

Property	TULSEQUAH CHIEF	District	ATLIN	Hole No.	TCU-90-22
Commenced	July 12, 1990	Location		Tests at	see end
Completed	Aug 5, 1990	Core size	BQ-2	Cor. dip	-70 degs
Coordinates	N	E		True Bra.	166 degs
Objective	test downdip ext. of 1989 sulphide inter.			% Recov.	
Date	Oct. 2, 1990			Horiz. Comp.	
Logged by	RJA/MJC			Vert. Comp.	
		Revision Date	November 2, 1990		

Feet From	To	Description
0.0	6.0 (0-1.8)	CASING
6.0 (1.8-6.9)	22.5	DIORITE Pale to medium green massive fine grained intrusive, homogeneous generally with felted crystalline texture, occasional feldspar glomeroporphs all less than 1mm. Lower contact vague and indistinct due to digestion and incorporation of host pyroclastic fines, of similar composition and colour. 17-18' dark grey very fine grained interval possible ripped up block of ash-tuff pyroclastic. Lower contact 25 degs to core axis.
22.5 (6.9-20.0m)	65.5	FINE GRAINED TUFFACEOUS SEDIMENTS - Intercalated Andesite Tuff/Lapilli tuff medium to dark grey, locally whitish, fine grained, well bedded; locally tuffaceous intervals 30-32.8'. Bedding oriented 30-40 degs., slightly variable. Core generally good often breaks parallel to bedding, medium hardness- can scratch by knife. 34.7-41' Fractured bleached interval, crackled, finely veined and broken to gravel sized fragments, pale grey green bleached colour. Very fine grained, no bedding left discernable, strongly altered or flooded, looks silicified but is scratchable, contacts sharp at 20 degs to core axis. At 42' well bedded at 27 degs to core axis. 34.7-41' Core very fractured- light greenish grey colour-not sure if bleached or primary colour. 30.1-32.8' Dacite-Andesite volcanoclastic-lapilli tuff and tuff sized fragments, poorly sorted interval of coarser pyroclastics with sharp but conformable contacts, massive but with clasts aligned parallel to bedding direction at 35-40 degs to core axis. Clasts highly variable from light siliceous (dacitic) to dark fine

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From	To	

grained andesitic, overall dacitic in nature, all in a dark grey fine matrix. At 64' bedding at 37 degs. to core axis.

64-66.6 Increase in hairline chlorite healed fractures, related to diorite.

65.5 86
Diorite dykes-contacts 30 degs to core axis. Minor-32 pyrite. 42.6-44.3', 40.7-41.3' - small medium grained.

(20.0-26.2m)

Diorite fine grained light to medium grey green intrusive with felted crystalline texture, massive and relatively featureless, softer and chloritic. Contacts broken, veined and calcareous.

FAULT

- 66.6-71' broken, ground approx. 30% calcite vein material, minor FAULT GOUGE.

78-86.6' also quite broken and calcite veined, locally vuggy with sparry calcite. Faulting and fracturing all post emplacement. Minor mixing of host tuffaceous material. Core generally very fractured and broken up especially at 65.6-74.8' and 80-86'.

86.0 93.0
(26.2-28.3)

FINE GRAINED TUFFACEOUS SEDIMENTS

- Veined and locally altered by diorite-small diorite veinlets locally, fine to very fine grained, dark to medium grey. Core broken up in angular 2-8 cm pieces; crackle brecciated with abundant fine chlorite more or less quartz healed fractures; variable hardness generally hard-silicified. Bedding rare approx. 35% to core axis.

93.0 101.7
(28.3-31.0)

FINE GRAINED TUFFACEOUS SEDIMENTS

- Well bedded- Strongly Bleached and Altered locally porphyroblasts.

94.8-96' and 99-100.3' VFG felsic intrusives- possibly - Sloko equivalents - these intrusives result in pale grey green mottled colouring, heterogeneous character. Intrusives easily scratchable by knife - sericite altered. Sharp upper and lower contacts, contacts rimmed with porphyroblastic rich zones - 1.3 mm, round in sediments. Sediments are well bedded - 45 degs to core axis.

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 From ----- To ----- Description -----

101.7 125
 (31.0-38.1) FINE GRAINED TUFFACEOUS SEDIMENTS
 - Cut by Felsic (sloko) Dykelets and possibly minor diorite dykelets. Chlorite-quartz veinlets common throughout section. Cut frequently by quartz rimmed chlorite filled veins coarsing irregularly through sediments grey-black colour very fine grained, relict bedding poorly preserved approx. 50 degs. to core axis.
 Some thin felsic dykes
 107.9-110.5' contacts 30 degs. to core axis.
 - 115.5 (6cm thick)
 - 117.1 (30cm thick)
 - 119 - 124' coarse volcaniclastic sediment - fragments 1 - 15 mm cut by calcite veinlets - core very fractured in this section.

125 157
 (38.1-47.8) FINE GRAINED TUFFACEOUS SEDIMENTS
 - Intruded by Felsic Dykelets (possibly sloko) complicated zone, similar to 101.7-125'
 Felsic dykes white to greenish white, fine grained - dykes are generally variably hybridized by sediments. Sediments generally fine grained, grey/black, but near dykes are bleached to white, greenish white colour.
 Main areas of felsic dykes - 125-125.6', 129.5', 130.9', 136.8', 139.7' and 151', 154.8', 139.7'-146' Diorite dyke - Two phases - 139.7' - 143.3' fine grained; 143.3 - 145.9' - feldspar porphyry upper contact 45 degs., lower contact 45 degs. core axis.

157 188.6
 (47.8-57.5) TUFFACEOUS SEDIMENTS
 - generally fine grained.
 176.8-179' coarse grained sediments - fragments 3-15 mm - some pyritic fragments 2-10 mm.
 Sediments locally bleached and cut by quartz - chlorite veinlets. Bedding at 45 degs. to core axis.

181-182' Diorite dyke - porphyritic - contacts 45 degs to core axis.
 Core moderately fractured 3 fractures/foot.

150.6-156.5' Tuff - fine grained weakly bedded, sericite altered and now with minor biotite alteration, vaguely finely crackled. Sharp contacts.

156.8' Note first appearance of weakly disseminated Fe sulphide, very fine, subhedral

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disseminated evenly in fine grained white, greenish white dyke (rhyolite) lower contact brecciated and upper contact vague approx. 45 degs. to core axis.

48.7 Relatively massive fine grained, dark grey, homogeneous weak alteration now includes BIOTITE and weak py disseminated, approx. 1-2% very finely disseminated subhedral medium or rare clots and fracture healings. Common thin chlorite/qtz healed fractures. Bedding rare but generally at 45 degs to core axis; examples at 170- 172.2', 171.9-172.5' strong biotite presence gives distinct brown tint.

187.6 870
 (57.5-265.3)

DIORITE

- Massive homogeneous medium to dark green grey fine to medium grained intrusive, easily distinguished from the extrusives by massive nature and colour (greener). Locally weakly porphyritic. Diorite shows evidence of multiphases with each phase having fine grained contacts. Zones of bleaching observed maybe due to later phases altering earlier phases at diorite.

187.6' - 10 inch quartz - breccia zone.

187.6-269' Generally diorite fine to medium grained and slightly augite porphyritic to equigranular. It is medium hard - leaves patchy knife metal. Irregular wispy chlorite veinlets. Rock grey greenish to greenish colour.

236.2 - 6" Zone broken core - no slickensides.

361-365' Zone of broken core, patchy quartz veinlets and pyrite. Core bleached. 36.4-37' gouge - main FAULT ZONE.

384-385' Zone of broken core.

269-439.6' DIORITE greenish grey to greenish black and coarse grained and equigranular. Minor patchy quartz and chlorite veinlets cutting core 30-90 degs. to core axis.

439.6-529.5' DIORITE fine - medium grained with more patchy mottled (bleached) zones and quartz veinlets more common (45-80 degs. to core axis).

Diorite texturally quite variable in this zone - probably contact zone between phases of diorite.

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Feet		Description
From	To	

460-462.5' DIORITE weakly brecciated and bleached.

529.5-711' DIORITE coarse grained, equigranular greenish grey colour. Few patchy quartz veinlets and chlorite veinlets generally 35 - 70 degs. to core axis.

565.6' 2" gouge zone.
712.6' sheer zone 6" wide.

589-609.5' 2 inch quartz veins 90 degs. end 40 degs to core axis.

711-744 DIORITE fine grained, greenish grey; equigranular. Locally weakly porphyritic.

744-751' Porphyritic diorite dyke - upper contact 25 degs to core axis and lower contact 45 degs to core axis. Augite phenocrysts aligned 10-20 degs to core axis.

751-810 Diorite fine grained, greenish grey.

799-820 Core very broken and fractured; minor slickensides on some fractures.

776' 8" epidote healed fracture zone 35 degs. to core axis.

795.5 2" quartz vein 90 degs to core axis.

811-816' Porphyrite diorite dyke - Augite phenocrysts 15% 1-2mm. Contacts 15-20 degs to core axis.

816-870' Fine grained equigranular diorite. Rock greenish grey.

820', 842', 850' 2-3 inch quartz veinlets 90, 45 and 45 degs respectively to core axis.

861 - 12" Shatter zone reannealed by quartz.

Note; except where indicated core generally only weakly fractured 1-2 fractures/ft.

FINE GRAINED TUFFACEOUS SIDEMENTS

- Very fine grained, massive, grey to slightly brownish grey, 3-5% disseminated to locally banded pyrite; sediments appear hornfelsed. Unit is strongly porphyroblastic -

870 918
(265.3-280.1)

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From _____ To _____ Description _____

porphyroblasts 1-3 mm, bluish and round to squarish; comprise 10-30% of rock. Sediments ore locally shattered and reannealed by chlorite veinlets and some quartz veinlets. Rare bedding approx. 30-35 degs. to core axis. Tiny non oriented quartz veinlets scattered throughout section. Some have pyrite core. Some chlorite veinlets contain magnetite.

918 952
(280.1-290.3)

DACITE. ANDESITE.

- Volcaniclastic with muddy matrix - tuff and lapilli sized fragments. A difficult to determine composition as some phases harder than others (leave knife or rock) and have slightly conchoidal fracture. Some felsic fragments locally. Generally rock could vary from dacitic to andesitic in composition. Light colour and slightly conchoidal fracture suggest dacite, but general appearance and hardness suggest andesite. Matrix contains variable clastic component resembling volcanoclastic sediments. Rock is fairly homogeneous in colour and texture, greyish, green in colour. Fragments aligned and 3 mm to 2 cm size. Fragments aligned 0-30 degs to core axis.

Generally - 30 degs at 914' and 924'
- 0 degs at 933.5' and 951'

Red hematite fragments common approx. at 5%. Zone locally cut by chlorite-quartz, epidote magnetite veinlets. Some fragments augite porphyry, some amygdaloidal, some chlorite but most massive aphanitic.

952- 956
(290.3-291.6)

F.G. TUFFACEOUS SEDIMENTS

- same as 870-919' very fine grained, grey soft to knife cut. Fine grained, grey, massive. No porphyroblasts; 1-5% pyrite. Rare bedding 15-20 degs. to core axis.

956- 959.7
(291.6-292.6)

DACITE-ANDESITE VOLCANICLASTIC

- same as 919'-952'. Muddy matrix. Bedding 0-15 degs to core axis. Hematite fragments 1-5% (red). Core very fractured.

959.7 963
(292.6-293.5)

F.G. TUFFACEOUS SEDIMENTS

- same as 870-919'. Very fine grained, grey. Soft to knife cut. Bedding 0-10 degs to core axis. No porphyroblasts. 1-5% pyrite.

963 970
(293.5-295.7)

DACITE-ANDESITE, VOLCANICLASTIC

- same as 919-952' Muddy matrix. Bedding 0-15

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Feet		Description
From	To	
		degs to core axis. Hematite fragments 1-5% (red)
970-	977 (295.7-297.8)	F.G. TUFFACEOUS SEDIMENTS - Bedding 20-25 degs to core axis. Same as 870-939. Very fine grained, grey. Soft to knife cut. Core very fractured. No porphyroblastic; 1-5% pyrite.
977-	980 (297.8-299m)	DACITE-ANDESITE VOLCANICLASTIC - Same as 286.1-290.3 Muddy matrix. Bedding 0-10 degs. to core axis. Hematitic fragments 1-5% (red).
980	(299-300.4)	>FG TUFFACEOUS SEDIMENTS< - Same as 870-919' No porphyroblasts. Very fine grained grey. Soft to knife cut. Bedding 25-30 degs to core axis. 1-5% pyrite. Core very fractured.
984	995 (300.4-303.3)	DACITE ANDESITE-VOLCANICLASTIC - Same as 919-952' Red hematitic fragments common 5-8%. Bedding rare but 40 degs. to core axis. Zone is very disturbed by chlorite-quartz veining - possibly related to nearby diorite dyke. Core quite fractured.
995	1000.5 (303.4-305m)	DIORITE DYKE - Fine grained, hard, massive, grey green, equigranular. Upper contact very altered and irregular - possibly low angle to core axis. Lower contact approx. 30 degs to core axis.
1000.5-	1010 (305.0307.9)	FELSIC DYKE - Possibly Sloko equivalent - Dyke appears to have occupied FAULT zone. Very mashed up and sheared - shearing 10-30 degs to core axis - parallel to upper contact. Core strongly fractured and broken. Some slickensides. Chlorite veinlets common. Upper contact 80 degs. to core axis. Dyke very hard to knife cut.
1010	1020.9 (307.9-313.9)	DIORITE DYKE - Variably intruded sheared and altered by felsic dyke (diorite locally quite hybridized). Diorite contains veinlets and patches at felsic dyke throughout. Quartz veinlets locally throughout diorite. Shearing diorite generally 30-40 degs. to core axis.
		1018.5-1023 - diorite strongly hybridized by felsic dyke. 1027.5-1029.5 - diorite strongly hybridized by felsic dyke.

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Feet		Description
From	To	
		Upper contact approx. 80 degs to core axis and lower contact vague.
1029.5	1064.7	FELSIC DYKE
(313.9-324.6)		- Related to 1000.5-1010' - possibly Sloko equivalent - Variably hybridized throughout - difficult to determine original composition. Variably sheared approx. 30-40 degs. to core axis.
		1029.5-1037' and 1057-1064.7' - These sections are the least hybridized view of dyke - closest to original composition and texture. Contacts 30-80 degs to core axis.
		1037-1057' - Variably hybridized diorite dyke or felsic dyke, strong mixture at both rock types, difficult to recognize either.
		1033-1037 - Considerable pink - reddish pink material in dyke - maybe either hematite or kspar. Zone contains minor patchy pyrite. Moderately fractured.
1064.7	1088.7	DIORITE DYKE
(324.6-331.9)		- Strongly sheared and hybridized by intruding felsic dyke. Shearing generally 30-45 degs to core axis. Quartz veinlets and chlorite veinlets common.
		1077-1088.7 - Effects of felsic dyke much more obvious - rock is hybridized combination diorite and felsic dyke. Minor patchy pyrite. Moderately fractured.
1088.7	1115	STRONGLY SHEARED AND BRECCIATED FELSIC DYKE
(331.9-339.9)		- Possibly Sloko equivalent - FAULT ZONE. Breccia fragments 3mm - 3cm. Dyke has been extensively sheared and fragmented. Locally gouge zones 0-20 degs to core axis.
		1094' (20degs) and 1104-1108' (0degs)
		Marioposite throughout in breccia fragments and matrix. Pyrite patchy 0-3%. Upper contact 45 degs to core axis. Lower contact 20 degs to core axis. This zone should be assayed for gold.
		NOTE: 1005.5-1115 - Whole zone is part of major zone at disturbance - fault zone with main faults probably centered on 1000.5-1010' and 1088.7-1115'.
1115	1189.5	DIORITE DYKE
(339.9-362.6)		- Grey black colour.

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Feet From	To	Description
		1115-1151 - Fine grained, moderately fractured, 4-5 fractures/foot.
		1151-1171 - Medium to coarse grained approx. augite phenocrysts common.
		1168.5-1170 - Small felsic dyke with 6 inches bleach zone on either side of dyke. Dyke similar to 1088.7-1115'. Upper and lower contacts 30degs to core axis.
		1171-1181 - Fine grained.
		1181-1189.5 - Zone of mixed diorite and dacite rhyolite pyroclastics - quartz veins common; zone 60% diorite, rest contaminated diorite and minor felsic pyroclastics. Upper contact against sheared Sloko dyke; lower contact irregular. Some shearing in dyke 35 degs to core axis. Fracturing 2/foot 179.5-180.5 core shattered.
1189.5	1256 (362.6-382.9)	DACITE - RHYOLITE PYROCLASTICS - Grey white to greenish white colours. Feldspar crystals common. Fragments grey aphanitic, feldspar porphyritic, reddish hematitic and locally chloritic (andesitic). Fragments commonly 1mm to 12cm, average 3mm to 5cm. Locally small hematitic (red) fragments.
		1203.5-1207 - Diorite dyke, upper contact 65 degs to core axis, lower contact similar
		1211.5-1213.5 - Diorite dyke, upper contact undeterminable, lower contact 30 degs to core axis. Quartz veinlets common
		1200-1203.5 - Diorite dyke contacts to 60-70 degs to core axis. Possible bedding - Bedding on tuff beds end flattened fragments.
		1250.5' - 40 degs to core axis
		1256' - 40 degs to core axis
		1227' - 40 degs to core axis
		1231-1232' and locally elsewhere in section 3-5mm round spots, greenish in colour. Minor quartz veinlets throughout section. 1224' - 2" diorite dyke.
1256	1491 (382.9-454.6)	DIORITE DYKE - Upper contact 65 degs. to core axis. Grey black colour, medium to medium coarse grained, hard to knife cut. Equigranular, mafics chloritized. Blocky rock, 1 fracture/foot; few

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Feet		Description
From	To	

scattered quartz-chlorite veinlets.

1318-1320 - Fine grained, possible contact between two diorite phases approx. 90 degs to core axis.

1357-1360 - Fine grained, possible contact between two diorite phases, foliation at 45 degs. to core axis.

1371.5-1373 - Fine grained, contact between phase, 70 degs to core axis.

1440-1441 - Fine grained contact between phases, 70 degs. to core axis.

1408-1417 - Similar diorite but slightly lighter colour - grey instead of grey-black.

1430-1432 - Fine grained - contact between two phases - 60 degs to core axis.

1462-1463 - Fine grained - contact between two phases - 45 degs to core axis. Core very blocky, 1 fracture/foot.

1491 1503
(454.6-458.2)

FELDSPAR PORPHYRY DIORITE

- probably a phase of diorite. Feldspar phenocryst 1-2 mm and 10-15% degs of core; feldspar crystals often zoned and locally glomerocrystic. Rock grey-black and hard to knife. Minor quartz-chlorite veinlets.

Lower contact 10 degs to core axis; upper contact 50 degs to core axis. Core blocky, 1 fracture/foot.

1503 1764
(458.2-537.8)

DIORITE

- Fine to medium grained, equigranular, massive, grey-black colour.

1523-1525 - Fine grained, possible contact between dyke phases.

1597-1598 - Fine grained feldspar porphyry diorite dyke feldspar phenocrysts 10-15% and 1-2mm; rock is grey-black colour; VFG cooling margin. Minor scattered quartz-chlorite veinlets.

1613.5-1614.5'; 1619-1630' -patch zones of feldspar porphyry diorite to equigranular

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diorite in places feldspar, rich pods look like fragments in diorite, grey black colour; fine to medium coarse grained. Difficult to define margins in dykes.

1687-1764 - More quartz-chlorite-epidote veinlets (locally magnetite). Then rest of section generally at 50-80 degs. to core axis. Some pyrite in veinlets. Diorite generally fine grained in this section. Looks like contact zone.

1753-1764 - Patchy felsic dykelets 1\2-4" could be xenoliths of underlying felsic volcanics.

1764 1784.5
 (537.8-544.1)

DACITE-RHYOLITE-PYROCLASTICS-LAPILLI-TUFF
 - Weakly altered (sericite/biotite). Light grey, greenish grey fragments (hard) in grey-black to black matrix - matrix soft to knife cut. Matrix probably variably altered to account for dark colour - mixed chlorite-sericite. Fragments 3mm to 20 cm. Alteration in matrix strongest from 1774-1784.5'. Bedding approx. 40-45 degs to core axis. Fragments commonly aligned parallel to bedding. Bedding common in tuffaceous matrix.

1781.5-1784.5 Coarse grained dark felsic tuff, black colour altered, bedding 45 degs. to core axis.

1784.5 1948.5
 (544.1-594.1)

MINERAL HORIZON
 MASSIVE SULPHIDE ZONE
 - host rock strongly altered upper contact with overlying dacite-rhyolite pyroclastics knife sharp and 40 degs to core axis. Rock strongly altered, sericitized and bleached. 1784.5-1785.5 - Strongly bleached, sericitized tuffs; 1-5% pyrite, minor sphalerite. Bedding 45 degs to core axis. 1785.5-1829 - High grade sphalerite (mainly yellow coloured) interbedded (finely) with pyrite. Host rock strongly sericitized, bleached tuffs.

Bedding

- 1785.5-1791' - 45 degs to core axis
 - 1791-1794' - 30-35 to core axis
 - 1794-1803.5' - 45 degs to core axis locally folded and 60-90 to core axis.

- 1803.5-1812' - Variable 0-90 degs but averages 40 degs to core axis.

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Feet
From _____ To _____ Description _____

- 1812-1816' - 40-45 degs.
- 1816-1819' Variable, difficult to tell may parallel core axis.
- 1829-1831' 60% pyrite with variable sphalerite and chalcopyrite, patches and bands, strongly altered tuffs; bedding.
- 1831-1834' Strongly sericitized and bleached tuff; 2-5% pyrite. Bedding variable averages approx. 20 degs.. Minor chalcopyrite.
- 1834-1867.5' 65% pyrite with variably but significant chalcopyrite, minor sphalerite as definite beds. Rocks strongly altered dacite tuff.

Bedding:

- 1834-1839' - 30 degs.
- 1839-1853' - 30 degs.
- 1867.5-1881' Intercalated 60% pyrite bands 1-3 feet thick with cpy and sphalerite with interbedded sph, galena, pyrite bands (5-15%), 1-3 'thick. Significant Cu and Zn; host rock strongly altered dacite tuffs.

Bedding: 1807.5-1876' 50 to 65 degs average approx. 55-60 degs contortions and folding in places. 1876-1881' - 20-40 Avg approx. 30 degs. Some contortions
1881-1885 Semi-massive pyrite (30%) with disseminated sphalerite and blebs at cpy; tan-white matrix maybe sphalerite or barite. Host rock strongly altered dacite tuffs.
Bedding-rock is contorted, bedding 0-50 degs averages 10-15%.

1885-1889.5 - 40-60% pyrite with disseminated black sphalerite and gobs of cpy. Light white-tan coloured matrix maybe barite or sphalerite. Host rock strongly altered tuffs.
Bedding contoured 10-50 degs. Averages 35 degs.

1889.5-1899.5 Primarily light yellow coloured sphalerite with some disseminated (5-15%) pyrite and 40-60% pyrite bands. Good grade Zn. Host rock strongly altered dacite tuff. Bedding 25-50 degs Avg approx. 40 degs.

1899.5-1895 Similar to 1889.5-1899.5', but less sphalerite. Bedding 40 degs to core axis.

1895-1910 Looks like footwall feeder zone, large bleached siliceous fragments surrounded by chalcopyrite-pyrite veinlets. Light tan coloured

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matrix maybe sphalerite or barite. Host rock altered dacite lapilli tuff. Bedding 30-40 degs.

1910-1928.5 Well banded light coloured sphalerite and pyrite. Pyrite averages 5-20%; except for 0.5-2' bands of 25-50% pyrite.

1910-1920 tan-white coloured matrix either sphalerite or barite. Chalcopyrite gobs in heavier pyrite sections. Banding - 30 degs to core axis.

1928.5-1933.5 Well banded pyrite and lesser chalcopyrite and sphalerite. Pyrite bands 2-10mm, averages 30%. Host rock strongly altered dacite tuffs, leached, sericitized. Bedding 40-55 degs approx. averages 40-45 degs.

1933.5-1948.5 Heavy pyrite (50-60%) with significant chalcopyrite bands and minor sphalerite.

1938-1940.5 Minor sulphide, well banded 5-15% in strongly altered dacite tuffs. Banding approx. 30 degs to core axis with one zone 0-10 degs (averages 30 degs.)

1948.5 1963.5
(594.0-598.6)

DACITE-RHYOLITE TUFF, CHERTY TUFF, CHERT - Strongly Altered (ser,py) with minor intermixed lapilli tuff phases.

1948.5-1956 Strongly leached, sericitized intermixed dacite tuff, chert, cherty-tuff bands, pyrite 5-10% finely disseminated.

1956-1960 Weakly altered dacite, rhyolite tuff, lapilli tuff, grey black colour very similar to

1781.4-1784.5 which immediately overlies the mineral horizon- dark colour due to alteration 3-8% pyrite.

1960-1963.5 Strongly altered dacite tuff, lapilli tuff, 5% disseminated pyrite. Bedding in section averages 45-50 degs. to core axis. Alteration, strongly bleached and sericitized - 3-10% disseminated and banded pyrite.

1963.5 1981.5
(598.6-604.1)

DACITE-RHYOLITE LAPILLI TUFF Strongly Altered.
(ser,py)

- Rock is strongly bleached and sericitized with

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3-5% disseminated pyrite. Relict fragments visible as grey-white blebs 3mm-10cm; locally some fragments appear to have quartz amygdule-like shapes. This unit may be a mixed dacite and andesite pyroclastic unit, but difficult to confirm due to alteration. Most fragments siliceous and hard to knife cut.

1970-1971 Relict less altered section grey-black coloured matrix with slightly greenish fragments.

Weak alignment of fragments in core:

1965' - 30 degs to core axis
 1970' - 50 degs to core axis
 1980' - 70 degs to core axis
 1981' - 30 degs to core axis

Note: Most fragments siliceous and interpreted to have been felsic in origin but 10-25% of fragments. Have round to ovoid 2-10 mm sized siliceous clots which could be relict amygdule and thus andesitic in origin. Best guess is unit dacite-rhyolite pyroclastic with 1-15 % andesite fragments.

1981.5 2002
 (604.1-610.4)

ANDESITE LAPILLI TUFF, Strongly Altered, difficult to be certain of composition. Vague relict fragments stretched around 30 degs to core axis. Fragments irregular shaped 3mm to 10 cm, bleached, grey-white and strongly sericitized. Pyrite disseminated and as veinlets 3-10%. Minor quartz veinings. Some possible relict quartz amygdules 2mm-10mm ovoid, throughout section. Rock is soft to knife. Matrix and fragments similar- grey-white, soft, sericitized. Banding 0-35 degs averaging 25-20 degs to core axis.

Note: difficult to determine original rock-type composition, but presence of possible amygdules, softness to knife and look of good siliceous fragments suggests rock is altered andesite.

2002 2029
 (610.4-618.6)

DACITE INTRUSIVE Strongly Altered. Grey-white colour, variable but locally abundant very tiny quartz veinlets, hardness (leaves knife) pyrite spots (1-5mm) disseminated and fair by massive homogeneous texture suggests altered dacite intrusive.

Rock has been bleached and sericitized; average 3-5% pyrite primarily as disseminations but locally pyrite veinlets 1-3mm top 7 cm thick.

Property TULSEQUAH CHIEF District ATLIN Hole No. ICU-90-22

Feet		Description
From	To	
		Upper contact irregular but averages 30 degs to core axis. Alteration, bleaching and pervasive sericitization and pyrite.
		2009.5-2011.5 - strongly bleached sericitized dacite lapilli tuff.
2029 (618.6-623.5)	2045.5	DACITE LAPILLI TUFF - Strongly Altered (py,ser) - Rock bleached, grey and sericitized; can be cut with knife but considerable knife left in rock. Remnant fragments vague and difficult to tell from matrix 3mm - 7cm. Pyrite disseminated and some clast-like - 3-8%.
		2039-2045.5 Black-greyblack dacite lapilli tuff; matrix black and softer than fragments which are grey. Fragments 3mm to 5 cm, siliceous. Matrix probably VFG chlorite, biotite, sericite mix. Pyrite 3-5%. Vague foliation in rock 45 degs to core axis.
2045.5 (623.5-632.8)	2075.5	DACITE INTRUSIVE- variably altered. - Grey, aphanitic and hard. 3-8% disseminated pyrite. Cut by tiny chlorite veinlets and 1 mm - 5 cm thick quartz veinlet.
		2058-2060.5 Diorite dyke-lower contact 45 degs to core axis, upper contact 45 degs to core axis.
		2043-2046.5 Core shattered.
2075.5 (632.8-638.7)	2095	DIORITE DYKE - Fine grained , green-grey scratchable intrusive, homogeneous and equigranular; cut by occasional fine anastomosing quartz veinlets. Sharp chilled upper contact, broken veined lower contact over 1.5m.
		2080.5-2086 DACITE DYKE pale grey siliceous extremely hard fine grained intrusive with abundant 0.2-2.0cm. Bull qtz veins at 80-90 degs to core axis, weakly disseminated by clots and stringers, more fractured than surrounding diorite.
2095 (638.7-648.7)	2128	ANDESITE TUFF-LAPILLI TUFF - Foliated, Locally with Dacitic Fragments.
		Weakly altered, bleached and possibly sericitized chloritized may have some mud in the matrix. Relatively homogeneous fine grained

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Feet		Description
From	To	

massive grey-black coloured; lapilli fragments form fine crackle breccia-like mosaic pattern 3-30mm; fragments soft.

Soft, easily knife scratched matrix; matrix black, darker than fragments.

Foliation and weak alteration give grains common orientation, usually at low angle to core axis (0-30 degs) and very indistinct grain boundaries.

No distinct bedding, overprinting foliation masks it but suggestions of it being parallel to foliation (low angle). Locally kink banded (rare).

2099-2104 FRACTURED ZONE core broken into knife like shards possible small 15-20 cm felsic dyke at 2099-2100', minor gouge and weak slickensides suggest movement - FAULT

Approx. 2120 matrix becomes lighter, higher degree of recrystallized/mobilized feldspar somewhat finer grained matrix but with

2106-2128' - lapilli tuff phase

2095-2106' - mainly tuffs, bedding 15-20 degs to core axis.

2128 2174
(648.8-662.8)

ANDESITE LAPILLI TUFF With Tuffaceous Phases (weakly altered) with 10% dacite fragments and bombs 3mm - 30cm throughout may have some mud with matrix.

2128' beginning of approx. 10% felsic dacitic lapilli sized clasts, generally highly siliceous/quartz subrounded and occurring within similar to andesitic pyroclastic of last section. Very soft and black matrix with grey-black fragments.

2135' Large Dacite bomb with irregular contacts at low angle to core axis fragments difficult to discern. Pale grey-green, very hard and siliceous "bedding" at 25 degs to core axis.

Similar pulses always 2' or less seen at 2128-2128.8', 2130', 2132', 2137.7', 2143'.

At 2143' aligned fragments at 5 degs to core axis.

2145-2150 Strongly altered bleached sericitized, approx. 10% dacitic fragments. Core fractured, calcite healed.

2150-2175 Weakly to moderately altered bleached sericitized andesite coarse tuff to fine lapilli tuff with bedding and/or foliation oriented 10-

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 Feet
 From ----- To ----- Description -----

20 degs to core axis. Difficult to distinguish, locally appears as bedding where continuity maintained otherwise simply manifest as common grain orientation, grain boundaries vague, corroded or eaten away.

Dacite component ? 5% as rare felsic 2-5 mm fragment.

Bedding common in tuffs approx. 15-20 degs. varies 0-30 degs.

Andesite material soft to knife, weakly altered sericite (chlorite), bleached (pervasive). This is a best guess at the alteration bleaching is very minor, lighting of units colour.

2174 2196
 (663.1-669.5)

ANDESITE FELDSPAR PORPHYRY DYKE

- could be tuff but homogeneous, massive nature, fine grained, quartz rich contacts and similar andesitic pyroclastic rock on either side suggest dyke. Matrix black, muddish black, probably pervasively biotite altered with 5-10% feldspar crystals. Fine grained dark green/brown massive homogeneous. Frequent fine fractures or veinlets of quartz-calc-epi-py.

Brown tint attributed to pervasive biotite alteration. Intermediate hardness, varies.

2184-2194 Siliceous intervals of harder material increased alteration (epidote/bleaching) with tiny (1 mm to 0.5mm) felsic phenocrysts. Represents dacite intermixing.

2194-2199 Flow banding on margin at dyke angular fragments dark in a swirlitg siliceous matrix to 2196'.

Banding 45 degs to core axis on lower contact and 20 degs on upper contact. Core 1-2 fractures /foot.

2196 2215
 (669.5-675.3)

FINE ANDESITE LAPILLI TUFF Weakly altered - Same as 2128-2174' except for red jasperoid fragments 5-10%, possible mud component in matrix. Locally magnetic, weakly foliated. Propylitic alteration as see 2150-2175', indistinct grain boundaries, soft, sericite and chlorite present; fairly homogeneous on a dm scale. Lapilli fragments indistinguishable from matrix generally - 3mm-2cm. Locally jasperoid fragments.

Foliation weak, weaker than 2095-2175' intervals. Magnetic dacite clasts beginning at 2200', rare but distinct, at 2206' they are

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Feet
 From ----- To ----- Description -----

hematitic as well, elongate reddish amorphous blebs.

2213-2215 Cherty contorted bands mixed with hematite, strongly magnetic. Alignment of fragments 10-30 degs to core axis.

2215 2225
 (675.3-678.4)

ANDESITE LAPILLI TUFF with Variable Dacite - Fragment Component 65% - probably weakly altered with porphyroblasts, possible mud component in matrix. Distinctive looking unit strongly fragmental dark, grey, green angular sub-angular fragments in darker matrix all overprinted by strong porphyroblastic development; Porphyroblasts generally in matrix 1-3mm bloated rice shaped ovoids; felsic fragments 3-30mm and subround to irregular shape. Core good, unit of variable hardness where matrix rich it is hard and light non scratchable, fragments scratchable, porphyroblasts hard and siliceous.

Note: odd looking unit; very distinct porphyroblasts developed throughout. Some felsic looking fragments are coalescing porphyroblasts. Some definite andesitic fragments 3-30mm but generally fragmental texture due to porphyroblasts- porphyroblasts might be due to adjacent dacite intrusive.

2225 2272
 (679.3-692.7)

FELDSPAR PORPHYRY DACITE INTRUSIVE
 - Hard, magnetic; dark fine, grained dacite dyke characterized by unusual hardness and 5-10% fine anhedral to subhedral feldspar crystals (plag). Cut by frequent irregular quartz epidote veins/veinlets. Looks aphanitic, very smooth, leaves knife frequently; grey-black colour, but fairly siliceous in hard lens. Local metamorphic textures includes incipient porphyroblastic growths, segregation of felsics and mafics or rimming if larger xtals. See 2249-2251 for example.

2261-2265.5 Xenolith of andesite lapilli tuff with porphyroblasts similar to 2215-2225'.

Note: hardness, generally uniform texture and quartz, epidote veinlets further evidence this unit intrusive and not tuff or flow.

2272 2305
 (692.7-702.7)

ANDESITE LAPILLI TUFF - very porphyroblastic, similar to 2215-2225' except no dacitic fragments; possibly mud component in matrix.

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Feet
 From _____ To _____ Description _____

Again a fine dark to medium grey andesite pyroclastic with weak to strong porphyroblastic development as 0.5 to 3.0 round to oval. Ubiquitous evenly, distributed porphyroblasts, usually faint to ghosted, always lighter than the matrix.

Composition unknown, await thin section analysis. Now possibly represents zone of higher alteration resulting from cooking by the surrounding intrusive material.

Core good, massive homogeneous intact - 1 fracture\foot. Easily knife scratchable; unit is massive with no alignment or bedding. 2290-2292' ghosted fragments. Pale subrounded 2-10 mm forms.

Noticeable decrease in frequency of veins and fractures, little or no epidote alteration seen in surrounding andesite. Which "unit" has higher degree of alteration?. Perhaps "Feldspar phytic" intervals are intrusive.

Difficult to see fragments except through supposition due to porphyroblasts distribution.

2305 2339.5
 (702.7-712.2)

FELDSPAR PORPHYRY DACITE

- Intrusive hard magnetic. Light to medium grey (distinct from above unit) similar to 2225-2272', very hard, leaves knife in almost all instances. Cut by abundant 1-10mm wide veins of soft white crystalline mineral- gypsum.

Locally brecciating the wallrock. Averg. 2 to 3 per meter. Also abundant amorphous quartz-epidote anastamosing veinlets. Sharp upper and lower contacts to abundant seric/chlorite veining 30 degs to core axis.

Some incipient feldspar developed in adjacent andesite volcanics suggesting some ingesting of volcanics by intrusive.

2339.5 2363
 (712.2-720.4)

ANDESITE LAPILLI TUFF Strongly Porphyroblastic; 1-2% dacite fragments 5-30mm as previously described. Dark grey fine grained massive homogeneous unit, easily scratched with local harder zones. Similar to 2272-2305' - probably mud component in matrix.

Evenly distributed subrounded pale 0.4 - 5.0mm porphyroblasts in darker grey-green matrix, locally and weakly biotite tinged brown. 2354' example of where porphyroblastic look more porphyritic, possible crystal faces, may represent feldspar phenocrysts from which porphyroblastic originate.

Very difficult to see andesite fragments. Can

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Feet		Description
From	To	

only guess due to distribution of porphyroblasts.

2363 2381.5
(720.4-726.1)

FELDSPAR PORPHYRY DACITE INTRUSIVE (magnetic)
- Same as previous Feldspar Porphyry Dacite intrusive but with locally intermixing of pyroclastics.

At 2371-2377' find bands of non felds-phyric tuff oriented at 30 degs to core axis. Again find increase presence of quartz-epidote veinlets. Feldspar phenocrysts plentiful. 3-5% scattered fine 0.1-1.0mm, subhedral, sharp lower contact at 10-15 degs to core axis. Some flow banding 35-40 degs to core axis.

2381.5 2390
(726.1-728.7)

DACITE LAPILLI TUFF
- Or phraetic/breccia and shearing on margin of dacite intrusion.
Light, grey clast supported, dacitic pyroclastic. Clasts and matrix very similar, difficult to discern difference, clast boundaries vague. Core good, intermediate to very hard, leaves knife here and there. Lower contact difficult, appears gradual, feldspar phenocrysts appear within this interval. Cut by occasional thin chlorite wavy veinlets. Non magnetic but for the thin chloritic veins.

2390 2415
(728.7-

ANDESITE LAPILLI TUFF With some tuff sections (Occasional dacitic fragments) clearly pyroclastic (locally bedded tuff) dark grey with tinges of green and brown (chlorite and biotite alteration weak). Locally weakly feldspar phyric, irregularly scattered small < 1mm feldspar crystals, varying abundance. Hardness widely variable, locally very hard, can't be scratched.

2392-2395 has moderately foliated appearance, foliation (bedding) at around 5-10 degs to core axis. Sharp contacts. Frequently magnetic disseminated magnetite or veined.

2409-2412 Bedding clearly defined; fine grained bedded andesite tuff oriented at 30 degs to core axis. Note absence of phenocrysts or p.blasts.

2425 Note presence of cm scale lighter dacitic clasts.

2415 2434
(736.1-742.4)

FELDSPAR PORPHYRY DACITE INTRUSIVE
- Possibly some phraetic brecciation. Similar to

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Feet
 From _____ To _____ Description _____

previous intrusive 2863-2381.5' Upper contact 20 degs to core axis. Generally grey colour - darker colours patchy probably due to ingestion of andesite volcanics.

2434 2453
 (742.4-748.2)

ANDESITE LAPILLI TUFF
 - 5% dacite fragments. Black colour. Fragments aligned 35 degs to core axis.

2435-2449 Fragments lighter colour than matrix. Minor patchy porphyroblasts.

2449-2453 bedding 45-50 degs to core axis. Increasing dacite fragment component towards base of section.

2453 2474
 (748.2-754.0)

DACITE-RHYOLITE LAPILLI TUFF - weakly altered - Light coloured fragments (white-pale green white) in dark green matrix. Fragments 3 mm - 10 cm. Alteration pyrite 2-4% and slight darkening of core (chlorite/sericite) 2467-2468' pyrite 15% dacite tuff. Fragments aligned 45 degs to core axis.

2474 2502
 (754.0-763.1)

ANDESITE LAPILLI TUFF
 - Up to 20% Dacite fragments, weakly altered. Grey-black colour with fragments distinct. Fragments aligned 40 degs to core axis. Sections up to 12" with 75% dacite fragments. Alteration pyrite 2-5% disseminated and veinlets; weak chlorite and sericite.

Core generally moderate hardness, some bands are chertier thus harder i.e 2493'. Core broken, generally < 10cm any piece. Common py healed fractures.

2499-2501' Broken to gravel size calcite py-chlorite-epidote alteration.

2500-2502' Coarse tuff, fine lapilli tuff, andesite, dark altered, dacite, bedded vaguely at 35 degs to core axis.

2502 2509
 (763.1-764.9)

FELSIC SLOKO DYKE
 - Extremely siliceous, white creamy green weakly banded interval cut by tangled network of chlorite by veinlets, approx. 10%

2505-2509' Broken up fractured, darker, contains xenoliths of wall rock. Pseudobrecciated texture. Sharp lower contact.

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Feet
 From _____ To _____ Description _____

2509 (764.9-768.1)	2518.5	<p>DACITE LAPILLI TUFF Strongly altered Mineral Horizon</p> <p>- Vaguely banded bedded py rich hard, dark grey pyroclastic strongly sericite, altered and py impregnated; most notably at 2511-2515' with 30% py. py appears to be mostly secondary, occurs along fractures and bedding planes replacement. Frequent quartz lenses/eyes 3-20mm wide oriented parallel to bedding. Trace chalcopyrite. Gouge dacite fragments surrounded by pyrite. Some pyrite that is banded (bedded) but coarse dacite fragments with it - maybe two feet of pseudobanded pyrite with only minor coarse dacite fragments.</p> <p>Alteration - pyrite, sericite bleaching. Section is probably mineral horizon, but quiescent interval to short to have developed good bedding sulphides. Interesting that associated with phase at felsic volcanism.</p>
2518.5 (768.1-784.2)	2571	<p>ANDESITE LAPILLI TUFF Weakly Altered</p> <p>- Strongly veined, chlorite, epidote quartz, garnet veins. Fairly massive homogeneous package of dark grey (grey-green) andesite pyroclastics, fragments barely visible, hard to discern from matrix; bedding only very rarely evident generally 30-35 degs to core axis. Quartz-epidote-garnet veins abundant, irregular, amorphous white-green orange patches. Pyroclastic pyrite rich fragments locally common, py also infilling many fractures.</p> <p>2542-2544.5 DIORITE classic chilled margins, coarse grained (feldspar & pyroxenes) intrusive.</p> <p>2546-2547 Weak porphyroblastic development mm scale subrounded to subangular dark porphyroblasts in lighter matrix, possibly nucleating about mafic phenocrysts. Estimate core composed 15-20% of the quartz-epidote-garnet vein material.</p> <p>Note: Difficult rock to determine type. Can occasionally see relict fragments with vague pyroxene phenocrysts and amygdules. The dark green colour, inhomogeneous texture in detail (homogeneous in general) and pyrite fragments suggest rock is andesite pyroclastic.</p> <p>Abundance of quartz-epidote-garnet veinlets suggest dacite intrusive nearby.</p>

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Feet From	To	Description																																																												
2571	2579 (784.2-786.1)	<p>FELSIC DYKE</p> <p>- Best guess is Sloko due to banding. Very fine grained, grey to grey black colour and banded. Banded probably flow bending and 15-20 degs to core axis. Variation in dyke colors and composition maybe due to hybridization with country rock. Locally feldspar phenocrysts; rock is hard to knife. Minor tiny quartz-epidote veinlets.</p> <p>Note: Banding in core suggest Sloko, but colour and feldspar phenocrysts suggest dacite intrusive.</p> <p>END OF HOLE</p> <p>SPERRY SUN READINGS FOR TCU-90-22</p> <table border="1"> <thead> <tr> <th>DEPTH</th> <th></th> <th>INCL.</th> <th>OBS. DIR</th> <th>COR. DIR</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>OM</td> <td>70.0</td> <td>38.5</td> <td>166.5</td> </tr> <tr> <td>199</td> <td>60.5M</td> <td>70.4</td> <td>141</td> <td>169</td> </tr> <tr> <td>459</td> <td>140</td> <td>70.6</td> <td>134</td> <td>162</td> </tr> <tr> <td>719</td> <td>219.2</td> <td>71.8</td> <td>152</td> <td>180</td> </tr> <tr> <td>979</td> <td>298.5</td> <td>72</td> <td>157</td> <td>185</td> </tr> <tr> <td>1239</td> <td>378</td> <td>72</td> <td>150</td> <td>178</td> </tr> <tr> <td>1499</td> <td>457</td> <td>73.2</td> <td>167</td> <td>185</td> </tr> <tr> <td>1759</td> <td>536.5</td> <td>74</td> <td>173</td> <td>201</td> </tr> <tr> <td>2019</td> <td>615.5</td> <td>74</td> <td>169</td> <td>197</td> </tr> <tr> <td>2274</td> <td>695</td> <td>75</td> <td>168.5</td> <td>196.5</td> </tr> <tr> <td>2539</td> <td>774</td> <td>75.8</td> <td>157</td> <td>185</td> </tr> </tbody> </table>	DEPTH		INCL.	OBS. DIR	COR. DIR	0	OM	70.0	38.5	166.5	199	60.5M	70.4	141	169	459	140	70.6	134	162	719	219.2	71.8	152	180	979	298.5	72	157	185	1239	378	72	150	178	1499	457	73.2	167	185	1759	536.5	74	173	201	2019	615.5	74	169	197	2274	695	75	168.5	196.5	2539	774	75.8	157	185
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Feet		
From	To	Description

SULPHIDE INTERSECTION DESCRIPTIONSH HORIZON 1784-1954'

1784'-1785.5'	(4a)	tan and grey ZnS, 75% host rock, 10%py
1785.5-1790'	(4a)	well bedded with cherty bands, 15%py, 40% host rock
1790-1796'	(5a/6)	5% py massive to bedded
1796-1831.5'	(4a)	massive to bedded, tan ZnS, abundant py 25-40%
1831.5-1834'		soft folded bedded anhydrite with 3-5%py
1834-1867.5'	(3)	massive py, moderately bedded, cpy
1867.5-1869'	(4a)	same as 1796'
1869-1871'	(3c)	with minor dissem ZnS
1871-1873.5'	(4a)	same as 1796'
1873.5-1879'	(3c)	with patchy cpy
1879-1887.5'	(3a)	5% py, also barite, cpy
1887.5-1890'	(2)	barren py
1890-1904'	(4a)	same as 1796', high py 15-30%, variable
1904-1911.5'	(4/7a,b)	30-60% cherty host rock, silicic frags with cpy
1911.5-1920.5'	(4a)	same as 1796', but with banded and dissem cpy, well bedded with 30-35% py
1920.5-1924'	(5)	well bedded, yellow ZnS with barite
1924-1933'	(4a)	same as 1796'-30-35%py
1933-1938'	(3a)	well banded py-sph-cpy, 40%py, no host rock
1938-1940.5'	(7b)	Sericitic bedded tuff, 5% dissem py
1940.5-1948'	(3a)	same as 1933-1938'
1948-1954'		well bedded cherty unit with trace ZnS, 2-4% py.