cu° in high sericite zone, contact shows underlying unit is earlier	
												fine-grained CHLOR-BIO, w/ cal veinlets and small clusters of grains, minor Hydrothermal Chlorite assoc w/ cal., Biotite is oriented parallel w/ foliation, becomes sericitic w/ more qtz and calcite at 247' w/ more hydrothermal CHLOR, then goes back to condition as before, minor serpentine ASSOC w/ QTZ xenoliths w/ Locally coarse sericite nearby; coexisting Pyrite w/ Mag ∴ Finally below oxidation zone Rutile? needles in QTZ phenos, Ser & CHLOR is coarser (recrystallized?) near lower contact	

Graphic Log Ft.: 210, 220, 230, 240, 250, 260

Footage From	To	Int.	Rec. %	Alteration * Chl	Ser	Ep	Bio	Cal	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
													meta sedimentite – ARKOSIC ? – PINK FELDSPAR qtz, CHLOR, (serpentine OR TALC) minor calcite pods w/ CHLOR RIMS, v. minor Biotite – CHLORITIZED locally, sericite INCREASES w/ DEPTH, ROTATED QTZ grains and incr. carbonate	
259	263	4		15 → 5	5 → 45	–	2 → 2	1 → 4	1	TR Cu° ASSOC w/ CHLORITE	minor mag-hem	260	greywacke (?) meta-sediment, more chloritic and limonitic material, dominantly qtz, chlorite, sericite, magnetite, plagioclase occassional pure chlorite lenses, magnetite Rind around rounded QTZ grains – replacement no real preferred orientation to grains, local zones w/ much limonite; truncated grains along bedding → inverted, also graded bedding supports this, rare QTZ pods, at 275' hydrothermal chlor & coarser sericite, often forming rims around plag at 282' rare Bio mixed w/ sericite and chlor becomes recrystallized, ~~truncated~~ Bedding, right-side-up – evidence of 2 deformational episodes, one prior to deposition of overlying unit, biotite around hematite grains, small qtz-ser pods with high magnetite, near lower contact chlorite increases	
263	288	25		25 → 20 35	10 → 20 15	– TR –	– TR –	3 → 3 4		TR Cu°	rounded mag-hem ~5%	270 280		
288	300	12		40 → 60 → 20	10 → 5 → 35	5 → 5 → 1	– –	5 → 3 → 3		TR Py, Bn	magnetite ~2%	290 300	meta-andesite porphyry – CHLORITE RICH w/ ASSOC pods of cal. Hydrothermal CHLOR plag is locally epidotized; becomes slightly brecciated w/ CHLORITE matrix holding frags together – NOT MUCH ROTATION, w/ TRACE ASSOC SULFIDES → CRACKLE ZONE?? high sericite [illegible] increased Chlor & ep become more pervasive, once out of pervasive CHLOR, no more "crackling" and sericite increases, plag is fresher MOST OF CHLORITE is hydrothermal and sheaths cal veinlets, get trace biotite at ~296'	

Footage From	To	Int.	Rec. %	Alteration * CHL	SER	EP	Bio	cal	Mineralization T.S.	Ore Min.	Gangue
300	306.5	6.5		20	30	10	5	4		trace Cu°	magnetite xtals & DUST
306.5	310.2	3.7		45				15			Hem after mag
310.2	317.5	7.3		10 ↓ 30 ↓ 15	45 ↓ 20 ↓ 35	— 4	TR	3			
317.5	319	1.5		—	45	—	2	2		TR Py	TR mag
319	329	10		10 ↓ 25	35 ↓ 30	3 3	2 ↓ TR 3	2 2			tr mag
329 / 330	330 / 331	1 / 1		15	25	5	4	4		—	TR mag
331	338.5	7.5		35 ↓ 15	15 ↓ 35	2 ↓ —	5 ↓ 2	3 ↓ 2		TR Diss Cu° v. fine grained w/ minor Po	
338.5	349.2	10.7		25	40	TR	TR	3		Abundant Cu°	mag DUST

Graphic Log Ft.: 310, 320, 330, 340, 350

General Description — Rock Type, Structure, Etc.

Agglomerate - lge fragments composed of multi-mineral, all altered, trace Bio in matrix w/ epidote-calcite lightly replacing plag, CHLOR matrix also mixed with sericite

FAULT ZONE, MOSTLY BULL QTZ and CHLORITE, Hydrothermal chlorite, with significant calcite WITH sericite near borders, a little hematite

Sericite-CHLORITE-QTZ fine grained schist WITH a few calcite stringers, trace biotite - Agglomerate - WITH sericitic frags in chloritic "cement", Becomes more chloritic w/ depth and minor shear zone, OXIDED Fe stained. thin epidote veinlets 316'

QTZ-SERICITE phyllite WITH veinlet control Biotite minor calcite -

META-agglomerate → SER-CHLOR-ep-Bio alteration in lge stretched clasts (2''), carbonate veinlets, local lavender colored sericite - (Mn-rich?) Definitely fragmental - possibly MILL ROCK, chlorite is vein & selective replacement, Biotite decreases - may be millrock near chlorite pipe, also small holocrystalline QTZ-Bio-feldspar selvages, then Biotite comes back in, CLASTS are meta andesites and meta-sediments w/ high sericite in sediments w/ Bio & sericite together or plain chlorite Lower contact relations indicate overturning

Numerous calcite veinlets & pods, Biotite, Qtz, Sericite, chlorite, w/ QTZ & PLAG relicts

BULL QTZ & CHLORITE w/ Hematite FAULT ZONE

equigranular QTZ-CHLOR-Biotite phyllite w/ minor calcite veining - meta-volcanic (andesite) w/ v. minor epidote, also Cu° along Limonite veinlets, also evidence of overturning at 338' Becomes finer grained and more sericitic near base

Cu° in limonite veinlets and disseminated mixing of QTZ-SER & CHLOR, sericite forms pods after plag phenos in andesite, chlor in groundmass, ISOCLINAL folding at 339' Begins to appear brecciated at 341', becoming gradually agglomeratic, pebbles are sericitic and slightly stretched

Footage From	Footage To	Int.	Rec. %	Alteration CHL	SER	EP	Bio	Cal	Mineralization T.S.	Ore Min.	Gangue
347.2	355.5	4.3		20 ↓ 30	40 ↓ 25	2 ↓ 4	8 ↓ 10	2 ↓ 1		high Cu°	minor mag
355.5	363	7.5		25 / 15	5 / 15	4 / 4	10 / 10	2 / 2		No Cu°	minor mag
363	365	2		10	15	10	7	1		tr Po	minor mag
365	372	7		5 ↓ 20 ↓ 15	45 ↓ 35 ↓ 40	TR ↓ 3 ↓ TR	3 ↓ 3 ↓ 3	2		tr Cp, Po; tr Cu° near base	minor mag
372	373.5	1.5		5	55	—	7	1		tr Cu°	mag

Graphic Log Ft.: 360, 370

General Description — Rock Type, Structure, Etc.

meta-agglomerate, hydrothermal chlor, sericite, qtz, Cu° is assoc w/ chlor, sandy-textured clasts, diss calcite and in pods or veinlets, altered plag, angular and sedimentary frags in a biotitic matrix (2ndary), becomes finer-grained and higher epidote & biotite contents, especially around calcite pods.

Bio-chlor-ep. meta andesite, stretched plag phenos, partly replaced by cal & ep., incr sericite at expense of chlor, has a border fine grain phase of same composition at 357, possible hypabyssal so it approaches more equigranular relict texture. Becomes higher grade w/ greater mineral segregation at depth, a few xenoliths near lower contact

Porphyritic meta-volcanic, epidotized plag, 2° biotite in groundmass, some of plag is re-sorbed, replaced by cal-ep., contact w/ overlying unit is gradational over ~ 1", biotite and sericite incr a lower contact, texture is cut off by underlying unit ∴ this is older - possible overturning, not a fault contact by much biotite at contact

meta-agglomerate, stretched pebbles - possibly pumiceous w/ sm. qtz grains, other lithic frags, minor Bio, chlor, mostly ser, qtz, small cal pods; incr in chlor & ep w/ depth, more oxidized & also composed of equigranular, fine grained clasts, small chlor-cal pods w/ ser halo, greater proportion of hydrothermal chlor near base w/ Cu°

Contact is brecciated prior to metamorphism w/ rotated frags w/ later aphanitic volc(?) input. Biotited meta ashflow? w/ volc frags mostly sericite, biotite, minor chlor, cal stringers qtz, plag w/ bio increasing toward lower contact, also incr in Cu°

Assays: Correlate w/ B-1

Footage From	To	Int.	Rec. %	Alteration* CHL	SER	EP	BIO	CAL	Mineralization T.S.	Ore Min.	Gangue	Assays
373.5	384	10.5		25 ↓ 5 ↓ 20	40 ↓ 40 ↓ 40	TR ↓ — —	7 ↓ 15 ↓ 5	2 ↓ 3 ↓ 2		tr Cu°		
384	393	9		10 ↓	45 ↓	— 2	— ↓ 3	3 ↓ 1		tr Cu° on fracs	mag DUST	
393	395.5	2.5		10	—	—	1	1		TR Cu°		
395.5	404			10 ↓ 5 ↓ TR	35 ↓ 45 ↓ 50	TR — —	2 ↓ 3 ↓ 2	1 ↓ 2 ↓ 1		TR Cp	minor mag	
404	420	60		20 ↓ 20 ↓ 25 ↓ ANDESITE 60 ↓ 20	25 ↓ 25 ↓ 15 ↓ TR ↓ 35	TR ↓ TR ↓ TR ↓ 1 ↓ —	1 ↓ 3 ↓ 5 ↓ 3 ↓ 3	2 ↓ 1 ↓ 1 3 ↓ 2		NO Cu TR Po	mag DUST	Correlate to B-1

—CONTINUED NEXT PAGE

Graphic Log Ft.: 380, 390, 400, 410, 420

General Description — Rock Type, Structure, Etc.

Bio-CHLOR-cal-QTZ fine grained, Rare xenoliths near contact, more numerous deeper ∴ meta-agglomerate, matrix is low Biotite, some of frags are high (andesitic ones) Becomes an equigranular fine grained Bio-ser rock, Relict plag phenos by sericite and calcite, Biotite is also localized along fractures w/ sericite envelopes or cal pods alternating zones of Brecciation and undisturbed rock. Near base is coarse agglomerate w/ trace Cu°

meta-rhyolite or tuff of qtz-ser-mag-minor CHLOR (Hydrothermal), thin CHLOR Lamina separating thick qtz-ser-plag layers, a few crosscutting cal-CHLOR veins picks up a few CLASTS at 390', slightly stretched. then get homogeneous ser-CHLOR fine grained phyllite, picking up a little epidote, and a little Biotite at Base

CHERT-pebble conglomerate (?) with a CHLOR-Bio matrix, minor calcite (COULD also be a MILLROCK), cherty frags are recrystallized

meta-latite, a few stretched pebbles, SERICITE-CHLORITE-BIOTITE-qtz, Limonite along fractures, often w/ SERICITE envelope, CHLOR DECREASES w/ Depth, Rare ASHFLOW layers, fewer CLASTS at depth - Becomes more of a flow, BUT a few "pumiceous" frags? a little BIT of pink Kspar near lower contact

meta-agglomerate - QTZ, CHLOR, Sericite minor BIOTITE, Becoming more abundant w/ DEPTH, alternating layers n clasts of QTZ-SER-BIO VS. QTZ-CHLOR-BIO STRETCHED PHENOS (RELICT & REPLACED PLAG), mostly QTZ-CHLOR-SER W/ BIOTITE only along veinlets in assoc w/ HYDROTHERMAL CHLOR, QTZ-SER CLASTS in CHLOR-BIO matrix, STREAKS of carbonate, at 416' meta Andesite about 6" thick, CHLOR-CP, minor Biotite w/ cal & ep replacing plag phenos; QTZ-carb. veinlets in high CHLOR-BIO ZONE.

— See also Lineat[illegible] plot at [illegible]

Footage From	Footage To	Int.	Rec. %	Alteration * CHL	SER	ep	Bio	Cal	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.
420	464	60		25 ↓ 25 ↓ 35 ↓ 45 ↓ 15 ↓ 30	40 ↓ 40 ↓ 30 ↓ 15 ↓ 40 ↓ 20	– – – – 1 1	4 ↓ 6 ↓ 3 ↓ 2 ↓ 10 ↓ 7	2 ↓ 5 ↓ 2 ↓ 2 ↓ 3 ↓ 5		Cp, Bn - high S= zone @ 425 tr py tr Py	~1	430 440 450 460	CONTINUE metagglomerate / frags from meta-andesite porphyry & latite (?) L_2 lineation is 15° steeper than hz. matrix is generally sericitic, w/ Cal-Ser Replacement of PLAG, zones of CHLOR enrichment w/in sericite, also around veinlets, CHLOR LAYERS, sparse QTZ eyes DISS SULFIDES, L_2 changes between 422' to 425', Biotite increases and coarsens with small concentrations of hydrothermal chlorite, at 429' Chlor begins to incr a little, at 431' picks Rounded QTZ grains and pebbles →, SED INPUT? w/ decr in Bio & Ser, seeming QTZ-SER pebbles sit in Bio-Chlor matrix w/ a few SULFIDES, MOST pebbles have volcanic texture and Biotite tends to concentrate in particular zones or clots and increases in AMOUNT, tr PY assoc w/ QTZ-Cal-Chlor veins, QTZ-ser vs Chlor-Bio assemblages in pebbles vs matrix w/ PY ASSOC w/ Bio-CHLOR, TOUCH of EPIDOTE w/ QTZ rims a few zones of higher CHLORITE (460') - greater andesite content w/ fewer Stretched pebbles, SULFIDE assoc w/ Cal-chlor-QTZ veinlet
464	466.2	2.2		55	10	–	15	10					meta-andesite porphyry, small CLAST in overlying agglomerate, Dominantly CHLOR-Bio-Cal; Chlor-Bio is matrix w/ QTZ-cal replacing phenos, cal is prominant near Lower contact.
466.2	480	13.8		2	45	–	4	3		tr py		470	meta-volcanic, mostly QTZ-Sericite-Biotite minor CHLOR, trace PY, POSSIBLY a latite CHLOR ASSOC w/ CAL RICH Lamina, picks Up stretched pebbles away from upper contact to become agglomeratic, QTZ Xstal clusters, also plagioclase & Kspar — takes on a brecciated appearance that is pre-metamorphic (~471) w/ pumiceous frags to

Footage From	Footage To	In	Rec. %	Alteration * CHL	SER	ep	Bio	cal	T.S.	Mineralization Ore Min.	Gangue
471	480			5 ↓ 15	45 ↓ 40	2 / 2	8 ↓ 5	2 ↓ 3		tr Cu° w/ Cu-sulfates on fractures	mag dust
480	480.6	.6									
480.6	484	3.4		3 / 15	40 / 30	1 / 1	10 / 12	2 / 3		—	minor mag
484	502	18		tr ↓ 15 ↓ 40 ↓ 10	55 ↓ 45 ↓ 20 ↓ 35	4 ↓ 2 ↓ 3 ↓ 1	5 ↓ 7 ↓ 15 ↓ 12	4 ↓ 2 ↓ 4 ↓ 2		tr Bn, w/ CPy; tr Cu° at 487'; tr PY	mag DUST
502	508	6		5 / 30 / 10	40 / 35 / 80	— / -	3 ↓ 15 / 5	2 / 3 / 1		tr. Bn, Cp w/ chlor; tr Cu°	mag
508	508.6	.6									

Graphic Log Ft.: 480, 490, 500

General Description — Rock Type, Structure, Etc.

QTZ-Kspar-Biotite meta agglomerate - Qtz latite composition, mag DUST, minor epidote & hydrothermal CHLORITE, epidote & calcite after plag, locally massive sericite replacement, becomes more like a meta latite porphyry w/ rounded phenos and local high biotite zones, locally OXIDIZING biotite and chlorite, trace Cu° and sulfates on fractures, as approach a silicified fault zone (vein)

Quartz-filled fault or vein

Andesitic meta-agglomerate inter-layered with andesites, significant biotite, usually mixed with minor CHLOR, mostly QTZ-plag-sericite-biotite-cal rock, chlor increases w/ depth, cap by felsic unit

Another interlayering of agglomerate w/ andesite with more significant andesite content possibly some K-feldspar as 2°dary mineral along w/ biotite, incipient epidote in plag w/ calcite, picks up hydrothermal chlorite at 486' (maybe retrograded biotite?) in matrix of agglomerate in andesitic layers - v. fine grained QTZ-ser-mag w/ lenses of biotite cutting through, SULFIDES mostly in andesite, local offsetting along bedding (bedding plane slippage). a tuff lens at 490' w/ high sericite, mag content. w/ a few QTZ eyes, a few calcite pods, becomes a porphyritic andesite w/ frags in it and chlorite - Bio matrix w/ Bio becoming more abundant w/ depth

DISTINCT CONTACT, up side down relationships, Andesite porphyry, PLAG phenos partly cal. replaced in / qtz-ser matrix, grades into agglomerate - SULFIDES in cal-qtz pods in agglomerate w/ hydrothermal chlor becomes possibly meta- rhyolite-latite w/ fractures [illegible] minor Cu°

QTZ vein or fault

Assays

Footage From	Footage To	Int.	Rec. %	Alteration * Chl	Ser	Ep	Bio	Cal	Mineralization T.S.	Ore Min.	Gangue	General Description: Rock Type, Structure, Etc.	Assays
												CONTINUE WITH SAME meta-agglomerate UNIT — QTZ-SERICITE-BIOTITE-Hydrothermal CHLORITE, Appears to have SERICITIZED stretched pumiceous (?) frags, diss. calcite	
508.6	523.5			5 ↓ 15 ↓ 10	60 ↓ 35 ↓ 55	— ↓ —	12 ↓ 17 ↓ 12	4 ↓ 3 ↓ 8		tr. Bn, Cp disseminated	mag DUST; often oxidized to hem or limonite	Bio is DISS & unoriented in both CHLOR-RICH and SER-RICH zones, most of qtz is recrystallized, SULFIDES assoc w/ Biotite minor epidote comes in at 512', thin lenses rich in magnetite, CHLOR content increases at 517' as does Biotite, mostly assoc w/ CHLOR, by 520 CHLOR decreases again, zones of oxidation — limonite STAINED WITH calcite veining, qtz veins	
523.5	525	1.5		25	40	—	5	3		~5% mag-hem	Hem after mag	High magnetite Chlor-ser volcano-clastic (conglomerate ? SED INPUT) most Chlor is hydrothermal	
525	561.5	36.5		10; 20 ↓ 10 ↓; 5 ↓ — ↓ 20 ↓ 5 ↓ —	65; 60 ↓ 55 ↓; 30 ↓ 55 ↓ 15 ↓ 40 ↓ 60	—; tr ↓ 3 ↓; 3 ↓ — ↓ 1-2 ↓ 2 ↓ —	3; 4 ↓ 12 ↓; 35 ↓ 20 ↓ 40 ↓ 10 ↓ 4	2; 2 ↓ 3 ↓; 2 ↓ 2 ↓ 3 ↓ 1 ↓ 2 ↓ 1		NO Cu	euhedral mag tetrahedra & octahedra; mag DUST as veinlets	BACK to meta-agglomerate w/ veinlet controlled Biotite, minor chlor in a qtz-ser rock a few stretched pebbles localized much Bio picks up a little epidote at 529' w/ concommittant incr in chlor; local incr. in biotite, Epidote increasing; lenses of sericitized ASH w/ DISS Biotite, CLASTS increase in size at 536' (of graded bedding, then ↑) with continued ser, Bio, epidote → Mill rock → rhyolite breccia (?), Bio increases significantly at 540'; becomes a biotite-sericite-qtz rock with minor calcite only traces of chlorite; from 542' to 545' interlayering of felsic ash units with Biotite-ser agglomerate. ASH is sericite with qtz and relict plag (?) and disseminated magnetite, with Biotite veining (maybe a rhyolite?); has a biotite-chlorite-rich zone near base of ash, then goes back to ser-biotite-qtz agglomerate, a few small calcite pods w/ Chlor rims w/ a little epidote disseminated around biotite grains, also epidote replacing relict plag phenos, a few zones of straw-colored sericite (pumice-ASH?) w/ only biotite in veinlets, becomes fine grained agglomerate, clasts are stretched and smaller, recrystallized.	

Footage From	Footage To	[illegible]	Rec. %	Alteration * CHL	SER	EP	BIO	cal	Mineralization T.S.	Ore Min.	Gangue	General Description — Rock Type, Structure, Etc.	Assays
564.5	606.5	4.5		10 ↓	40 ↓	2 ↓	18 ↓	3 ↓		frac-filling of py@572'		meta-andesite with widely scattered xenoliths — locally brecciated with biotite filling fracs; generally med. gray qtz-ser-epidote-minor chlor-calcite rock, usually equigranular. finely disseminated mag & biotite, L2 lineation inclined 35° to vertical to the left, stringers & small pods of calcite, often w/ hydrothermal chlorite intergrown & rimming, CHLOR decreases @ 571, minor qtz veins, in faulted zones alteration is mostly CHLOR-Bio, w/ qtz-cal veins all broken up, but continues as bio-ser-qtz schist, a thin layer of andesite porphyry w/ elongate plag phenos replaced by cal-ep with higher biotite content @ 579'. at 581' Biotite significantly decreases leaving qtz-ser rock w/ minor biotite, then picks up again to ~10% of rock and a little epidote, occasional high biotite pods; epidote is controlled by veinlets & lamina, by 590' Bio is ~equal to ser abundance, epidote becomes increasingly abundant developing a stockwork fracturing system w/ cal & epidote, pods of cal, a few relict, fresh plag phenos, Biotite veinlets assoc w/ pyrite, epidote veinlets & assoc w/ QTZ-Bio pods, higher Bio content ~603 WITH SULFIDES to bottom of unit, cal-ep stockwork	L2 35° F1
				2 ↓	55 ↓	1 ↓	18 ↓	2 ↓		tr py			
				–	60	–	4	1					
				– ↓	55 ↓	14 ↓	10 ↓	1 ↓		tr cp	Diss mag		
				TR ↓	25 ↓	8 ↓	20 ↓	2 ↓					
				TR ↓	40 ↓	6 ↓	15 ↓	3 ↓		tr po			
				TR	35	3	20	2		py veinlets			
606.5	607.5	1		Tr	35	8	15	4				fresh appearing andesite porphyry, cal-epidote replacing plag phenos, in a qtz-ser-biotite groundmass — dike?	
607.5	612	4.5		tr	35	3 → 6	20	2		tr py		meta-andesite bio-ser-qtz, trace chlor, epidote & cal stockwork, epidote incr w/ depth, then diminishes near lower contact	
612	613.5	1.5		30	15	2	35	4		—	minor mag	Bio-Chlor. rock w/ cal veinlets, minor sericite no mineralization — spotted chlorite schist w/ biotite porphyroblasts (v. small)	

Graphic Log Ft.: 570, 580, 590, 600, 610

Footage From	Footage To		Rec. %	Alteration * CHL	Ser	ep	Bio	cal	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
13.5	621	7.5		5	-	5	25	2		tr py			altered DIORITE DIKE w/ CHILLED Borders — fine-grained, phaneritic, epidote veinlets, qtz-plag-magnetite, minor CHLORITE and trace py, becomes coarser toward interior of dike, w/ incr in CHLOR, ep, mag; no preferred ORIENTATION – post metamorphic dike, Pyrite is weakly disseminated	
				25	-	20	-	3				620		
21	665.5			tr	30	1	15	1-2		micro veinlets of py, cp	Diss euhedral mag ~8%		fine-grained meta-andesite, qtz-ser-bio, trace chlor, epidote; significant magnetite; at 627' 6" qtz vein, local brecciation w/ biotite filling also magnetite, small qtz eyes, short intervals of biotite schist, cut by cal-ep stringers, py assoc w/ cal pods rimmed by chlor-ep., also ep after plag, @ ~637 qtz content increases to ~50% of rock, localized clusters of pyrite w/ cal-ep, at 642' about 6" of andesitic conglomerate, biotite veinlets sometimes as an envelope around cal-qtz stringers, another agglomeratic unit 6" thick at 652', w/ clasts being qtz-ser rich & matrix of qtz-bio-ser, possibly some stretched pumiceous(?) clasts that are replaced by qtz, py assoc w/ qtz-ser, Biotite is v. fine grained, and less abundant most epidote confined to stringers, also coarser biotite is structurally (stringer, veinlet) controlled, trace amts of pink Kspar	
		44.6		2	30	-	20	1						
				-	-	2	95	1				630		
				1-2	20	8	30	2						
				-	20	5	20	1		bio cp		640		
				-	30	4	15	2		tr py	Mag. dust	650		
				-	45	7	5	2				660		
655	679.8			-	20	15	30	5		Dss cp (trace)			porphyritic andesite, v. small epidotized-calcified plag phenos in a bio-ser-qtz; lge pods of qtz, biotite replacing mafic phenos pseudomorphically, most coarse biotite assoc w/ cal pods & veinlets, "phenos" are splotchy, subhedral-anhedral, and become more abundant (~30% of rock) w/ stockwork of cal-ep veinlets, incr in biotite & coarsening at 675', and then phenos thin out toward lower contact, and bio slightly increased in matrix & in veinlets	
				TR	20	8	35	2		tR py		670		
				TR	20	5	40	3				680		

Footage From	To	Rec.	%	Alteration * Chl	ser	ep	Bio	cal	T.S.	Mineralization Ore Min.	Gangue
678.8	680.8	1		10	—	—	25	5			
680.8	683	2.2		TR	25	2	30	2		—	mag Xtals
683	705	22		2 ↓ TR ↓ 5 ↓ 5 ↓ 2	30 ↓ 30 ↓ 20 ↓ 20 ↓ 20	8 ↓ 3 ↓ 45 ↓ 5 ↓ 5	10 ↓ 18 ↓ — ↓ 25 ↓ 25	3 ↓ 2 ↓ 3 ↓ 2 ↓ 10		tr. py; tR. v. fine Bn	hem after mag Xtals; high mag.
705	718	13		— ↓ –	15 ↓ 20	10 ↓ 2	35 ↓ 30	5 ↓ 3		tR Bn; —	mag Xtals subhedral
718	720	2		—	25	3	15	1		tr py	mag Xtals
720	724	4								minor Bn, Cp	
724	726.5	2.5		TR	20	15	30	5		tR Bn	mag in groundmass

Graphic Log Ft.: 690, 700, 710, 720

General Description — Rock Type, Structure, Etc.

meta intermediate dike, Biotite phenos in a qtz-plag-biotite matrix; some of biotite cores are retrograded to chlorite, minor cal, Kspar, no epidote, mafic. Border — all biotite.

meta porphyritic andesite, qtz-ser-bio, minor epidote; cal clots assoc w/ coarser bio. near lower contact get's small plag phenos

contact indicates right side-up, meta-andesite qtz-carbonate pods, Bio-ep lamina & stringers, qtz-ser rich stretched clasts?, disseminated Bio in qtz-ser rock, minor Chlor, some of biotite is oxidized partly to golden color and micr @ 691', a few zones of high epidote w/ qtz-ser, no mafics; But set in Bio-ser-ep-qtz @ 703', stockwork becomes very dense. mostly calcite

porphyritic andesite – ~5% altered plag phenos, intense cal-ep stockwork of veinlets sericitic halos along cal-qtz veinlets, groundmass of rock is ser-Bio-qtz-fine gr. @ 709' a 6" massive epidote zone w/ cal-bio-qtz veinlets, plag altered to cal-ep., Cal-ep suture veinlet w/ser halo, locally bio coarsens slightly, limonite on fracs

meta-agglomerate (?) SPLOTCHY andesite, cal vein, cal-ep stringers, few widely scattered cal-ep replaced phenos, clots of Epidote rimmed by Biotite, also Bio veinlets, at 719.5' is a qtz vein w/ a few ep and py inclusion

SHEAR zone of QTZ, epidote and brecciation of porphyritic andesite, zones of pure biotite set off by qtz veins, scattered hydrothermal chlorite minor Epidote locally (721'), clasts of meta andesite; @ 722' massive epidote zone w/ QTZ veins, epidotized plag phenos and biotite veining.

porphyritic andesite cut by stockwork of ep-cal veinlets, phenos of Biotite-cal cores w/ epidote rims, Bn assoc w/ Biotite positive, not too far remobilized, (after cp?) & Source for Cu°

Footage From	To	Int.	Rec. %	Alteration* cl	ser	ep	bio	cl	T.S.	Ore Min.	Gangue	Graphic Log Ft.
6.5	730	3.5		40	—	25	15	15		—	—	
730	735			—	20	15	40	10		finely dissem Bn		730
				—	15	10	20	5				
735	789.5	54.5		TR ↓	25 ↓	15 ↓	15 ↓	10 ↓		tr. Bn, Cp disseminated as fine grains	Diss mag & in clots	
				10 ↓	15 ↓	15 ↓	30 ↓	5 ↓				740
				2 ↓	15 ↓	10 ↓	40 ↓	5 ↓		possibly tr Cu° v.fine-grained		
—	—	GRADATIONAL							—			750
				TR ↓	10 ↓	15 ↓	45 ↓	3 ↓				
				TR ↓	10 ↓	10 ↓	40 ↓	3 ↓		[illegible]	mag DUST & Diss grains	760
				3 ↓	15 ↓	2 ↓	30 ↓	2 ↓				770
				3 ↓	10 ↓	8 ↓	30 ↓	4 ↓		veinlet controlled Bn, Cp, Py		
				TR ↓	2 ↓	5 ↓	50 ↓	2 ↓		— — —		780
				TR	15	TR	45	2				

General Description — Rock Type, Structure, Etc.

meta-lamprophyre, DIKE w/ CHLORITIZED mafic phenos, some altered in Biotite & Calcite in a Biotite-epidote groundmass, w/ accessory calcite

meta-andesite(?) porphyry, Biotite groundmass w/ phenos? Biotite core & qtz-ser halo; Scattered epidote, also epidotized plag, Bio decr w/depth and ser increases

meta-agglomerate, moderately rounded frags a few relict plag, Cal-ep stockworks w/ pods developed at fracture junctions, ser-bio-ep rock w/ pink splotches? — piedmontite? (or remotely garnet), epidote veins, also Bio veinlet rimmed by qtz sericite halo Rare ashy lamina, Biotite increases w/ epidote replacing of lamina, a few remnant plag grains w/ dominant epidote-cal., get incr in chlorite; at 478' is a 3" band of massive epidote w/ depleted or bleached? borders having only partly replaced to fresh plag, nearby qtz vein in zones of intense fracturing & veining by cal-ep Biotite is coarser and more abundant. grades into a meta andesite w/ widely scattered altered phenos w/ ep. veining w/ fewer clasts mostly a qtz-bio rock w/ epidote veinlets a few small patches where biotite is oxidized to sericitic or vermiculite composition; epidote veinlets in stockwork have qtz rinds, stretched pebbles are qtz-ser rich set in Bio-qtz-mag matrix all cut by cal-ep veinlets, degree of crystallinity seems somewhat dependent upon the amount of veinlet cutting, finely disseminated sericite after groundmass plag, local zones rich in cal-ep as splotches w/ qtz w/ diss Bio, but goes back to an andesite composed of qtz-bio w/ cal, ep, Bio veinlets, becoming more qtz rich, and coarsening of bio grains, sulfides localized along cal-chlor veinlets then appear incr in Bio content, at ~780' interstratified zones of meta-andesite with meta agglomerate, with increase in sericite content (mixed w/ qtz)

Assays				

Footage From	Footage To		Rec. %	Alteration * CHL	SER	EP	BIO	CAL	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description: Rock Type, Structure, Etc.
				–	10	5	45	3					continue interlayered meta-agglomerate and meta-andesite w/ incr in epidote at 781' epidote veinlets w/ disseminated & veinlet calcite, at 786' a higher sericite, low bio unit ~ 6" thick (meta latite?) w/ foliation controlled minor py, Bio forms discontinuous selvages and is commonly mixed w/ cal-ep.
				–	55	5	10	2		tr py, after Bn	mag dust		
	789.5			–	25	5	35	2					
789.5	814.5	25		Tr	30	4	15	3 ↓		tr py		790	mostly meta-agglomerate, gradational contact over ~30 feet, rexstallized QTZ & biotite filling between clasts, clasts are mostly QTZ-ser-mag dust to give light-grey color, a few magnetite lenses, stringer epidote, rare clots of biotite, sulfides usually assoc w/ trace chlorite (hydrothermal), fine calcite, minor epidote stockwork veinlets, usually Bio fills around clasts of qtz-ser-mag, slight incr in chlor at 803', w/ locally higher py content, then biotite incr near 809'; QTZ, Bio, ser rock w/ cal-ep veinlets and pods w/ a little 2° biotite near lower contact becomes epidote rich w/ stockwork calcite veinlets to almost pervasive replacement, a vertical cal-black 2° chlorite vein following the core w/ coarser biotite in the host rock and disseminated epidote, probably near a faulted zone.
				TR ↓	30 ↓	4 ↓	20 ↓	↓		tr py, Bn	mag dust & lenses		
				5 ↓	25 ↓	5 ↓	30 ↓	3 ↓				800	
				TR ↓	35 ↓	2 ↓	20 ↓	3 ↓					
				TR ↓	30 ↓	3 ↓	30 ↓	4 ↓		tr py		810	
				TR	10	15	30	20					
814.5	819	4.5		–	35	2	15	3		tr py			
				–	35	8	12	4					
819	828.5	9.5		TR ↓	30 ↓	12 ↓	15 ↓	3 ↓		tr py		820	
				TR	45	15	20	10		Diss fine Bn			
				TR	35	20	25	8				830	
													QTZ-ser-Bio meta dacite porphyry, stretched plag phenos replaced by qtz-ser-minor cal set in qtz-ser-Bio groundmass, Bio decrease downward with increase in epidote, @ 818' epidote vein w/ calcite, w/ a few qtz stringers
													meta-porphyritic andesite interbedded w/ andesite, relict & fresh plag set in, cal-ep after plag-Bio veinlets, w/ cal-ep pods in qtz-cal matrix qtz-cal vein @ 821' to 823'; cal-ep pseudomorphs after plag, Bio veinlets, becomes brecciated near lower contact, w/ dense ep-cal stockwork, Bio minor

Assays

Footage From	Footage To	Int.	Rec. %	Alteration * CHL	ser	ep	Bio	cal	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
[8]28.5	831.5	3		35 / 15	1- / TR	2 / TR	15 / 40	[illegible]		—	mag dust		Bio-Chlor-qtz, minor ser, cal meta-andesite dike (diorite?) pre-metamorphic alternating Bio and chlor-ser-qtz bands v. minor epidote, cut longitudinally by a qtz-cal vein, minor biotite content, V	
[83]1.5	860.5	29		TR	15	20	25	8					meta andesite porphyry, partly epidotized plag phenos, epidote stringers cut matrix phenos are rimmed by Biotite, textures indicate right side up, incr in sericite ~ 834', Bio pseudomorphs after hblende, cut by epidote, and cal-epidote veins and discontinuous veinlets, mostly in biotite, w/ depth entire plag phenos is epidotized, and biotite decreases locally, becomes mostly relegated to veinlets w/ minor unmineralized rock becomes fresher, 847' deeper, and epidote increases in zones, biotite is almost exclusively as selvages around phenos, sparsely disseminated epidote is controlled by veinlets, and plag; phenos become coarser & numerous at 853', at 857' biotite increases w/ ser decr, tr chlor assoc w/ cal pod, w/ ep mostly in veinlet zones at 859' → an epidotized zone ~6" thick, near lower contact mostly a Bio-chlor-cal rock, v. little ser	
				TR	30	10	20	5		tr, tiny cp, Bn Disseminated	mag dust			
				↓	↓	↓	↓	↓						
				TR	20	10	30	4		tr py		840		
				↓	↓	↓	↓	↓						
				TR	40	10	10	3						
				↓	↓	↓	↓	↓		tr py assoc w/ chlor and		850		
				TR	40	12	15	4		in qtz-cal vein widely scattered				
				↓	↓	↓	↓	↓						
				TR	20	8	35	2		Bn, Cp w/ epidote	dissem mg-hem xtals			
				↓	↓	↓	↓	↓						
				35	TR	5	40	4				860		
[86]0.5	862.5	2		3	40	2	15	2					meta-sediments (?) - qtz-ser w/ interlayering of chlorite, appears to be possibly metadacite interlayered of argillaceous sediments? w/ a lower zone ~1½ thick of meta-agglomerate of qtz-ser w/ biotite veinlets, minor epidote, chlor,	
[86]2.5	864	1.5		30	5	10	35	3					Bio-chlor-qtz-epidote-calcite dike + minor sericite, initially mafic in composition	
[86]4	873	9		TR	35	7	25	4		Py, Bn trace	mag dust		qtz-bio-ser & epidote meta-dacite (?) Bio veinlets; a few plag-qtz phenos, slight decr in Bio & ep @ 868', widely spaced Bio veinlets, picks up rare clasts near lower contact,	
				↓	↓	↓	↓	↓						
				TR	45	5	15	3						
				↓	↓	↓	↓	↓				870		
				TR	40	8	10	4						
[87]3	876			TR	30	5	20	2			mag DUST		Bio-qtz-ser. minor epidote, meta andesite-porphyritic,	
				TR	35	↓ 12	15	4						
[87]6	877.5	1.5		15	10	TR	20	5					meta sediments, mostly qtz-chlor-biotite, minor sericite - meta graywacke	

Footage From	To	Int.	Rec. %	Alteration CHL	SER	EP	BIO	CAL	T.S.	Mineralization Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
													meta-agglomerate, Bio-ser-qtz w/ bio veinlets often w/ assoc epidote, small cal qtz veinlets & pods, w/ decrease in Bio w/ depth, gets a cal-qtz, cal-ep, Bio-qtz veinlet stockwork @ 883-4, lge epidote pods surrounded by Biotite veinlets,	
7.5	886.5	9		TR	30	8	17 ↓	3		DISS py-cp Bn				
				—	55	5	10	4			bio mag xtals ; dust	880	meta andesite (?) - high biotite content - coarser xtallic !. better foliation, w/ DISS epidote, in qtz-ser rock, also bio veinlets	
.5	910	23.5		—	30	5	35	2		DISS TR py			Bio increases slightly w/ depth to 890' and agglomeritic texture becomes apparent, pyrite seems to be assoc w/ chlor, a few mag pods, about 903' becomes a bit agglomeratic, becoming more sericitic and qtz rich, clasts are slightly stretched, rounded & biotite rich, forming rims around clasts, becomes more sulfide-rich near lower contact w/ higher sericite, lower Biotite	
				TR	20	3	15	2				890		
				↓	↓	↓	↓	↓			mag pods			
				|	20	2	45	2						
				↓	↓	↓	↓	↓		tr po				
				1	25	2	38	2				900		
				↓	↓	↓	↓	↓						
				TR	30	4	30	2		lgh py	mag dust		Bio rich meta-sediments - argillaceous, w/ qtz and sericite, a few Bio-stringers, calcite is mostly as little pods, v. little epidote, very sericite rich @ 911', picks up a little more biotite near lower contact. qtz-cal vein	
0	915	5		TR	25	3	20	2				910		
				TR	60	2	5	3		——	mag pods & DUST			
5	927.5	12.5		20	5	2	30	6					Bio-chlor meta andesite, w/ cal-ep veinlets, minor ser, decr in chlor w/ depth and incr in sericite, w/ cal-ep remaining, at 920' Bio increases significantly — more or less a Bio-qtz schist, agglomeratic near lower contact, sericite-qtz clasts w/ minor biotite, set in qtz-bio matrix	
				5	20	4	40	5			mag DUST			
				↓	↓	↓	↓	↓				920		
				—	10	2	55	2						
				↓	↓	↓	↓	↓						
				—	30	4	20	2						
7.5	930	2.5		—	30	4	15	1					qtz-ser-bio schist w/ limonite staining, sulfides localized in qtz-epidote zones, picks up a little chlorite about 930' along veinlets, Bio veinlets near lower contact Bio incr toward lower contact	
				—	30	2	25	2		tr cp, Bn	mag DUST	930		

lge ... Chlor, less Bio here.

Footage From	Footage To		Rec. %	Alteration* Chl	Ser	Ep	Bio	Cal	T.S.	Mineralization Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
930	951	21		15 ↓ 40 ↓ 47 ↓ 45 ↓	20 ↓ 5 ↓ 5 ↓ TR ↓	2 ↓ 7 ↓ 5 ↓ 10 ↓	20 ↓ 25 ↓ 20 ↓ 15 ↓	3 ↓ 7 ↓ 4 ↓ 15 ↓		tr py	minor diss mag-hem xtals	940, 950	Bio-chlor-ser-qtz, minor epidote, meta-agglomerate, Becomes more chloritic w/ depth, irregular calcite veinlets, w/ more calcite & epidote, less sericite, zones rich in chlor and zones of mixed Bio-chl ~942 picks up more calcite & epidote at 945' clasts are still there and mostly qtz-sericite in chlor-bio-cal matrix w/ py in clasts, also epidote in clasts, at 949' composition remains consistent, but foliation is less pronounced, calcite is disseminated & in veinlets	
951	1006.5	55.5		40 ↓ 40 ↓ 25 ↓ 45 ↓ 45 ↓ 40 ↓ 60 ↓ 60 ↓ 55 ↓ 60	— ↓ 6 ↓ 6 ↓ — ↓ — ↓ — ↓ — ↓ — ↓ 5 ↓ 10	5 ↓ 15 ↓ 10 ↓ 5 ↓ 3 ↓ 3 ↓ 20 ↓ 10 ↓ 5 ↓ 4	15 ↓ 10 ↓ 25 ↓ 10 ↓ 15 ↓ 20 ↓ 5 ↓ 15 ↓ 20 ↓ 5	8 ↓ 8 ↓ 8 ↓ 3 ↓ 6 ↓ 4 ↓ 4 ↓ 4 ↓ 4 ↓ 3		Cubes of py; Cu_2O veinlet, Diss tr Bn Cp Py; py cube	—	960, 970, 980, 990, 1000	slightly foliated chlor-cal-Bio schist w/ calcite veinlets, lge py cube (1/8" edges) w/ higher epidote content, 952.5-954 is qtz vein, Beyond vein get more sericite, picks up more agglomerate character at 958', w/ sericite higher in clasts, keeps coarse py, but is higher in biotite, meta-agglomerate, at 980 → Cu_2O vein Biotite increases a bit around 980' also, 981-982 → qtz vein, 983-984 qtz vein, w/ cp, py near it, less foliated there too, and more Bio; diss chlor-ep at 889' w/ v. little bio, cal veinlets, no pronounced foliation, w/ slight incr in biotite at 990' cal-ep veinlets squiggle through high chlorite rock – meta-agglomerate, slight increase in Bio-ser at 992' w/ diss epidote, many flattened and elongated pebbles at 996' w/ cal localized in pebbles, py cube assoc w/ chlor-ep, Bio is gone w/ ser in clasts, going to br. green chlor & black chlor,	

Footage From	To	Int.	Rec. %	Alteration * Chl	ser	ep	bio	cal	T.S.	Mineralization Ore Min.	Gangue
				50	5	20	–	0		tr py	few mag.
06.5	1016	9.5		65 ↓ 70	– ↓ –	5 ↓ 5	5 ↓ –	5 ↓ 3		tr py	
6	1018	2		25	–	5	30	8			
18	1022.5	4.5		40	8	7	5	8		——	
2.5	1026	3.5		60	10	3	–	4		tr py	
26	1027	1		4	–	8	–	6		—	—
27	1031	4		55	–	5	8	6			
				35	–	5	25	3			

Graphic Log Ft.: 1010, 1020, 1030

General Description — Rock Type, Structure, Etc.

trap-like vein material w/ round qtz eyes intrudes, indicates may be near intrusive & chlorite. maybe retrograde biotite, cal-qtz veinlet at 1003; w/ a zone of epidote nearby

meta-lamprophyre dike → mafic phenos are partially replaced by chlor in a chlor matrix, a few cal veinlets. —appears phenos were hblende orignally, then biotitized then retrograded to chlorite, py occasionally assoc w/ phenos, retrograde effect is more complete w/ depth

meta-andesite porphyry, bio-chlor-ep, significant dissem cal, qtz vein gashes, possibly trace garnet? Base is a 6" qtz vein w/ epidote assoc, adds a few clasts near lower contact

Breccia w/ epidote healing and replacing plagioclase, probably initially andesite porphyry, small qtz-chlor-ep vein, no prevalent foliation, Becomes agglomeratic but with fractured andesitic-dacitic clastics, chlorite veining, a few pods of cal-ep near lower contact

a basal arkosic(?) unit or chert nodule(?) w/ qtz-ep veins in it, a little bit of basaltic dike input as veinlets & along foliation, grades up to andesite of br green & dark chlorite w/ diss calcite, a few rounded & rotated pebbles replaced by chlor, minor relict Kspar(?) rich-lithic?

meta-sediments (?) - arkosic, rounded feldspar frags in a pink matrix, chlor-ep replacement calcite pods

meta-lamprophyre dike w/ bl. chlorite phenos in green chlor matrix, cal veinlet, minor relict biotite, epidote assoc w/ veinlet cal. Local zone of 80% epidote, picks up more biotite near Base - less retrograde effects

Footage From	To	Int.	Rec. %	Alteration * chl	ser	ep	sil	cal	T.S.	Mineralization Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
1	1038	7		55 45 40	— — 8	8 ↓ 5 6	15 ↓ 20 20	8 6 5		tr py cubes			a few partly replaced Biotite phenos by chlor in a chlor matrix, minor diss epidote, pods of calcite & disseminated, local zones of brecciation w/ cal-ep healing, Becomes agglomeratic w/ increased biotite content gradually, cal-ep veining pyrite increase toward lower contact pyrite cubes are probably result of reXtallization during retrograde event,	
38	1053.2	15.2		40 40 10 ↓ 10	— 10 15 ↓ 15	10 10 — ↓ 10	10 10 60 ↓ 15	5 5 10 ↓ 5		high pyrite HIGH Py zone diss py Po veinlet		1040 1050	textural cut-off indicates ... made up w/ later "basaltic" intrusive vein, meta-andesite of chlor-ep, minor bio picks up a little sericite interior, stretched hblende phenos to [ ] shape, partly replaced by bio & retrograded to chlor. calcite veinlet @ 1040', possibly an ash layer at 1041' w/ higher sericite, then becomes a high biotite, moderate chlorite rock w/ alot of calcite, small lenses of cal-py rel with andesitic agglomerate w/ sericitic clasts w/ epidote rich zones, goes to dominantly dark chlorite - epidote w/ minor sericite and hydrothermal chlor, near lower contact cal-qtz-Po vein w/ chlor rim,	
3.2	1060	6.8		10 30 15	— — 15	15 20 10	45 25 25	12 10 8		Po diss. 5% Po		1060	dull-looking Amphibolite. ; Dominantly biotite w/ dissem epidote, calcite & lithic frags (?) — meta graywacke?, irregular X-cutting calcite veinlets, Becomes more chloritic and pyrite-rich to interior, epidote veinlet w/ hydrothermal chlorite halo, ~5% Po at 1059', higher sericite in elongate clasts near lower contact	/
0	1072	12		5 ↓ — 15 40 60	10 ↓ — - — —	20 ↓ 40 30 15 10	30 ↓ 5 10 20 15	6 ↓ 2 3 3 10		Po disseminated high Po	tr mag	1070	andesitic agglomerate, Bio-ep-minor ser, interlayered with andesite porphyry w/ epidotized phenos, from 1063 to 1068 dense epidote-qtz stockwork & zones of massive replacement, then get replacement w/ preservation of original textures, picks up additional bio-chlor, finally a chlorite zone w/ blebs of bio or epidote, sedimentary texture at base - graywacke	

Footage From	To	Int.	Rec. %	Alteration * Chl	ser	ep	Bio	cb	T.S.	Mineralization Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays				
													equigranular chlor-ep-calcite "dike" Biotite pseudomorphs, cut often by cc-qtz veins, sheared-healed lower contact					
1072	1075.5			45	–	20	–	8										
1075.5	1085	9.5		60	15	–	–	5		tr Po	garnet(?)		CHLORITIZED Agglomerate, pods of cal-ser and black chlorite within green chlor, textural truncations and basaltic veinlets, picks up epidote w/ depth, possibly some garnet, then away from late "basalt" Biotite develops occassional bands of epidote, richer in Biotite toward Base.					
				40	–	10	25	5										
				20	–	15	40	3				1080						
				10	–	20	40	15										
1085	1100	15		60	TR	TR	10	4					Biotite porphyritic andesitic rock (?) w/ complete chloritization of groundmass, adds some sericite and biotite is finer at 1087; chlorite appears to retrograde as it shows that Biotite "phenos" are being attacked by chlor, pyrite is partly oxidized w/ Limonite halos, a few splotches of epidote, Py increases @ 1096, along w/ a couple ep veins, relict flow structure (?) w/ sericite w/in Bio-chlor andesite porphyry					
				50	5	5	15	2										
				50	–	8	25	3		tr py		1090						
				↓	↓	↓	↓	↓		high py ~3%								
				40	10	5	25	3				1100						
1100	1104			10	–	15	40	5		—			agglomerate, Bio-ep-chlor, DISS and veinlet cal, no sulfides, picks up sericite near its Base, v. little chlor. a zone of massive epidote at ~ 1102'					
				TR	15	10	55	10										
1104	1113			50	5	3	20	4					Bio porphyritic andesite similar to 1085-1100 rock, with chlorite matrix, minor disseminated epidote, takes on agglomerate character 1106' w/ qtz-ser-cal clasts, smaller increase sericite, takes on a brecciated appearance as if post-meta there was fault activity to jumbled the unit, very high calcite in-filling, Biotite phenos have been stretched, Both stringers & replacement pods of calcite ± biotite in chlorite schist,					
				35	15	5	10	8										
				30	10	5	5	25		tr py		1110						

retrograde effect

Footage From	To	Int.	Rec. %	Alteration * Chl	ser	ep	Bio	cal	Mineralization T.S.	Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
13	1131.5	18.5		45	5	TR	15	3		Diss Po & tiny stringers			an upper thin unit of pebble conglomerate going down to equigranular meta-andesite, late intrusive (basaltic?) input along weak zones, into Bio-qtz-chlor-ser becoming Bio-ser-qtz w/ minor chlor, cut by later intermediate dike, - Rock becomes a foliated biotite qtz diorite w/ a few cal-chlor pods, also cal-ep vein Bio-chlor veinlet, fresh appearing - possibly intrusive, thin zones (2") where there has been some later structural disruption → w/ associated chloritization of biotite; v. fine qtz, plag in matrix; in local oxidized zones Bio → chlor sulfides are usually controlled by foliation, greater frequency of cal-qtz-chlor veins & pods below 1127', accompanied by higher chlorite, much of biotite appears phlogopitic, biotite, etc become much finer grained w/depth (chilled border? on a dike), decrease in biotite near lower contact	
				5	–	TR	35	3						
				15	TR	5	25	4				1120		
				10	TR	3	20	2				1130		
315	1162	30.5		TR	–	–	30	1		tr Po			gradationally, picks up greater agglomeratic character, essentially same composition w/ clasts that are lighter in biotite, generally biotite is coarser, high biotite zones may be xenoliths, Po increase at depth to ~ 1% of rock, rock is generally finer grained @ 1138'; but also increase Bio content, a few relict plag phenos, possible niccolite? intergrown w/ Po @ 1146, cal-ep vein at 1149 stringer Po @ 150', pebble inclusion, calcite veinlets w/ assoc sulfides @ 1150', in biotite meta-andesite, very fine grained, cal vein epidote in widely scattered plag phenos, toward lower contact calcite veinlet density increases w/ coarser biotite, calcite vein at 1158, also incr qtz content near lower contact - fine grained	
				2	5	–	35	2				1140		
				2	–	–	45	3		Po w/ NiAs ? intergrown (1146)				
				2	2	3	45	3		stringer Po @ 1150		1150		
				5	3	3	40	4		Po w/ NiAs @ 1157'		1160		

possib[illegible] hornsfel 1210

Footage From	Footage To	Int.	Rec. %	Alteration: Chl	Ser	ep	Bio	cal	GAR DIS.	Mineralization: Ore Min.	Gangue
1162	1163	1		15	–	3	45	20			
1163	1164	1		1	–	3	55	5		tr Po	
1164	1178	14		8	–	3	50	2		tr Po	
				↓	↓	↓	↓	↓			
				15	15	8	25	11		Diss & veinlet Po	
				↓	↓	↓	↓	↓			
				2	15	3	40	2		Framboids	
1178	1179										
1179	1223.5	44.5		5	–	3	35	3	15	Po pained on fracs & diss, foliation control	
				10	3	–	25	3	10	High sulfide zone	
				25	5	3	10	3	–		
				↓	↓	↓	↓	↓			
				5	20	TR	25	4	–	diss Po	
				↓	↓	↓	↓	↓			
				5	15	TR	35	2	-		
				↓	↓	↓	↓	↓		cal vein controlled Po & Niccolite	
				3	10	–	30	4			
				↓	↓	↓	↓	↓			
				TR	20	–	30	4		Po, NiAs v. fine	
				↓	↓	↓	↓	↓			
				TR	25	TR	45	6			

Graphic Log Ft.: 1170, 1180, 1190, 1200, 1210, 1220

General Description — Rock Type, Structure, Etc.

spotted chlor-Bio schist → meta andesite porphyry of lower Bio zone (chilled margin?) mostly calcite replacing plag

v. fine grained Bio-qtz schist w/ minor chlor v. fine cal-ep veinlets, local spots of Bio - meta-andesite.

meta agglomerate, Bio-chlor w/ cal-chl-ep veinlets, sulfide is controlled by foliation & cal-chlor, diss cal too, fine grained chlor w/ strings of Bio in clasts, much of Po, Cp is also [?] on fracture surface almost dendritic splotches, intense cal-chlor veining 1167-1169, assoc incr ser and coarsened then returns to fairly massive meta-agglomerate - fine grained texture, higher qtz content, small epidote veinlet, sulfides are diss & foliation controlled, a little more coarse bio etc @ 1176, also Po framboids & Cp splotches @ 1176.'

Fault zone → qtz-cal-ep cement supporting varied rock types: granodiorite, andesite, chlor schist

metaagglomerate - structural [?], Bio-garnet?-qtz, Bio & gar are very fine grained, then chlor increases slightly and grains are a bit coarser, biotite becomes more phlogopitic & chlor incr, LZ orientation is 35° to orientation of core at 1191, more of an interbedding of andesite and agglom., coarsens slightly @ 1193, small cal-ep veins, framboidal Po, cal-chlor pod w/ qtz ser rim, goes into an andesite unit uniform in Bio-ser [?] fine grained at 1205, Po & NiAs along cal veinlets, becomes a Bio-qtz-ser-cal hornfels textured rock → no foliation, fine grained small Bio veinlets, a few relict plag, slightly coarser at 1216' Po stockwork 30% @ 1217, foliation controlled Po, Ni, stronger foliation and [?], Cal vein w/ chlor halo, more sericite near base w/ more altered plag phenos

Footage From	Footage To	Int.	Rec. %	Alteration * CHL	ser	ep	Bio	cal	T.S.	Mineralization Ore Min.	Gangue	Graphic Log Ft.	General Description Rock Type, Structure, Etc.	Assays
1223.5	1226.5	3		25	—	—	45	.12		Diss Po			Bio-Chlor-cal meta-andesite → cal disseminated to give speckled appearance, Becomes finer grained ~1' from gradational contact, v. fine altered plag phenos to cal-chlor, non foliated → possibly post metamorphic,	
1226.5	1238.5	12		TR	40	—	20	3					foliated Biotite-sericite andesite with minor included frags, a few plag pheno relicts ∴ porphyritic andesite, picks up a little chlor-ep alteration near Po veinlets has a slight agglomeratic character, possibly disguised by metamorphism for short intervals high pheno content (replaced by cal-ep-chl) at 1235, fine grained Bio incr, decr in sericite @ 1235', near lower contact Biotite increases substantially	
				2	40	7	20	3		veinlet Po		1230		
				1	25	2	35	2			dis mag			
				7	15	5	45			Po, Nils				
1238.5	1243.5	6		3	15	10	35	6		Po veinlet assoc w/ QTZ		1240		
				4	30	6	20	5						
1243.5	1250	6.5		TR	15	6	30	3		tarnished Po Diss & veinlet ~3% of rock			[illegible], initially an andesite porphyry w/ numerous altered plag phenos in a biotite sericite-cal matrix, (plag is epidotized), sulfides increase to center of unit, qtz-ser frags in Bio-ser groundmass, minor chlor, agglomeratic zones in andesite w/ v. small phenos	
				3	5	2	40	4						
				TR	2	4	45	6						
1250	1256	6		3	10	TR	40	5		veinlet Po		1250	meta-andesite porphyry with lge phenos, relict plag grains replaced by ep, cal, bio, in fine grained qtz-bio groundmass, wisps of calcite, becomes more equigranular & biotite rich, more calcite veinlets; abundant Po in veinlets & individual grains, cal-ep after plag	
				15	5	—	30	3		—				
												1260	fine grained meta andesite, medium coarse Biotite w/ v. fine qtz-ser, veinlet cal-Po, minor chlor thin interbedded porphyritic units and local increases in diss. Calcite and coarser Bio, phenos are smeared out, small Bio lenses, Becomes V. fine grained, Chocolate Brown mixture of Chlor & Bio w/calcite, a couple of stretched pebbles higher in Bio near lower contact.	

Footage From	To	Int.	Rec. %	Alteration * chl	ser	ep	bio	cal	T.S.	Mineralization Ore Min.	Gangue	Graphic Log Ft.
2	1277.3	21.3		20 ↓ 10 ↓ 2 ↓ 15 ↓ -	10 ↓ 25 ↓ 35 ↓ 25 ↓ 15	— ↓ — ↓ — ↓ — ↓ 6	35 ↓ 30 ↓ 20 ↓ 30 ↓ 25	8 ↓ 4 ↓ 5 ↓ 4 ↓ 8		veinlet Po veinlet Po	mag xstals	1260 1270
.3	1279	1.7		10	35	—	15	6				
9	1290.5	11.5		TR ↓ 10 ↓ 20	15 ↓ 25 ↓ 30	—	25 ↓ 30 ↓ 25	15 ↓ 6 ↓ 2		veinlet Po; stockwork Po diss Po		1280 1290
5	1295.7	5.2		5 15	—	—	70 60	8 10		Po along chlor veinlet		
7	1299	3.3		— —	? 25	— 3 —	15 20 40	2 3 5				1300

General Description — Rock Type, Structure, Etc.

mixture of porphyritic andesites, andesites, small % is agglomeratic, fine grained Bio chlor-qtz w/ ser mixed w/ qtz, irregularly shaped qtz-cal vein w/ chlor rind, sulfides assoc w/ chlor-cal veinlets; goes toward a Bio-ser-qtz rock w/ widely scattered chlor, small clots of calcite in Bio-ser-qtz matrix w/ plag phenos @ 1264'; remains porphyritic w/ incr matrix sericite, foliation is poorly developed, apparent flow structure? w/ elongation counter to foliation w/ incr chlor becomes porphyritic and biotite is coarser grained at 1271'; relict plag phenos replaced by ep & cal, minor qtz, ash frag at 1276' in with high calcite, coarser Bio-ser-qtz stretched replaced phenos

meta sediments?, high sericite, Biotite-qtz minor chlor w/ pods & lenses of calcite

andesite, numerous wisps of calcite in fine-grained qtz-Bio-ser rock w/ v. small altered phenos, becomes coarser @ 1281, a lens of Po that is consistent w/ bedding, a few clasts to give an agglomeratic texture, and then becomes fine grained again w/ higher chlor, less cal, slightly porphyritic w/ altered plag to chlor-cal, at 1295 is a qtz w/ minor Bio-chlor vein, partly recrystallized, possibly a lge xenolith since metamorphosed Bio schist intrudes it(?), then get incr chlor in v. fine grain Bio-ser-qtz meta andesite

very fine grained Bio-qtz, minor calcite meta-andesite, possibly a dike, also chloritic, very poorly foliated, small stringer chlor w/ Po, becomes slightly brecciated near lower contact

chilled or gradational contact, qtz-Bio schist, Bio is coarse, all else is very fine grained → Bio-qtz lattice, limonite replacing py; minor epidote within unit becomes Bio-qtz-cal-ser meta andesite