ALTERATION INVESTIGATION of

HOLES K-13 & K-14, KIM CLAIMS

KIMBERLEY, B.C.

also copies of Previous Reports

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TELEPHONE (416)-368-4972

TORONTO 1, ONTARIO

PETER PRICE
CONSULTING GEOLOGIST
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January 15,1976.

Dr.Earl D.Dodson,
Regional Geologist,
Chevron Standard Ltd.,
401 Marine Bldg.,
355 - Burrard St.,
Vancouver, B.C.
V6C 2G8

Dear Dr.Dodson,

Re: Alteration Investigation of Holes K13 & 14, Kim Claims
Kimberley Area, B.C.

The following relates to an examination of 54 thin sections taken from specimens from the above D.D.Holes as follows:-
T.S.299-320. Specimens from K13 taken by J.R.Cranstone.
T.S.321-352. Specimens from K14 taken by J.W.Simpson.

(Note. 2 thin sections from each specimen were cut for close identification of the various types of sediments cut by Hole K14).

The detail of the 54 thin sections studied is given in the accompanying notes and tables. Copies of the alteration drill hole sections are also included.

For reference purposes, I am also including copies of my previous reports on the area, dated Dec.7,1073, June 7,1972, Mar.20,1972, and Dec.5,1969.

Description of Alteration Sections.

As this method is fully explained on page 2 of my report of Dec.7,1973, I am not repeating it here, but I believe it to be relevant to understanding the sections of Holes K13 and K14, as well as the Legend.

Hole K13.

K13 was collared 1000 feet southwest of it's proposed location due to overburden difficulties. Thus it did not cut the most interesting area, but encountered much diorite.

However it showed an unexpected amount of alteration, not only in the sediments, but also in the diorite. It is unusual to find so much higher magnesium Chlorite (Item 5, Chlorite 1) in the diorite intrusives in this area. Further, the complicated contact zone (Zone 2) shows many other favorable features (Items 4,6,7,8 & 9).

Thus I believe that Hole K13 was not a total loss, but showed that the favorable alteration types are present in both sediments and intrusives.

Hole K14.

K14 encountered argillites and quartzites over it's entire length (450 feet). The alteration features present in this hole are very similar to those shown in Hole K10 (which are listed on page 3 of my Dec.7,1973 report). This is particularly true with regard to the presence of the Chlorite 1 porphyroblasts.

The only feature which is rather disturbing is the sudden appearance of the higher iron chlorite (Chlorite 2) in Zone 2. This might be due to an unusual amount of argillite in this Zone. However the favorable type of biotite still persists (Item 4).

Zone 3 (387'-450') shows the most favorable alteration.

Thus I believe that Hole K14 strengthens my opinion that the results shown in Holes K9 & 10 are persisting to the northwest and that the deepening of Hole K14 is warranted.

I realize that much of the above may be inexplicable to you, but am hoping that during your proposed visit to Toronto I will be able to demonstrate the facts on which my opinions are based.

Accordingly I am holding this report and other material until your visit.

Sincerely,

Peter Price

Peter Price,
Consulting Geologist.

Legend

1 Zn.

2 Pb.

3 Cu.

4 Low Biref. Biotite (Higher Magnesium)

5 Chlorite ① (Higher Magnesium)

6 "Mixed"

7 Pleochroics

8 Muscovite

9 Tourmaline

10 "Spots"

11 High Biref. Biotite (Higher Iron)

12 Chlorite ② (Higher Iron)

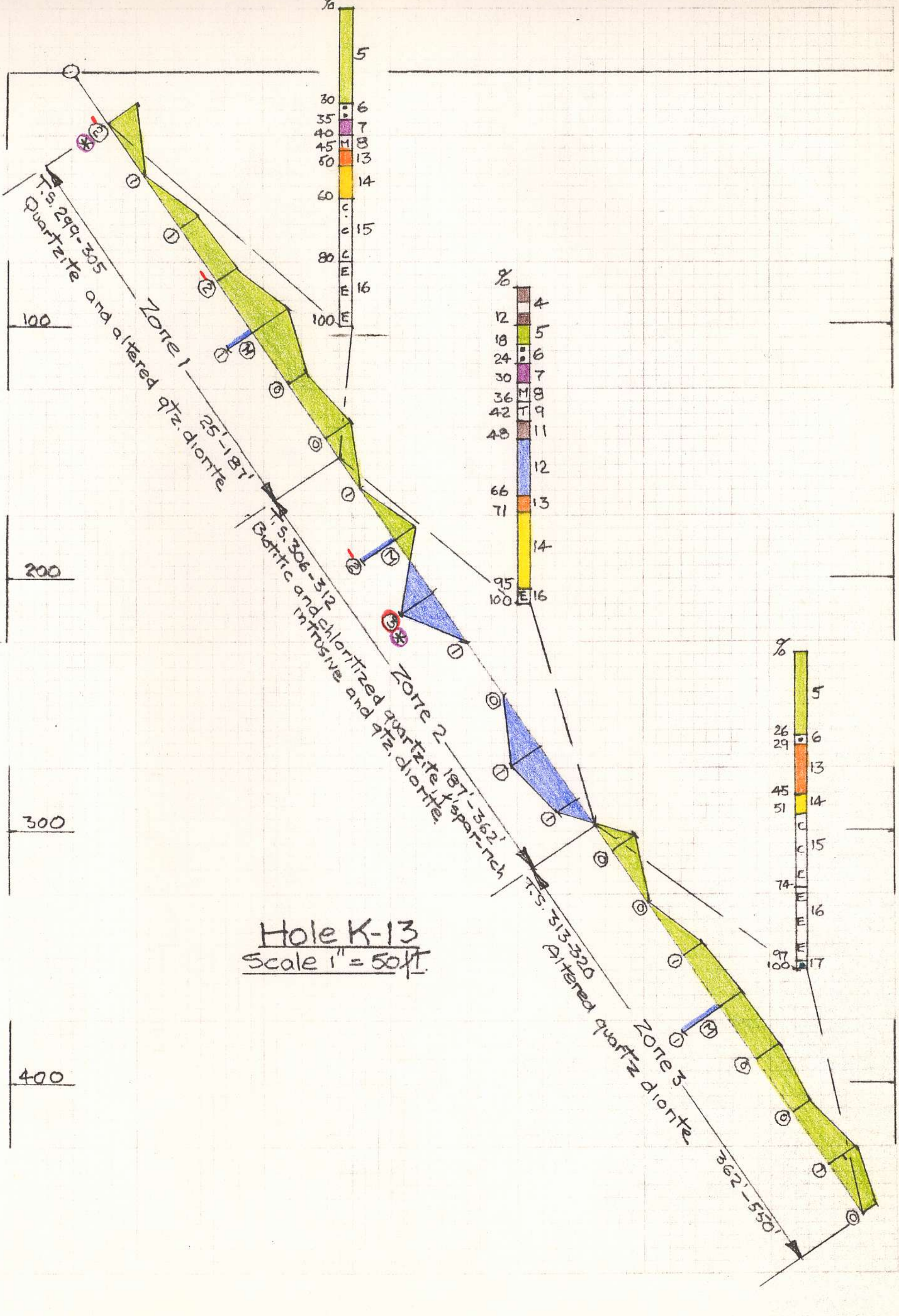
13 "Heavy" Sericite

14 "Well to heavy" Carbonates

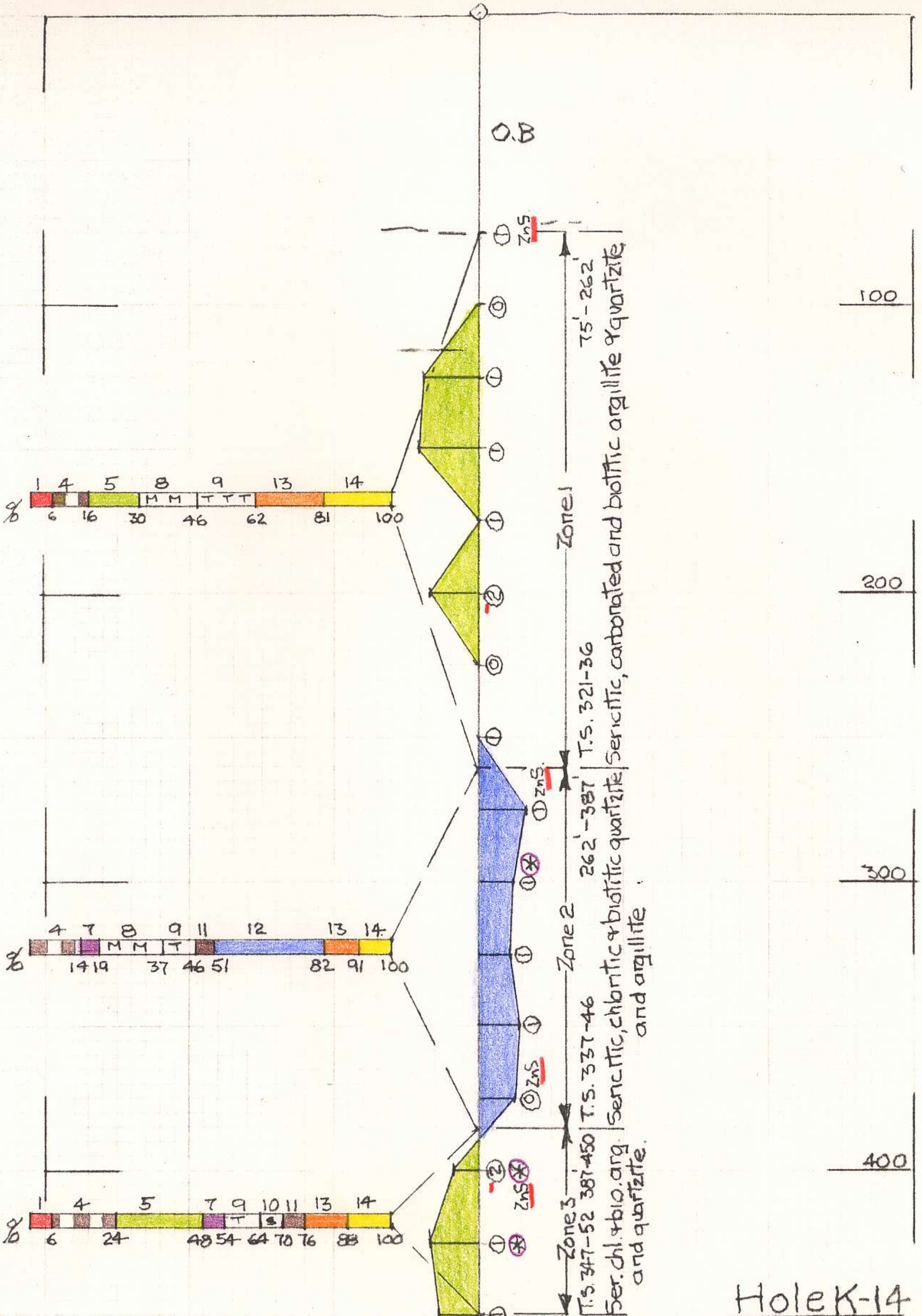
15 Clinozoisite

16 Epidote

17 Secondary Amphibole



Hole K-13
Scale 1" = 50 ft.



Hole K-14

Scale 1" = 50 ft.

KIM CLAIMS, HOLE K - 13.

T.S. # e 299 at 25'.

Rating 2 - very good section to show a fine grained quartzite with no definite feldspar in background, which has been fairly heavily altered by (1) fine grained sericite, and (2)well to heavy disseminated porphyroblasts of moderate bi-refringent Chlorite 1 R.P. with some pleochroic haloes. There is a trace of pyrite throughout section. Hazy bedding appears to be 30deg. to core axis.

T.S. # e 300 at 50'.

Rating 1 - good section to show a change to an intensely altered rock which now consists of fine grained carbonates, muscovite generally in veinlets, and disseminated quartz grains. The specimen shows a rusty carbonate vein sub-parallel to core axis, but the thin section was cut from the non-rusted portion. NOTE no chlorite.

T.S. # e 301 at 75'.

Rating 1 - good section to show another change to a carbonated and chloritic quartz diorite. There is heavy primary amphibole and feldspar in background, and some quartz. Dominant alterations are (1) heavy carbonates in veinlets and disseminations, and (2) a network of veinlets consisting of low bi-refringent Chlorite 1 R.P. This chlorite appears to have attacked the feldspar but not the amphibole.

T.S. # e 302 at 100'.

Rating 2 - very good section to show a heavily altered quartz diorite. Dominant alteration is clinozoisite with some epidote. These minerals have almost completely replaced the background feldspar. Further they are always accompanied by low bi-refringent Chlorite 1 R.P. Luecoxene is disseminated throughout section.

T.S. # e 303 at 125'.

Rating 1 - good section to show the same rock but with changes in alteration. Dominant alteration is epidote with minor clinozoisite. There are veinlets and clots of high bi-refringent Chlorite 1 with some mixed Chlorite 2. Some of the feldspars have altered to sericite and there are also slight veinlets and disseminations of carbonates.

T.S. # e 304 at 150'.

Rock is an epidotized quartz diorite. It closely resembles T.S.# 302, except that some of the feldspars have been converted to sericite. Rating 0.

T.S. # e 305 at 175'.

Rock is a moderately altered quartz diorite. More background feldspars remain unaltered, and there is a moderate amount of background quartz. Epidote is the dominant alteration, and is accompanied by minor clinozoisite. There is only slight low bi-refringent Chlorite 1 R.P. Rating 0.

T.S. # e 306 at 200'.

Rating 1 - good section to show a change to a biotitic and sericitic quartzite. Disseminated high bi-refringent green biotite is extremely heavy. Sericite is also heavy, and is accompanied by slight muscovite. Rock is banded normal to core axis. Cannot see any "spots". NOTE no chlorite.

T.S. # e 307 at 225'.

Rating 2 - very good section to show what appears to be a fairly coarse grained quartz feldspar intrusive which has been intensely altered. Dominant alterations are (1) heavy disseminated moderate bi-refringent green biotite, (2) much disseminated carbonates, (3) disseminated sphene? leucoxene?, and (4) a network of veinlets cutting all the preceding consisting of low bi-refringent Chlorite 1 R.P. with Chlorite 2 mixed. NOTE no sulphides.

T.S. # e 308 at 250'.

Rating 3 - excellent section to show a fairly coarse grained feldspar-rich intrusive, which has been heavily chloritized. High bi-refringent Chlorite 2 with excellent pleochroic haloes (see especiall 1/2 way at 2.30 o'clock) occurs as a network of veinlets. The chlorite is well crystallized. The only other alteration of note is disseminated carbonates. Also occuring with the chlorite is disseminated pyrrhotite.

T.S. # e 309 at 275'.

Rating 1 - good section to show a change to a rock which consists mainly of carbonates with some quartz. Specimen may come from a vein sub-parallel to core axis. What the original rock was is indeterminate, but there are patches (remnants?) of a fine grained siliceous rock with tourmaline. NOTE no chlorite.

T.S. # e 310 at 300'.

Rock is a quartz vein with carbonates. It is probably another part of the same vein described in T.S.# 309, but quartz is dominant instead of carbonates. Rating 0.

T.S. # e 311 at 325'.

Rating 1 - good section to show a change to an amphibole-rich quartz diorite. Rock is only moderately altered as follows:- (1) moderate bi-refringent Chlorite 2 occurs mainly as patches and with disseminated pyrite, (2) moderate bi-refringent green biotite is slight, often with pyrite, and (3) there is a trace of carbonates.

T.S. # e 312 at 350'.

Rating 1 - good section to show an intensely epidotized quartz diorite. Very little of the original diorite remains. The epidote is extremely heavy and has completely obliterated the background feldspars. The only other alterations are traces of carbonates, moderate bi-refringent Chlorite 2 and much disseminated leucoxene.

T.S. # e 313 at 375'.

Rock is an epidotized quartz diorite. It is amphibole-rich and fairly heavily altered. Dominant alterations are (1) heavy clino-zoisite and epidote in veinlets and disseminations, and (2) many veinlets of moderate bi-refringent Chlorite 1 R.P.. There is some replacement of amphibole by Chlorite 1. Cutting the section east-west is a vein consisting of quartz and feldspar with much granophyre. Rating 0.

T.S. # e 314 at 400'.

Rock is quartz diorite. Alteration has changed and is only moderate. There is no clinozoisite, epidote or chlorite, the only alteration of note being veinlets and disseminations of carbonate. Rating 0.

T.S. # e 315 at 425'.

Rating 1 - good section to show a change to an intensely altered quartz diorite. Alteration is intense and resembles that in T.S.# 313 as follows:- (1) dominant alteration is clinozoisite and epidote in veinlets and disseminations, and (2) low bi-refringent Chlorite 1 R.P. in veinlets and disseminations. There is no carbonates.

T.S. # e 316 at 450'.

Rating 1 - good section to show a quartz diorite which shows less primary amphibole than usual, and in general is only moderately altered. Alteration consists of (1) clinozoisite and slight epidote in veinlets and disseminations, (2) carbonates mainly in veinlets, and (3) patches and veinlets of moderate bi-refringent Chlorite 1 R.P. with some Chlorite 2 mixed.

T.S. # e 317 at 475'.

Rock is a moderately altered quartz diorite. It closely resembles T.S.# 316 with the exception that there is no carbonates. Rating 0.

T.S. # e 318 at 500'.

Rock is an altered amphibole-rich quartz diorite. There is more amphibole than in any of the preceding sections, but the alteration is similar to T.S.# 316, except that Chlorite 1 R.P. shows low bi-refringence, and there is much more leucoxene. Rating 0.

T.S. # e 319 at 525'.

Rating 1 - good section to show the usual quartz diorite but with much heavier alteration. Besides the usual clinozoisite and epidote, there is much secondary amphibole. Vienlets and disseminations of very low bi-refringent Chlorite 1 R.P.occur throughout section but moderate bi-refringent Chlorite 1,well crystallized,occurs on the borders of a late quartz carbonate veinlet.

T.S. # e 320 at 550'.

Rock is an intensely altered amphibole-rich quartz diorite. Alter-ation is extremely heavy, but unlike previous sections,epidote is dominant rather than clinozoisite. Further Chlorite 1 R.P. shows very low bi-refringence. There is only slight [illegible]

HOLE K - 14.

T.S. # e 321 at 75'.

Rating 1 - good section to show a sericitic and carbonated fine grained quartzite. Sericite is extremely heavy and occurs both as disseminations and in bands, which probably represent bedding. Carbonates are fine grained but are heavy and disseminated. Low bi-refringent biotite and tourmaline occur throughout the section. The northeast corner of section is well pyritized, and there is a trace of ZnS (see especially 1/4 way at 7.30 o'clock).

T.S. # e 322 at 75'.

Rating 1 - good section to show a carbonated and sericitic fine grained quartzite. Carbonates in disseminations and veinlets are heavier than in T.S.# 321. Sericite is less, but low bi-refringent biotite is more plentiful. Pyrite is the only sulphide and occurs mainly in a veinlet with carbonates.

T.S. # e 323 at 100'.

Rock is a carbonated quartzite. It is slightly coarser grained than T.S.# 321, and there are definite changes in alteration as follows:- (1) carbonates are dominant, (2) there is only as trace of sericite, and (3) there is no biotite,tourmaline or sulphides. Rating 0.

T.S. # e 324 at 100'.

Rock is a carbonated quartzite. It resembles T.S.# 323 in all respects. Rating 0.

T.S. # e 325 at 125'.

Rating 1 - good section to show a change in rock and alteration. The rock is a fine grained banded argillite. Extremely heavy sericite is the dominant alteration, together with much disseminated carbonates. Carbonates also accompany pyrite, which occurs in minute beds. High bi-refringent Chlorite 1 occurs as two types:- (a) as porphyroblasts disseminated throughout the section, and (b) accompanying the pyrite and carbonates. There is also much fine grained low bi-refringent biotite in some beds, together with tourmaline.

T.S. # e 326 at 125'.

Rating 1 - good section to show a sericitic banded argillite. It resembles T.S.# 325 in all respects.

T.S. # e 327 at 150'.

Rock is a sericitic banded argillite. It resembles T.S.# 325 but there are some changes in alteration. As usual, sericite is dominant, but there are porphyroblasts of muscovite. Pyrite occurs in minute beds and is accompanied by carbonates and a trace of high bi-refringent Chlorite 1. There is no biotite, and only a trace of tourmaline. Rating 0.

T.S. # e 328 at 150'.

Rating 1 - good section to show essentially the same rock as in T.S. # 327, but with definite changes in alteration. Dominant alterations are (1) heavy carbonates disseminated throughout section and occuring in definite veins with pyrite, (2) sericite is again very heavy, but there are no porphyroblasts of muscovite, and (3) veinlets containing pyrite and carbonates also show much quartz. Rock is dark colored due to closely spaced thin bands of gunk. NOTE there is no chlorite.

T.S. # e 329 at 175'.

Rating 1 - good section to show a change to a sericitic and biotitic contorted argillite. Rock has a brecciated appearance, but this is due to microfaulting. Sericite and low bi-refringent biotite are extremely heavy, the latter generally in bands. Pyrite as veinlets and disseminations is associated with carbonates. The veinlets often occupy microfaults. NOTE no chlorite.

T.S. # e 330 at 175'.

Rating 1 - good section to show the same contorted and microfaulted argillite, but with some changes in alteration. There is no biotite. Sericite is extremely heavy, and there is much more carbonates than in T.S.# 329. Mainly they are fine grained and disseminated, but there is a definite association with fairly heavy pyrite mainly in veinlets. Again no chlorite.

T.S. # e 331 at 200'.

Rating 2 - very good section to show a thin bedded argillite in which the dominant alteration is sericite. There is negative to heavy pyrite, generally associated with carbonates, and high birefringent Chlorite 1. The latter also occurs as porphyroblasts throughout section. NOTE cannot see any sphalerite in section, but geochem shows 370 p.p.m.

T.S. # e 332 at 200'.

Rating 2 - very good section to show a rock and alteration very similar to that in T.S.# 331.

T.S. # e 333 at 225'.

Rock is a thin bedded sericitic argillite. Extremely heavy sericite is the dominant alteration, but there are also porphyroblasts of muscovite as in T.S.# 327. Pyrite occurs along beds and in veinlets with quartz and carbonates. NOTE no chlorite. Rating 0.

T.S. # e 334 at 225'.

Rock is a thin bedded sericitic argillite. It resembles T.S.# 333 in all respects, except that there is a pyrite veinlet cutting the bedding at about 70degs. and obviously occupying a micro fault. Rating 0.

T.S. # e 335 at 250'.

Rock is a fine grained quartzite. Rock is relatively unaltered, the only unusual feature being disseminated fine grained minute crystals of muscovite. Sericite is only slight, but carbonates occur in veinlets with pyrite. Rating 0.

T.S. # e 336 at 250'.

Rock is a fine grained quartzite. It resembles T.S.# 335 in all respects. Rating 0.

T.S. # e 337 at 275'.

Rating 1 - good section to show a change in rock and alteration. The rock is a finely laminated argillite. Alteration is as follows:- (1) heavy disseminated sericite and rods of muscovite which are often altered to high bi-refringent Chlorite 2, (2) heavy disseminated high bi-refringent biotite, and (3) minute veinlets of quartz and moderate bi-refringent Chlorite 2.

T.S. # e 338 at 275'.

Rating 1 - good section to show a change to a somewhat different rock and alteration than in T.S.# 337. The rock shows not only beds of fine grained argillite, but also some coarser grained beds. Alteration is as follows:- (1) the same heavy sericite and rods of muscovite altered to high bi-refringent Chlorite 2, (2) high bi-refringent biotite varies from slight to heavy, the latter in the coarser grained beds, and (3) porphyroblasts of low bi-refringent Chlorite 2. One late veinlet containing pyrite also shows a trace of ZnS.

T.S. # e 339 at 300'.

Rating 1 - good section to show a change to a chloritized and biotitic quartzite. Moderate bi-refringent Chlorite 2 is the dominant alteration, occuring as three types:- (a) porphyroblasts, (b) alteration of biotite, and (c) minute veinlets. Low bi-refringent biotite varies from slight to heavy. Sericite and muscovite are minor.

T.S. # e 340 at 300'.

Rating 1 - good section to show a chloritized and biotitic quartzite. It resembles T.S.# 339 in all respects, except that the moderate bi-refringent Chlorite 2 shows some pleochroic haloes.

T.S. # e 341 at 325'.

Rock is a chloritic and biotitic quartzite. It resembles T.S.#s 339 and 340 closely, except that there are more veinlets of low bi-refringent Chlorite 2. Rating 0.

T.S. # e 342 at 325'.

Rating 1 - good section to show a change to a quartzite in which the only alteration of note is heavy moderate bi-refringent Chlorite 2 in disseminations and veinlets. NOTE there is no biotite, sericite or muscovite.

T.S. # e 343 at 350'.

Rating 1 - good section to show a change to a heavily sericitic argillite ? with quartz chlorite veinlets. It is difficult to determine if this rock is an argillite due to the fact that it has been intensely sericitized. Cutting this rock are veinlets consisting of quartz, moderate bi-refringent Chlorite 2, muscovite, and a trace of tourmaline.

T.S. # e 344 at 350'.

Rating 1 - good section to show the same heavily sericitic argillite, but with only vague occurrences of veinlets so prominent in the previous section. Moderate bi-refringent Chlorite 2 occurs mainly as an alteration product of muscovite, and minor low bi-refringent biotite.

T.S. # e 345 at 375'.

Rock is a chloritized quartzite. Moderate bi-refringent Chlorite 2 is the dominant alteration, and occurs as disseminations and in veinlets with quartz and carbonates. There is some replacement of low bi-refringent biotite by Chlorite 2. Sericite and muscovite are minor. Rating 0.

T.S. # e 346 at 375'.

Rock is a chloritized quartzite. It resembles T.S.# 345 closely with the exception that, if there was biotite, it is now altered to moderate bi-refringent Chlorite 2. Rating 0.

T.S. # e 347 at 400'.

Rating 2 - very good section to show a change in both rock and alteration. The rock is a sericitic thin bedded argillite with sub-parallel bands of gunk. Low bi-refringent biotite varies from negative to well, and appears to be confined to individual beds. Pyrite is fairly heavy. Low bi-refringent Chlorite 1 R.P. occurs both as disseminated porphyroblasts and with pyrite, with a trace of pleochroic haloes.

T.S. # e 348 at 400'.

Rating 2 - very good section to show a sericitic and biotitic thin bedded argillite. It is similar to T.S.# 347 except that high bi-refringent biotite is much heavier. There are many low bi-refringent Chlorite 1 porphyroblasts. Two carbonate veinlets cross section which are "rimmed" by low bi-refringent Chlorite 1, and show a trace of ZnS.

T.S. # e 349 at 425'.

Rating 1 - good section to show a change to a biotitic and chloritic argillite. Low bi-refringent biotite is extremely heavy. There are many porphyroblasts of high bi-refringent Chlorite 1. The same chlorite accompanies disseminated pyrite and shows some pleochroic haloes. Sericite is not as heavy as in preceding sections.

T.S. # e 350 at 425'.

Rating 1 - good section to show the same rock as in T.S.# 349 and similar alteration, the only exception being that besides the high bi-refringent Chlorite 1 porphyroblasts, there are many low bi-refringent Chlorite 1 "spots". These show some pleochroic haloes.

T.S. # e 351 at 450'.

Rating 1 - good section to show a change to a biotitic fine grained quartzite. Low bi-refringent biotite is extremely heavy, but there is much less sericite. Fairly heavy pyrite occurs in bands. It is often associated with carbonates and moderate bi-refringent Chlorite 1. There are a few Chlorite 1 porphyroblasts.

T.S. # e 352 at 450'.

Rating 1 - good section to show a rock which is similar to T.S.# 351, but with very little pyrite. As before, low bi-refringent biotite is extremely heavy, but in this section there are porphyroblasts of carbonates accompanied by moderate bi-refringent Chlorite 1.

T.S. No. E	Hole No.	Footage	Rating	Logged as:–	Rock shown by Thin Section:–
299	K-13	25	2	No log received	Sericitic & chloritic f.g. quartzite
300	"	50	1	" " "	Carbonates, muscovite & qtz.
301	"	75	1	" " "	Carbonated & chloritic qtz. diorite
302	"	100	2	" " "	Epidotized qtz. diorite
303	"	125	1	" " "	Heavily altered " "
304	"	150	0	" " "	Epidotized " "
305	"	175	0	" " "	Moderately altered " "
306	"	200	1	" " "	Biotitic & sericitic quartzite
307	"	225	2	" " "	Intensely altered qtz. K'spar intrusive?
308	"	250	3	" " "	Chloritized K'spar-rich intrusive
309	"	275	1	" " "	Carbonates & qtz (vein?)
310	"	300	0	" " "	Qtz. vein with carbonates
311	"	325	1	" " "	Amphibole-rich qtz. diorite
312	"	350	1	" " "	Intensely epidotized " "
313	"	375	0	" " "	Epidotized qtz. diorite
314	"	400	0	" " "	Qtz. diorite
315	"	425	1	" " "	Intensely altered qtz. diorite
316	"	450	1	" " "	Moderately " " "
317	"	475	0	" " "	" " " "
318	"	500	0	" " "	Altered amph-rich " "
319	"	525	1	" " "	Heavily altered " "
320	"	550	0	" " "	Intensely altered amph-rich " "

T.S. No.	Hole No.	Foot-age	Rating	Chlorite		"Mixed" Chlorite		Pleochroic Haloes in Chlorite	
e:				1 deg.	2 deg.	1 deg.	2 deg.	1(deg.)	2(deg.)
299	K-13	25	2	R.P 5.7 well to hea diss	—	—	—	8.9 sli. H.	
300	"	50	1	—	—	—	—	—	—
01	"	75	1	diss & V 3.2 R.P well	—	—	—	—	—
02	"	100	2	3.7 R.P well V.	—	—	—	—	—
03	"	125	1	"clots" 6.5 well diss & V	—	—	4.8 sli	—	—
04	"	150	0	3.2 R.P well V	—	—	—	—	—
05	"	175	0	4.8 sli diss	—	—	—	—	—
06	"	200	1	—	—	—	—	—	—
07	"	225	2	3.6 hea V. R.P	—	—	6.1 sli V & diss	—	—
08	"	250	3	—	6.1 Hea V with sulph	—	—	—	9.8 H well
09	"	275	1	—	—	—	—	—	—
310	"	300	0	—	—	—	—	—	—
11	"	325	1	—	5.3 well diss with sulph	—	—	—	—
12	"	350	1	—	3.7 Tr with carbs	—	—	—	—
13	"	375	0	4.2 well V. R.P.	—	—	—	—	—
14	"	400	0	—	—	—	—	—	—
15	"	425	1	3.5 well V & diss R.P	—	—	—	—	—
16	"	450	1	4.1 well V & diss R.P	—	—	7.2 sli V.	—	—
17	"	475	0	4.5 well V & diss R.P	—	—	—	—	—
18	"	500	0	3.2 sli V & diss R.P	—	—	—	—	—
19	"	525	1	4.9 sli V. R.P 2.5 sli V & diss R.P	—	—	—	—	—
320	"	550	0	2.1 hea V & diss R.P	—	—	—	—	—

T.S. No. e	Hole No.	Foot-age	Rating	Amph.	Epidote	Biotite	Sericite	Quartz	Feldspar	Carbs.	Sulphides	'Gunk' (Sphene)
299	K-13	25	2	—	—	—	Ser. well to hea diss	f.g. Bx hea, V. Tr	?	—	Py Tr diss	Gunk well diss + rust
300	"	50	1	—	—	—	Musc well diss + V	Bx, well c.g.	—	Ext hea	Py well V + diss	ditto
01	"	75	1	Amph. Prim Hea diss.	—	—	—	Bx sli	Bx very hea	Hea. diss + V.	Py Tr diss	Leucoxene sli diss
02	"	100	2	ditto	Clino. hea Ep well	—	—	Bx sli	Bx alt	—	—	Leuc. well diss
03	"	125	1	ditto	Ep well Clino sli diss	—	Ser sli after f'spar	—	Bx alt	Sli diss + V	—	ditto
04	"	150	0	ditto	Clino hea Ep well	—	ditto	—	Bx alt	—	—	ditto
05	"	175	0	ditto	Ep hea Clino sli V?	—	ditto	—	Bx alt	sli. V.	Py sli diss + V	ditto
06	"	200	1	—	—	Ext hea diss 22.6 L.Y.-G.	Ser very hea Musc. sli	Bx very hea	Bx sli	—	Py sli f.g. diss	—
07	"	225	2	—	—	Very hea diss 20.7 L.Y.-G	—	Bx hea	Bx very hea c.g.	Very hea diss + V	—	Sphene? Leuc? hea diss
08	"	250	3	—	—	—	—	Bx sli	Bx very hea c.g.	Well diss + V	Po? well diss + V	Sphene sli diss
09	"	275	1	—	—	—	Ser sli V?	Bx sli + V	Bx Tr	Ext hea diss	—	Tourmaline Tr diss
310	"	300	0	—	—	—	—	Bx ext. hea	—	Neg to well diss	—	—
11	"	325	1	Amph Prim. Hea diss	—	Sli diss 19.3 L.Y.-G	—	Bx well	Bx hea alt	—	Py well diss	Leuc sli diss
12	"	350	1	Amph Prim sli Sec well	Ep. ext hea diss + V	—	—	Bx. well	Bx alt.	sli V	—	Leuc. hea diss
13	"	375	0	Amph Prim Hea diss	Clino hea Ep well diss + V	—	—	grano Bx well + V	grano Bx hea + V	—	Py sli diss	ditto
14	"	400	0	Amph Prim Well diss	—	—	—	Bx well	Bx hea	Well V and diss	—	ditto
15	"	425	1	ditto	Clino hea Ep well diss + V	—	Ser neg to hea after f'spar	Bx well	Bx hea alt	—	—	ditto
16	"	450	1	ditto	Clino well Ep sli V + diss	—	Ser neg to hea after f'spar	Bx well + V	Bx hea alt	Well V + diss	Py well diss	Leuc sli diss
17	"	475	0	ditto	ditto	—	ditto	ditto	ditto	—	—	ditto
18	"	500	0	Amph Prim ext. hea	ditto	—	ditto	ditto	ditto	—	—	Leuc. hea diss
19	"	525	1	Amp Prim. hea " Sec well	Clino hea Ep well V + diss	—	—	ditto + V	ditto	Sli V.	—	Leuc. well diss
320	"	550	0	Amph Prim Ext hea	Ep very hea Clino sli	—	Ser neg to hea after f'spar	ditto + V	ditto	Sli V	—	ditto

T.S. No.	Hole No.	Footage	Rating	Logged as:–	Rock shown by Thin Section:–
321	K-14	75	1	Mudstone "fragments" in quartzite	Sericitic + carbonated f.g. quartzite
322	"	75	1	" " " "	Carbonated + sericitic " "
323	"	100	0	Well sorted light gray quartzite	" quartzite
324	"	100	0	" " " " "	" "
325	"	125	1	Medium gray laminated argillite	Sericitic banded argillite
326	"	125	1	" " " "	" " "
327	"	150	0	" " " "	" " "
328	"	150	1	" " " "	Carbonated " "
329	"	175	1	Contorted + brecciated "	Sericitic + biotitic contorted argillite
330	"	175	1	" + " "	" + carbonated " "
331	"	200	2	" + " "	" + chloritic thin bedded "
332	"	200	2	" + " "	" + " " " "
333	"	225	0	Medium gray laminated "	Thin bedded sericitic argillite
334	"	225	0	" " " "	" " " "
335	"	250	0	F.g. quartzite	F.g. quartzite
336	"	250	0	" "	" "
337	"	275	1	Laminated argillite ?	Sericitic + biotitic argillite
338	"	275	1	" "	" + " "
339	"	300	1	F.g. quartzite	Chloritized + " quartzite
340	"	300	1	" "	" + " "
341	"	325	0	" "	" + " "
342	"	325	1	" "	Chloritic quartzite

T.S. No. e	Hole No.	Foot-age	Rating	Chlorite		"Mixed" Chlorite		Pleochroic Haloes in Chlorite	
				1 deg.	2 deg.	1 deg.	2 deg.	1(deg.)	2(deg.)
321	K-14	75	1	—	—	—	—	—	—
22	"	75	1	—	—	—	—	—	—
23	"	100	0	—	—	—	—	—	—
24	"	100	0	—	—	—	—	—	—
25	"	125	1	Porph. & with py. 7.4. well diss & V	—	—	—	—	—
26	"	125	1	6.1 ditto	—	—	—	—	—
27	"	150	0	7.9 Tr in V with py.	—	—	—	—	—
28	"	150	1	—	—	—	—	—	—
29	"	175	1	—	—	—	—	—	—
330	"	175	1	—	—	—	—	—	—
31	"	200	2	Porph & with py 6.2 well diss & V.	—	—	—	—	—
32	"	200	2	Porph & with py. 5.5 well diss & V	—	—	—	—	—
33	"	225	0	—	—	—	—	—	—
34	"	225	0	—	—	—	—	—	—
35	"	250	1	—	—	—	—	—	—
36	"	250	0	—	—	—	—	—	—
37	"	275	1	—	6.2 after muscovite 4.6 V sli	—	—	—	—
38	"	275	1	—	5.8 after muscovite 3.2 sli diss porph.	—	—	—	—
39	"	300	1	—	4.3 hea diss & porph and after bio & V	—	—	—	—
340	"	300	1	—	4.7 ditto	—	—	—	7.8 H. Tr
41	"	325	0	—	3.9 hea diss & V.	—	—	—	—
42	"	325	1	—	4.3 Hea diss & V	—	—	—	—

T.S. No. e	Hole No.	Foot-age	Rating	Amph.	Epidote	Biotite	Sericite	Quartz	Feldspar	Carbs.	Sulphides	'Gunk' (Sphene)
321	K-14	75	1	—	—	Sli diss f.g. 18.0 col-LB	Ser Ext hea diss & bands	Bx hea f.g	Bx sli f.g	Well to hea f.g.	ZnS Tr. Py neg to well	Tourmaline sli diss.
22	"	75	1	—	—	Well diss. 18.3 col-L.B	Ser sli to hea bands	ditto	ditto	Well to hea f.g & V	Py sli V.	Tourmaline Tr.
23	"	100	0	—	—	—	Ser Tr	Bx hea	Bx well	Well to hea	—	—
24	"	100	0	—	—	—	Ser Tr	ditto	ditto	ditto	—	—
25	"	125	1	—	—	Well bands 17.6 col-LB	Ser ext hea diss & bands	Bx hea f.g.	?	Well diss & V and with Py	bands Py neg to well	Gunk. bands Tourmaline well
26	"	125	1	—	—	ditto	ditto	ditto	?	ditto	ditto	ditto
27	"	150	0	—	—	—	Ser. ext. hea Musc. porph	ditto	?	Hea diss & V with Py.	bands Py neg to well	Gunk sli Tourmaline Tr
28	"	150	1	—	—	—	Ser ext hea Musc sli	ditto & V with Py	?	Very hea diss & V with Py	V. & bands Py neg to hea	Gunk hea bands
29	"	175	1	—	—	Hea bands f.g 19.1 col.-LB	Ser. Very hea.	ditto	?	Well V with Py	with carbs Py well V	—
330	"	175	1	—	—	—	Ser ext hea Musc Tr	ditto & V with Py	?	Hea diss and V with Py	with carbs Py hea V	Gunk. hea bands Tourmaline Tr
31	"	200	2	—	—	—	Ser hea Musc Tr	ditto	?	Hea diss and V with Py.	with carbs & chl. Py hea V	ditto
32	"	200	2	—	—	—	ditto	ditto	?	ditto	ditto	ditto
33	"	225	0	—	—	—	Ser ext hea Musc sli porph	ditto & V with Py	?	Sli V with Py	V & bands Py neg to hea	Gunk hea bands
34	"	225	0	—	—	—	ditto	ditto " " "	?	ditto	ditto	ditto.
35	"	250	1	—	—	—	Ser sli Musc well diss	ditto	Bx sli f.g.	ditto	V with carbs Py neg to hea	—
36	"	250	0	—	—	—	ditto	ditto.	ditto	ditto	ditto	—
37	"	275	1	—	—	Hea diss. 21.6 LY-B.	Ser. hea diss Musc sli alt	ditto & V.	ditto	—	Py sli diss	Gunk sli bands
38	"	275	1	—	—	Sli to hea diss 22.3 LY-B	ditto	Bx hea f.g & cg	?	—	ZnS Tr V. Py sli diss & V.	ditto
39	"	300	1	—	—	Sli to hea diss 19.2 col-LB	Ser sli diss Musc Tr alt	Bx hea cg	Bx sli f.g	Well V & diss	Py Tr diss	—
340	"	300	1	—	—	Sli to hea. diss 20.1 col-LB	ditto	ditto	ditto	—	Ditto	—
41	"	325	0	—	—	Well diss 22.6 LY-B	Musc sli	ditto	ditto	Sli V.	Py Tr diss & V	Tourmaline Tr.
42	"	325	1	—	—	—	—	ditto	ditto	Tr V	ditto	ditto

T.S. No. e	Hole No.	Footage	Rating	Logged as:–	Rock shown by Thin Section:–
343	K-14	350	1	Very siliceous argillite	Heavily sericitic argillite? with qtz. chlorite veinlets.
344	"	350	1	" " "	" " " ?
345	"	375	0	Medium grained quartzite	Chloritized quartzite
346	"	375	0	" " "	" "
347	"	400	2	Laminated argillite	Sericitic & chloritic thin bedded argillite
348	"	400	2	" "	" & biotitic " " "
349	"	425	1	Quartzite	Biotitic & chloritic argillite
350	"	425	1	"	" & " "
351	"	450	1	Argillaceous quartzite	" F.g quartzite
352	"	450	1	" "	" " "

T.S. No. e	Hole No.	Foot-age	Rating	Chlorite 1 deg.	Chlorite 2 deg.	"Mixed" Chlorite 1 deg.	"Mixed" Chlorite 2 deg.	Pleochroic Haloes in Chlorite 1(deg.)	Pleochroic Haloes in Chlorite 2(deg.)
343	K-14	350	1	—	5.4 well V with qtz. & after musc	—	—	—	—
44	"	350	1	—	5.9 sli V & porph. with qtz & after bio	—	—	—	—
45	"	375	0	—	4.2 well diss & V	—	—	—	—
46	"	375	0	—	4.7 well diss & V	—	—	—	—
47	"	400	2	& with py 3.5 well diss. porph.	—	—	—	6.8 H Tr	—
48	"	400	2	2.9 well diss. porph	—	—	—	—	—
49	"	425	1	& with py 6.2 well diss porph	—	—	—	10.0+ H sli	—
350	"	425	1	3.7 diss "spots" 6.7 well diss porph.	—	—	—	7.8 H Tr "spots"	—
51	"	450	1	& with py 4.3 sli diss porph	—	—	—	—	—
352	"	450	1	with carbs 5.2 sli diss porph	—	—	—	—	

T.S. No. e	Hole No.	Foot-age	Rating	Amph.	Epidote	Biotite	Sericite	Quartz	Feldspar	Carbs.	Sulphides	'Gunk' (Sphene)
343	K-14	350	1	—	—	—	Ser ext hea Musc well V	BK hea & V	?	sli V.	Py Tr diss	Gunk well diss.
44	"	350	1	—	—	Sli V.? 17.5? col - L.B	ditto	ditto —	?	—	Py Tr diss	ditto
45	"	375	0	—	—	sli diss alt. 19.2 Col - B	Ser sli Musc sli	ditto	BK sli	Neg to well V & diss	ZnS Tr. Py sli diss	Tourmaline sli
46	"	375	0	—	—	—? alt.	ditto	ditto	ditto	—	Py Tr V	ditto
47	"	400	2	—	—	Neg to hea bands 17.8 col - LB	Ser. hea bands	ditto	?	Sli diss	Py well diss	Gunk hea bands
48	"	400	2	—	—	Very hea diss 22.8 LY. - DB	Ser. very hea	ditto	?	Neg to well V.	ZnS Tr. Py sli diss & V	ditto
49	"	425	1	—	—	Ext hea diss 18.2 col - LB	Ser hea	ditto	?	Sli diss	Py well diss	Gunk welldiss
350	"	425	1	—	—	Ext hea diss 19.0 col - B	Ser ext hea	ditto	?	Tr diss	Py well diss	ditto & tourm.
51	"	450	1	—	—	Ext hea diss 18.1 col. - B.	Ser sli	ditto	?	Sli diss with py	Py well diss	ditto ditto
352	"	450	1	—	—	ditto	ditto	ditto	?	Neg to well diss porph?	Py Tr	ditto ditto

December 7,1973.

Mr.J.D.Harvie
Co-ordinator,
Business Development Dept.,
Imperial Oil Ltd.,
111 - St. Clair Ave.W.,
Toronto 7, Ont.

Dear Mr.Harvie,

Re Recent Drilling, Kim Claims, Kimberley Area, B.C..

A memorandum written by G.deMille (received by me in June 1973), coupled with a study of thin sections taken from surface specimens from Claim 54, and those taken from Holes K10 and K11 (drilled in 1973), has caused me to re-evaluate my opinions regarding these claims.

The 74 thin sections were cut from specimens as follows:-

T.S. 225-241. Surface specimens collected by J.S.Scott in the north west area of Claim 54.

T.S. 242-281 Specimens taken from Hole K11 by J.R.Cranstone.

T.S. 282-298 Specimens taken from Hole K10 by J.R.Cranstone.

The examination of the above thin sections has prompted me to re-assess all the data from the holes drilled previously on the Kim Claims (K1,2,4,5,7,8 & 9), together with that gained from surface specimens.(see Reports dated Dec.5,1969, March 20,1972 and June 7,1972).

This led to a re-calculation of the data, and the plotting of new alteration sections of all the drill holes. For comparison purposes, I have done a similar re-calculation etc. of the results obtained from my study of the alteration types shown by the holes drilled on the Rimrock ground.

The detail of the 74 thin sections listed above is given in the accompanying notes and tables. Copies of the new alteration drill hole sections are also included.

Description of New Alteration Sections.

The attached Alteration Sections follow the same method used in a large number of other areas. As you are familiar with this method, it is unnecessary to give the details here. However, the order of the 17 items given in the Legend requires some explanation.

Items 1 (Zn), 2 (Pb) and 3 (Cu) result from the geochemical assays done on all core specimens from the holes drilled on the Kim Claims. Only those results which showed at least twice background or better for these three metals are considered. The rest of the items (4 to 17) are arranged in what I believe to be a descending order of importance.

From my present intensive work on the biotite group, I believe that there is a direct relation between biotite with a higher magnesium content (Item 4) and chlorite with a similar higher magnesium content (Chlorite 1) (Item 5). Further, I believe that an increased amount of these two types appearing together is favourable. This stems from my work done on specimens I collected from the alteration present in the hanging wall of the Sullivan orebody. Conversely, the higher iron type biotite and associated higher iron type chlorite (Chlorite 2) are unfavourable. Hence these two items are listed as Nos. 11 and 12.

Items 6 and 7 relate to favourable variations in the chlorites. Items 8 to 10 are, I believe, arranged in a descending order of importance. The placing of the "spots" (No.10) found in the South Area is still debatable. Items 13 to 17 are in the order of least importance.

HOLE K-11.

K-11 was collared 500 feet southeast of Hole K-1 and roughly on the same azimuth and a similar dip (see Section). Both collared in highly altered diorite, but the diorite in K-11 showed more mineralization.

It is probable that a fault occurs between these two holes which may be the northeast extension of the large fault (shear) zone mapped by J S.Scott where it outcrops 1600 feet to the southwest. If this is true, then it is possible that considerable movement has taken place on this fault.. The horizontal component is unknown at present, but the vertical component is at least 300 feet - east side up.

If this is true, then the different zones shown on section in Hole K-11 have rough counterparts in Hole K-1. This also might explain why both holes bottomed in a "spotted" zone (Zones 6). There has always been some difficulty in assigning a dip and strike to the contact of the "spotted" zone (see report Dec.5,1969 pp 12-14), but it is now obvious that it differs markedly from the dip and strike of the Aldridge sediments, and also that of the diorite dykes.

It should also be noted that Holes K-1 and K-11 show much more geochem. Zn. and Pb. than that shown by Holes K-5 and K-8 (see section).

HOLE K-10.

Hole K-10 was drilled approximately 1100 feet due south of Hole K-9 at a dip of 55° and azimuth due west. It's length was only 410 feet. Hole K-10 is somewhat remarkable in the following respects:-

(1). It showed more sulphides than any hole drilled to date.

(2). In general it showed the best geochem. Zn. (see section).

(3). The dominant alteration is Chlorite 1 with a preponderant habit of porphyroblasts (see notes and tables). This type, I know, occurs in close association with the Sullivan orebody (see also Congress Brochure, p.32 (copy attached)), and was also found by me in the hanging wall of the orebody.

(4). It is of interest to note that this type of Chlorite 1 was predominant in Hole K-9 (see notes and tables, T.S.Nos.165-171), and in Scott's surface sampling in Claim 54 (see especially T.S.Nos.238-241).

(5). Lastly, the amount of low iron biotite in Hole K-10 is notable.

Definition of North and South Areas.

The drilling done to date on the Kim Claims (except Holes K-2 and K-4) is confined to two widely separated areas. (Note distance from Hole K-11 to Hole K-7 is roughly 8000 feet). These are here called North Area and South Area.

The South Area (also called the Lone Pine Hill area) includes Holes K-1, K-5, K-8 and K-11. The North Area includes Holes K-7, K-9 and K-10, also specimens from Claim 54 and those from Claim 166 (North Shear Zone - see report March 20/72, p.3).

In the following discussion the two areas are referred to in this way.

General considerations.

None of the drilling done to date has intersected (a) any commercial sulphides, and (b) no alteration zone which can be classed as of prime interest.

I believe that any such results from the drilling done to date, (which after all is near surface, somewhat "blind" and widely spaced) would be too much to expect under the circumstances. The area is too well known and has been thoroughly studied, not only by Cominco geologists. but also those from other well known mining companies.Rather, at the present time, more subtle alter= ation changes should be looked for, which would not appeal to people other than those really familiar with the Sullivan orebody and the general area.

First, however, if the theory of ore genesis adhered to is that of standard sea-bottom syngenesis involving one favourable horizon (Lower Aldridge-Middle Aldridge contact), then all work done to date should be judged in this respect. If this horizon exists at all on the Kim Claims, then it is pertinent to form an opinion as to where and at what depth it might occur. In this respect a discussion of George deMille's memo is relevant.

His memo states that on examining Kim Cores (South Area?) Cominco geologists "are of the opinion that the Aldridge section cut is lower than we had suspected, probably Lower Aldridge, comparable to sections beneath the footwall at the mine."

This opinion raises almost impossible structural conditions. If the South Area rocks are below the favourable horizon, then not only the rest of the Lower Aldridge, but all of the Middle Aldridge has to be "crammed" into an area which is not big enough to accomodate it. This difficulty is overcome by postulating " a north-northwest set of faults cutting across the Kim Block and separating Creston and Aldridge rocks on the surface east of Lone Pine hill" (p.1) It is also stated (p.2) that "displacements range to several thousands of feet (and must if the stratigraphic determinations are approximately correct) but the direction of motion is conjectural".

If the theory of ore genesis has to adhere to the "favourable contact" structurally, then all the above poses almost insurmountable difficulties to intelligent evaluation of the Kim Claims. Then no further work is warranted, and the claims should be abandoned.

As you know, I have little faith in the theory of "standard sea-bottom syngenesis". My views have been expressed in two previous reports (Dec.5/69,p.3 and March 20/72,pp.2 & 3). I agree that there are features (banding etc.) in the Sullivan orebody that are reasonably explained by such a theory, but there are a number of other features which pose questions that are not answered by it.

In this respect, it is of interest to note that the Cominco geologists see the same difficulties. These are expressed in the Congress Brochure pp.33 & 34 (copies of which are attached). Hence the actual origin of the Sullivan remains debatable and I am still staying with my original opinions.

If these objections to syngenesis are valid, then some other possibilities deserve consideration. They are:-

(1). There may be, in other areas, no strict adherence to the "favourable horizon". In fact, it is entirely possible the orebodies might occur at any horizon - even in the Creston! I realize that this statement would be classed as heretical in some quarters, but I believe it to be true.

(2). Whereas the dominant alterations in the hanging wall of the Sullivan are albite and chlorite (up to a height of 800 feet above the orebody), little is known about whether alteration of interest persists further up into the hanging wall. Therefore any alteration that is unusual and known to be located near known ore is worth ~~further~~ investigation. It is also true that if any of the above is valid, then future work should be based on these features, rather than a strict dependence on the assumed location of the "favourable contact".

Which area is the more favourable?

Based on the present information, I believe that it is now possible to form an opinion as to which area on the Kim Claims is the more favourable. On page 2 of this report I have listed the various alteration minerals in a decreasing order of importance (see also the Legend).

On page 5A is a diagram to show the Relative Percentages of Alteration Minerals occuring in all the thin sections from the South and North Areas. It is obvious from this diagram that the North Area is the more favourable at present.

Another diagram (page 5B) is also included, which makes a similar comparison of the Rimrock and the two Kim Areas. (Note that, since no geochem was available on Rimrock, the Kim Areas have been re-calculated on this basis). The same trend toward the North Area is shown, but also that the South Area is better than Rimrock.

As stated above,(p.2) the placing of the "spots" in the South Area is debatable, but even if they were deleted entirely,it would not change the above noted trends to any great extent.

Conclusions.

I believe that, rather than stopping all work on the Kim Claims, further exploration (detailed mapping, drilling etc.) is warranted, especially if the above noted criteria are applied.

At present I favour drilling deeper in, and also to the west of, the North Area. However I am not entirely convinced that the South Area should be abandoned.

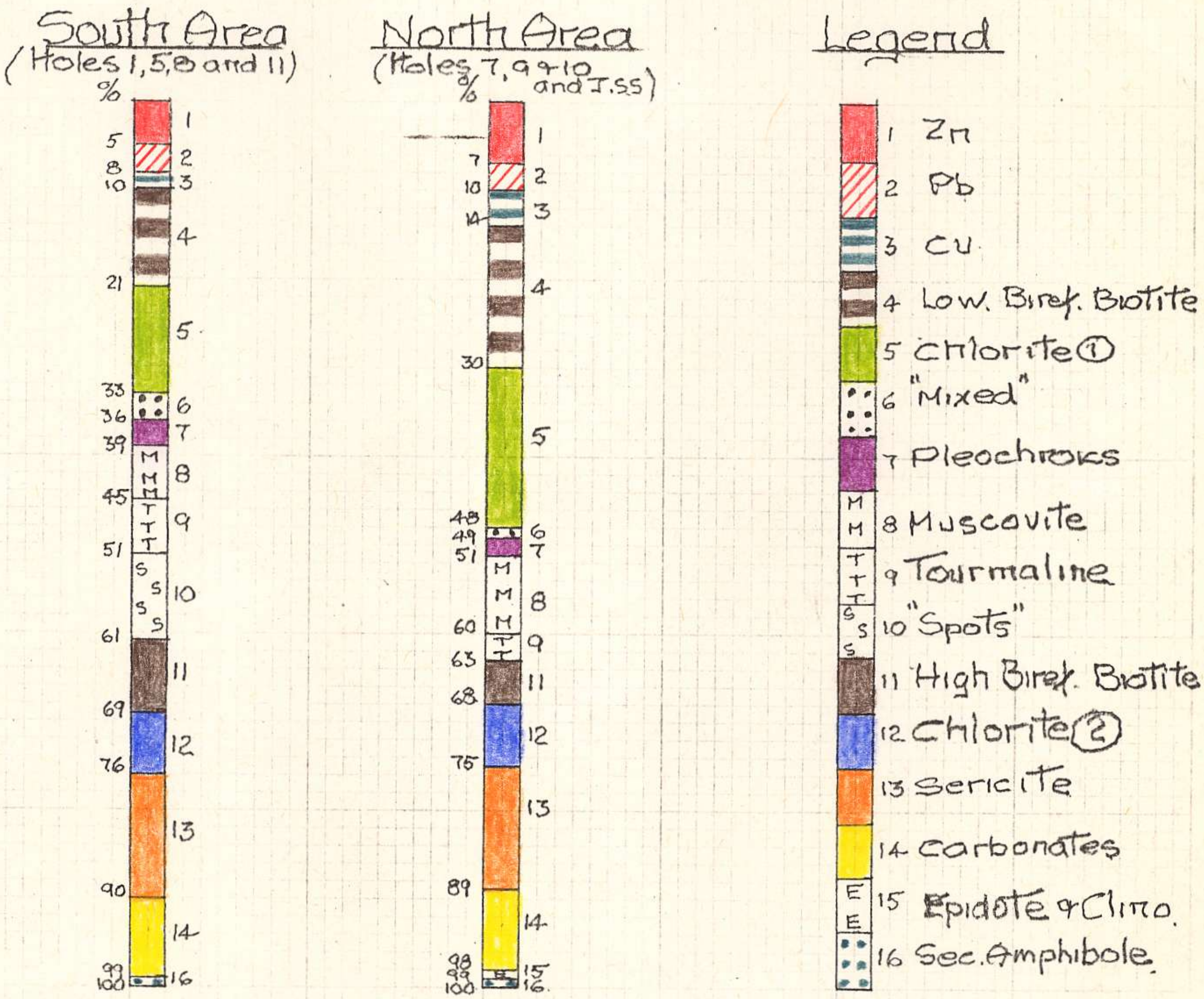
I would like to discuss this whole matter personally with you and Fenton Scott at your convenience. I am sending a copy of this report to Doug Layer.

Peter Price

Legend

1 Zn.
2 Pb.
3 Cu.
4 Low Biref. Biotite
5 Chlorite ①
6 "Mixed"
7 Pleochroics
8 Muscovite
9 Tourmaline
10 "Spots"
11 High Biref. Biotite
12 Chlorite ②
13 "Heavy" Sericite
14 "Well to heavy" Carbonates
15 Clinozoisite
16 Epidote
17 Secondary Amphibole

Relative Percentages of Alteration Minerals occuring in

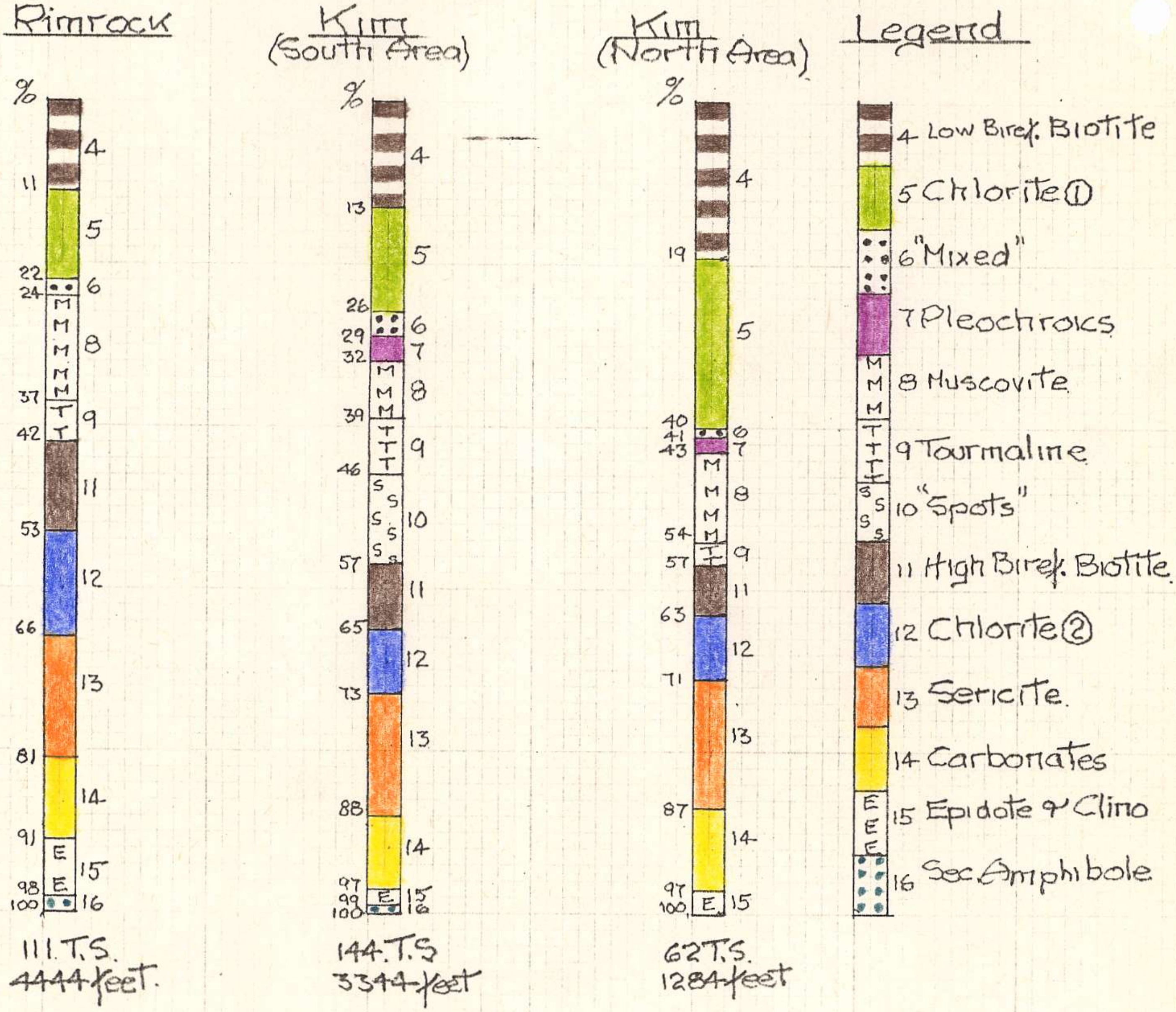


144 Thin Sections representing 3344 feet.

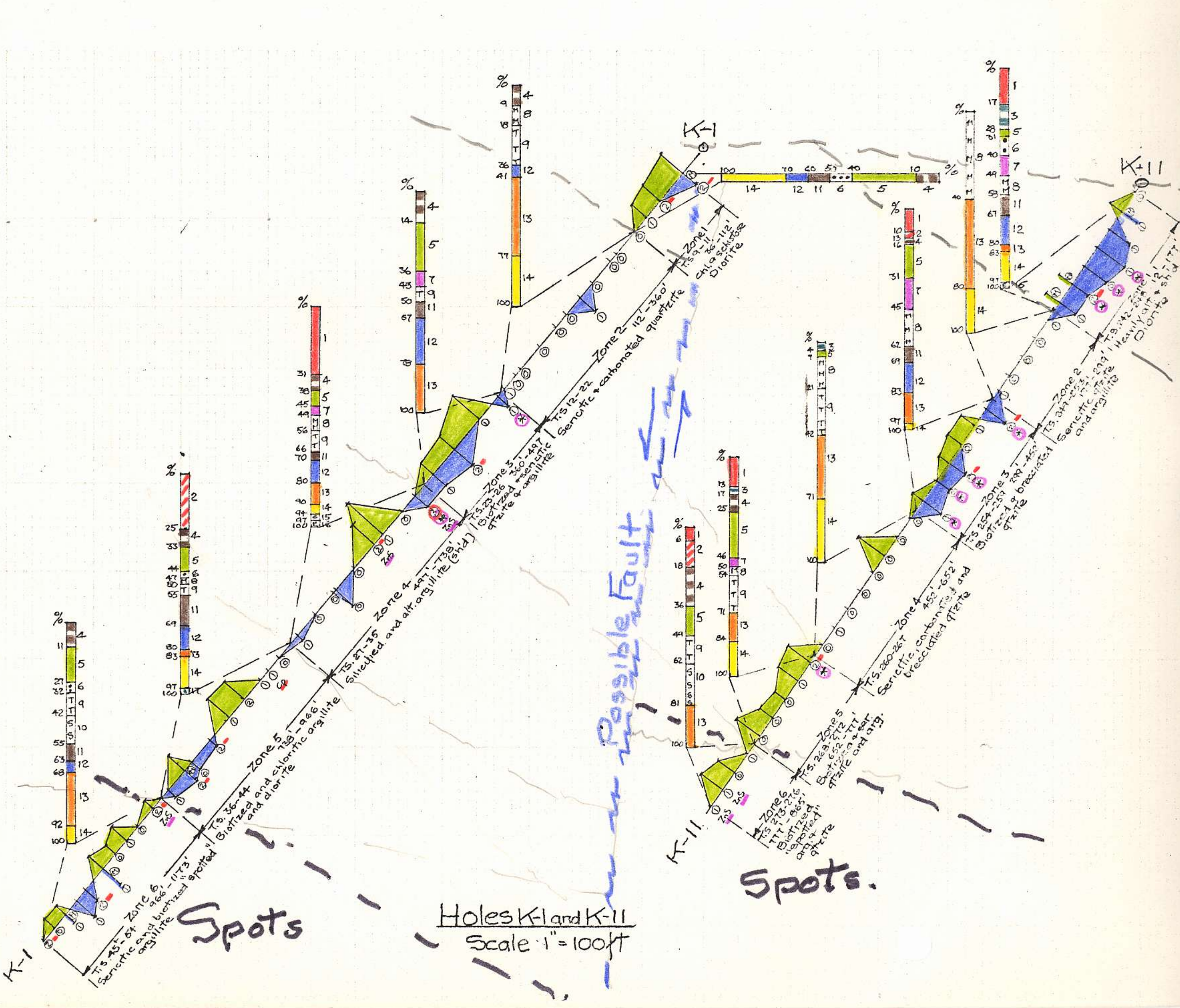
62 Thin Sections representing 1284 feet.

Kim Claims

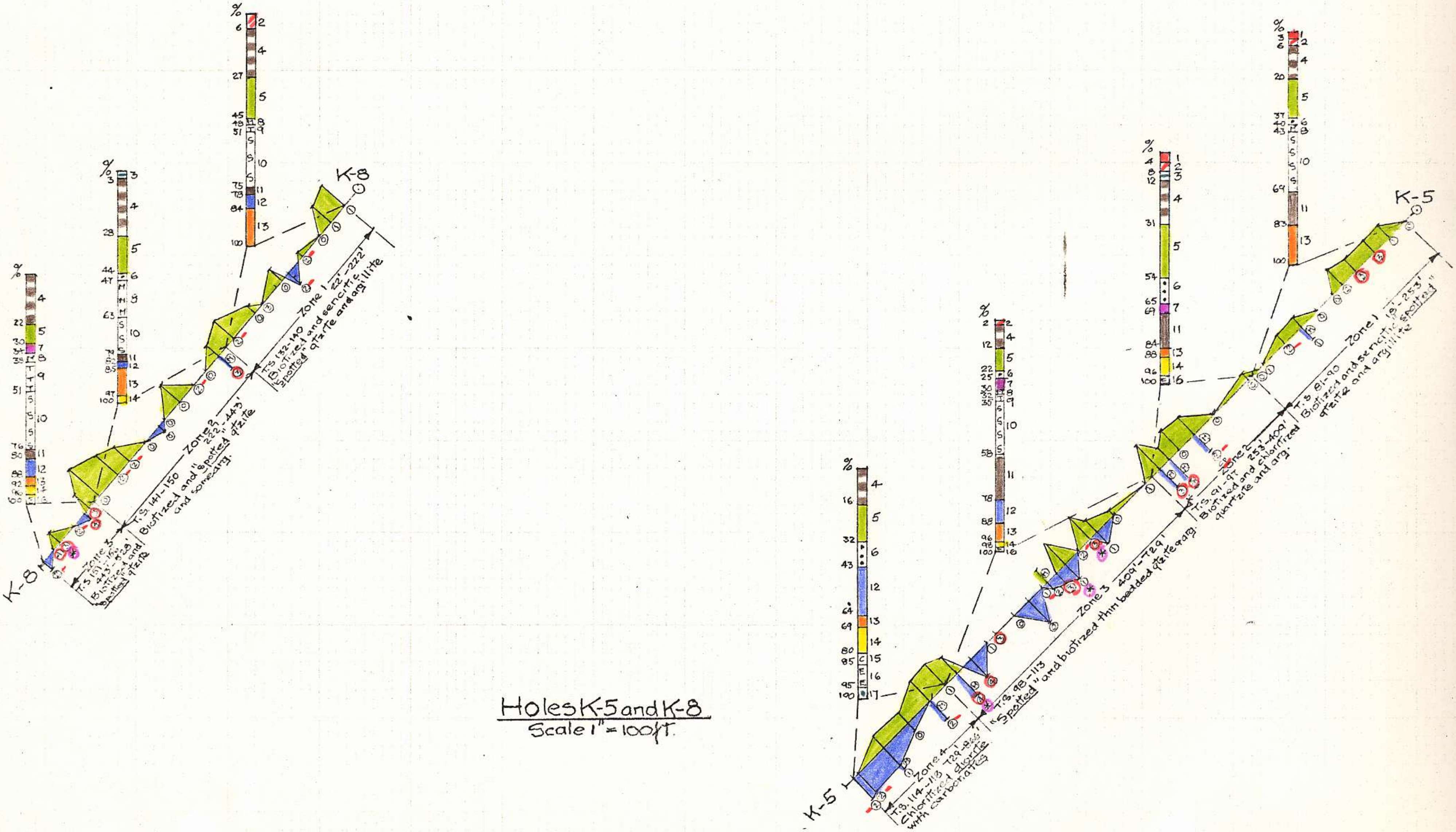
Relative Percentages of Alteration Minerals occurring in



Page 5 B

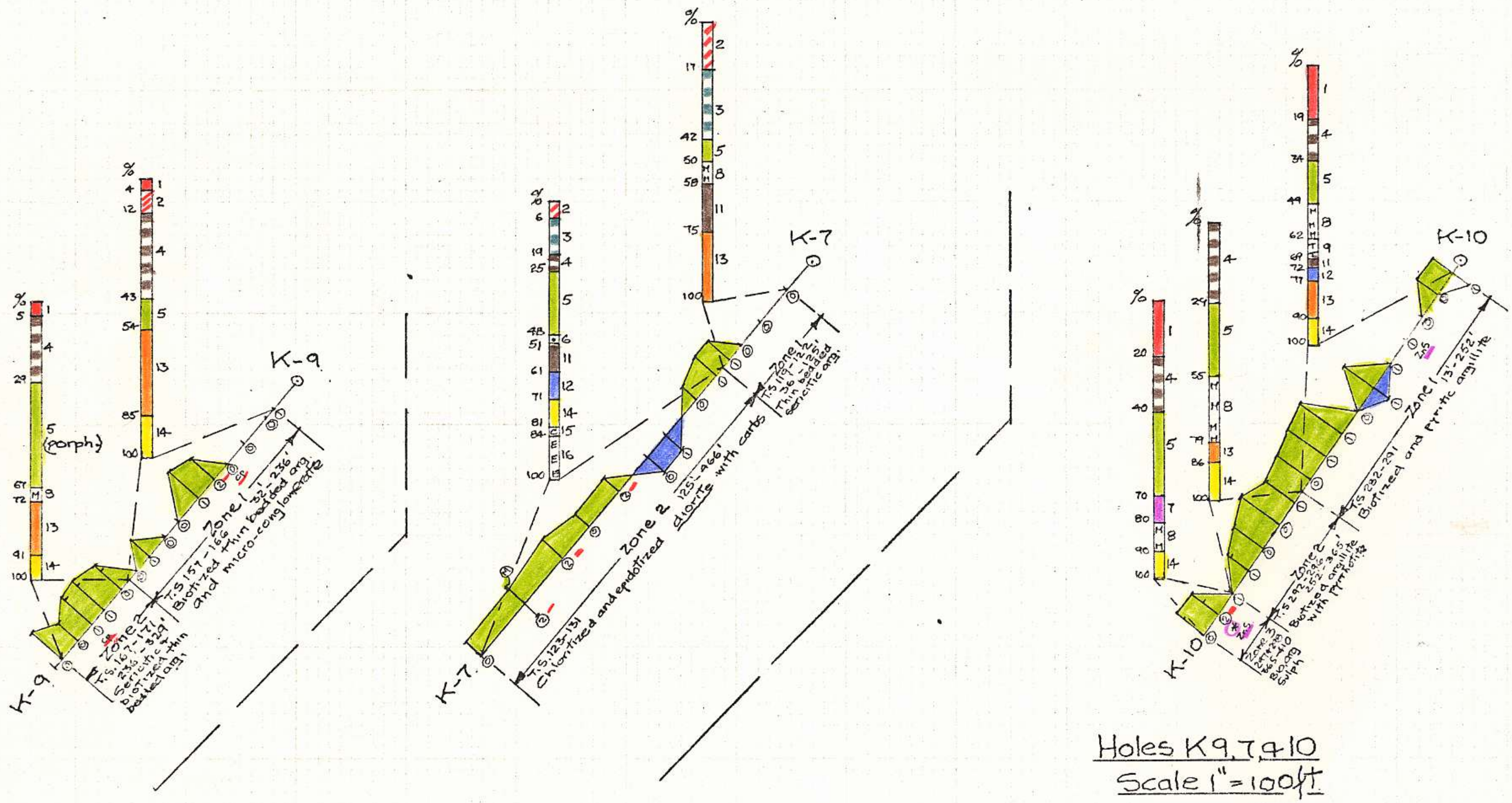


K-1
K-11
Zone 1 T.S. 9-11 36'-112' Chl. & schistose Diorite
Zone 2 112'-360' T.S. 12-22 Sericitic & carbonated quartzite
Zone 3 360'-497' T.S. 23-26 Biotized & sericitic q'tzite & argillite
Zone 4 497'-738' T.S. 27-35 Silicified and alt. argillite (shd)
Zone 5 738'-966' T.S. 36-44 Biotized and chloritic argillite and diorite
Zone 6 966'-1173' T.S. 45-64 Sericitic and biotized spotted argillite
Zone 2 Sericitic q'tzite and argillite
Zone 3 Biotized & brecciated q'tzite
Zone 4 Sericitic, carbonated and brecciated q'tzite
Zone 5 Biotized & sear q'tzite and arg.
Zone 6 Biotized "spotted" arg. & q'tzite
Possible Fault
Spots
Spots.
Holes K-1 and K-11
Scale 1" = 100 ft



Holes K-5 and K-8

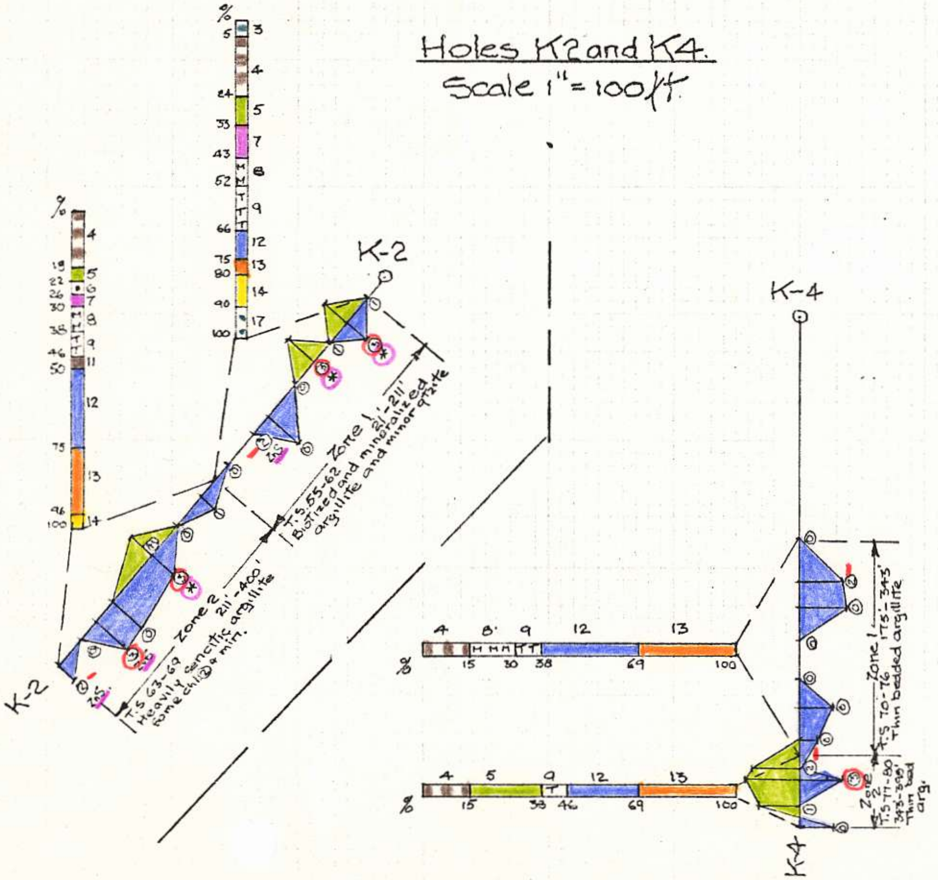
Scale 1" = 100 ft.

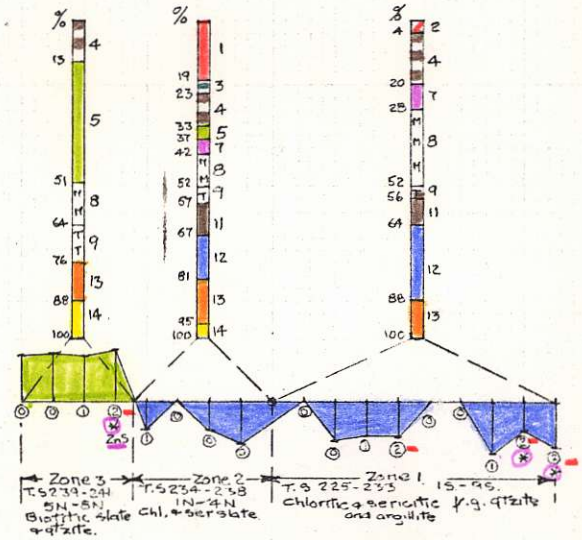


Holes K9, 7 & 10
Scale 1" = 100 ft.

Holes K2 and K4.

Scale 1" = 100 ft.





J.S.S. Surface Samples

Claim 54

Scale 1" = 40 ft.

IMPERIAL OIL LIMITED - PRODUCING DEPARTMENT PETE PRICE

REGIONAL OFFICE

MEMORANDUM

June 7, 1972

File: 82-G-12

MI-377

TO: D. B. Layer

FROM: P. Price

RE: ROCK OUTCROP ON EASTERN HALF OF KIM CLAIMS - KIMBERLEY AREA, B.C.

On June 1 and 2, 1972, J.S. Scott and I made a reconnaissance examination of rock outcrops in the above noted area. Previously, I had only seen the outcrops around Hole K.2, and I wanted to check the unusual strikes and dips noted during the original visit. Another objective of the trip was to check the possibility that there was an unconformity between the Creston and the Aldridge formations. Further, I wanted to examine outcrop at Hole K.9 and those further to the northwest, also those to the west of Hole K.7. (Note: Numbers used below are claim numbers of both old and new staking.)

Area around and north of Hole K.2

Outcrops on Claims 49 and 50 are very numerous and show strikes varying from N10°-40°E and dips from nearly vertical to 55°SE. The rocks are thin bedded and fissile Aldridge. The outcrops on Claim 40 also show the same features.

Starting on Claim 39 the area along the powerline and stretching as far west as Claim 45 shows much outcrop. Almost without exception these outcrops show a North 25°-45°West strike and dips at 35°-40° northeast. These rocks are slightly thicker bedded than those around Hole K.2.

Thus, there is a divergence of almost 90° in the northern part of the area compared to the southern part. A disturbance of major proportions is indicated. Whether this is due to folding or faulting is uncertain at this time. In any case a re-examination and re-mapping of the area is warranted. There is far more outcrop than is indicated on the original 1,000' to the inch preliminary map.

.../2

It should also be noted that all of Claims 15, 17, 19, 21, 45, 46, 47 and 48, together with the southern half of Claims 16, 18, 20 and 22 were not covered by the original gravity and magnetic surveys.

The steep hill along the powerline going down to the road on Claims 15 and 16 showed very thin bedded argillites with a northeast strike and flat dips northwest. These rocks may be Creston. If they are, there is a definite unconformity ~~in~~ this area.

Also examined were numerous outcrops in the northwest corner of Claim 16. Here the strikes are north to north 25°E with dips of 25° to the east. They are fairly thick bedded Aldridge with a normal strike and dip.

With the exception of the zone near Hole K.2, on which a small incline shaft was sunk, no areas of obvious rust or alteration were noted. (Hole K.2 did not cut this zone.)

Opinion:

In spite of the above, it is believed that this whole area deserves a more careful look. The presence of a large disturbance (fold?, fault?) on the northwestern flank of the large magnetic anomaly overlying a known intrusion is, I believe, sufficient reason to re-examine the original geophysics (gravity, etc.).

Further, since diamond drilling is necessary to hold these restaked claims, a hole should be put down under Hole K.2 and on the same azimuth. At present, this hole need only be of sufficient length to hold the ground provided it definitely intersects the zone on which the small incline was put down.

Areas around Holes K.7 and K.9

The discovery of an intensely sheared and favourably altered zone on Claims 185 and 166 (see my March report) prompted an examination of the outcrops at, and to the northwest, of Hole K.9. The area in the northwest corner of Claim 54 shows many outcrops bit I did not see any intense shearing or alteration in any of them. It is of course possible that, if the strike shown in my March report is correct, it would pass to the northwest of these outcrops. In any case these outcrops should be re-mapped in detail and sufficient specimens taken to detect any interesting alteration.

The outcrop area west of Hole K.7 was also examined. Most of the outcrops are diorite as would be expected from Hole K.7. The only unusual feature noted was a pit showing a number of quartz carbonate veinlets, whose strike is somewhat indefinite, and which did not appear to carry any worthwhile mineralization. Interest in the whole area stemmed from the fact that Hole K.7 showed well above background values in Cu and Pb coupled with favourable alteration. However, nothing was gained from the outcrops seen which would lead to further work.

Opinion:

I believe that, since Group 4 claims expire this year, an inclined hole should be drilled from the outcrop area in the northwest corner of Claim 54. This would at least test the possible northeast extension of the shear zone described in my March report.

Note: An attempt was made to examine the Creston-Aldridge contact shown on Rice's map along Mather Creek near Highway 93A. Some outcrop was examined but high water in Mather Creek prevented any firm opinion as to an unconformity, etc.

Peter Price

PP/gf

March 20,1972.

Mr.J.D.Harvie,
Coordinator,
Business Development Dept.,
Imperial Oil Ltd.,
111 - St. Clair Ave.W.,
Toronto 7, Ont.

Dear Mr.Harvie,

Re Kim Claims, Kimberley Area, B.C.
Study of surface samples collected in 1970 and 1971.

As arranged with you, J.S.Scott and I made a re-examination of the surface outcrops on the above noted claims in August 1970. The results of the alteration study made by me on the 19 specimens collected, caused me to return to the area with Scott in May 1971, when a further 27 specimens were collected. During this trip, a visit was paid to the Placid Oil Mine at Bull River. A long discussion with Art Freeze of Cominco re the Kimberley area took place in Calgary in 1970. During the 1971 trip, a visit was made to the Sullivan Mine, where Scott and I had a session with H.C. Morris, Chief Geologist at the mine. The original purpose of the 1970 visit was to check the area for any occurrence similar to the peculiar alteration features shown in Holes K1, 5 and 8, drilled in 1969. These features were detailed in a report to you dated December 5,1969. The 1971 visit was made primarily to check an interesting zone in the northern area of the claims which was found in 1970, and also to widen the search for alteration features beyond that covered the previous year. The accompanying plan shows the areas where specimens were taken.

Conclusion.

It is believed that sufficient critical information has now been obtained to warrant continued exploration of these claims. Further, no claims should be allowed to lapse without conclusive evidence that they are worthless. The reasons for these opinions are set out in some detail below.

General.

The general geological setting of the Sullivan orebody and the various opinions as to it's origin were given on pp.2-5 in the December 1969 report. On page 3 I gave a summary of my beliefs as follows:-

"For various reasons, I have some remaining affection for the hydrothermal origin, agreeing with some, but not all, of the Cominco geologists."

In this respect, it is, I believe, useful to summarize the opinions of Freeze and Morris, as gained in the discussions referred to above.

Freeze, who was Chief Geologist at the Sullivan for a number of years previous to 1969, believes the following:-

(1) Origin is hydrothermal. Orebody post-dates diorite.
(2) In hanging wall of orebody tourmaline is not much use, albite is fair, but chlorites are the most critical alteration products.
(3) Origin of "spots" indeterminate. Did not know how far they extended beyond actual mine area.
(4) South of Hidden Hand Fault very little known about structure, faulting, etc. Hence if there is a favorable horizon in the Aldridge, wouldn't even hazard a guess as to where it is south of the above fault.

Morris, present Chief Mine Geologist at Sullivan (had been there two years before last summer) believes the following:-

(1) Basic belief is that orebody is syngenetic. He favors an assemblage of sulphides, albite and tourmaline from the surrounding rock (diagenesis?) or from unknown heat source.
(2) Diorite is later than the ore.
(3) Turbidite horizons should be sought by "down-the-hole" geophysics. This because Sullivan is believed to occur in this type of material.
(4) Origin of "spots" definitely associated with diorite resulting from thermal metamorphism. Believed them to be universal in the area wherever diorite intrusions are found.

It is obvious that the above opinions represent the two extremes. As in most geological controversies, it is doubtful if it will ever be entirely clear as to what was the dominant process, or if there was a combination of both. My beliefs remain the same as set forth above on this page.

Reasons for re-examination of surface outcrops.

The 1970 trip was undertaken primarily to check the belief that wherever diorite occurred "spots" should be in evidence. Consequently outcrops of diorite where good exposures of bordering Aldridge quartzites are present were examined. The location of these specimens is shown on the 1000' Scale copy of Scott's original mapping.

This work failed to find any "spots" in the field, or in any of the thin sections made from the specimens taken, (see notes and tables, thin sections Nos.175-182 inclusive, and thin sections Nos.189-193 inclusive.)

The 1971 trip did not have the "spots" as a prime objective, but a careful watch failed to disclose any in the several outcrops examined. Neither did the thin sections from the specimens taken on this trip disclose any, (see notes and tables thin sections Nos.194-216 inclusive, also Nos.219 and 220).

All the above leads to the following conclusions:-

(1) "Spots" are not universal in the sediments where they have been intruded by diorite/gabbro sills or dykes.

(2) To date, the only area where they do occur on the Kim Claims is that cut by Holes K1, K5 and K8. Full details of this occurrence were given in the report dated Dec.5,1969(see pp.12-15).

(3) Since - at the present time - the only other area where they are known to occur is the Sullivan Mine, it is obvious that the area cut by Holes K1,K5 and K8 warrants further work.

North Hill Shear Area.

During the 1970 trip, while checking the quartzites surrounding a large area of diorite crossed by line 205, a shear zone cutting the diorite was found. Thin sections Nos.186,187 and 188 were cut from specimens taken from this sheared area. These sections yielded very interesting results (see notes and tables). This was the first time that chlorite and albite had been located in outcrop on the Kim claims. As this type of alteration occurs over a large area in the hanging-wall of the Sullivan orebody, the location obviously warranted another look.

Accordingly, it was revisited in May 1971, and specimens were taken from which thin sections Nos.194-203 inclusive were cut. This series confirmed the previous work (see notes and tables).

Apparently the interesting alteration stems from a shear zone which strikes N60°E. Dip is roughly vertical. The actual zone can be seen only for a very short distance. Overburden covers it in both directions. The specimens were taken to determine whether the alteration zone extended for a distance into the quartzites which outcropped to the northwest of the shear zone. No outcrops border the shear on it's southeast side. The 1971 specimens showed that the alteration extended out at least to 60' northwest of the shear.

I believe this area to be of high interest, and should be investigated further.

J.S.S.Shear Zone Area.

In 1968 Scott mapped a large rusty shear zone south west of Lone Pine Hill. It was visited by us in 1971. Specimens were taken from which thin sections Nos.204-216 inclusive were cut. Scott's interest stemmed from the fact that I.O.E. staff had reported that there was no faulting visible on the Kim Claims.

This zone is undoubtedly a large fault, with the quartzites on the south east side standing vertically. Diorite on the south east side is cut off by the fault. The location of the above noted thin sections is shown on the accompanying map.

None of the 13 specimens taken show anything comparable to those taken from the North Hill Shear Area. The dominant alteration is sericite. There are only traces of chlorites. As mentioned above, none showed any "spots" (see notes and tables).

One point of interest however that should be mentioned is that the shear zone extension to the north east would pass close to the location of the Turam anomaly east of Lone Pine Hill. Further, it's north eastern extension would project into the North Hill Shear area. Thus it is entirely possible that this zone may be a large active shear zone that could act as "plumbing" for hydrothermal solutions (see attached plan).

Visit to Placid Oil Operation (Bull River).

At the time of our visit Placid Oil were preparing their discovery for production. The ore is a complex series of quartz veins cutting Fort Steele and/or Aldridge quartzites. Two areas were being prepared for open pit. A third area known as the "underground zone" was not being developed. Ore reserves were quoted as 1.5 million tons averaging over 2% copper. Neither of the pits had developed far enough to get through the overburden, but we did see some of the better grade core intersections. We formed the opinion that the mine was spending too much for plant, etc.

This type of deposit is, I believe, somewhat new to this area, and the reason for the visit was the results obtained in Hole K7 and a small quartz vein with chalcopyrite near this hole. These need further investigation.

Summary and Conclusions.

All of the above, I believe, indicates that the Kim Claims constitute an excellent exploration bet. They cover a large area tied on to a great producing mine. Our present information is scattered and meagre, but two areas have given definite encouragement.

Undoubtedly, as more is known about the geology and alteration, other areas will be found. I recommend that careful continued exploration should be done, but only as specific targets present themselves.

I would like to discuss this whole matter personally with you and Fenton Scott at your convenience. I am sending a copy of this report to Doug Layer.

Peter Price,
Consulting Geologist.

Copy: D.D.Layer.

December 5,1969.

Mr.J.D.Harvie, Co-ordinator,
Business Development Dept.,
Imperial Oil Ltd.,
111 - St.Clair Ave.W.,
Toronto 7, Ont.

Dear Mr.Harvie,

Re Kim Claims,Kimberley Area,B.C. Study of alteration features shown in Holes K1,2,4,5,7,8 & 9.

As arranged with you,a series of specimens were collected from the above holes. In Calgary, on August 7 & 8, 1969, Mr.J.S.Scott and I examined and took specimens from Holes K1, 2,4,5 & 7. (Holes 3 & 6 were not drilled.) At Marysville on August 11, we examined and took specimens from Holes K8 & 9. August 12 & 13 were spent in examining outcrops,mainly in the critical area in the southwest part of the property.

The following table gives the number of specimens taken from each hole,together with the applicable Thin Section numbers:

Hole	Location S	Location W	Az.	Dip	Length	No.of Specs.	Thin Section Nos.
K1	25+300	34+100	315°	-50°	1173	46	EK 9- 54
K2	30+600	21+400	315°	-50°	404	15	EK 55- 69
K4	22+500	17+400	-	-90°	400	11	EK 70- 80
K5	25+370	36+740	315°	-45°	880	39	EK 81-118 +89A
K7	22+300	26+600	300°	-50°	466	13	EK 119-131
K8	23+820	36+800	315°	-50°	537	25	EK 132-156
K9	19+500	24+900	315°	-50°	338	15	EK 157-171
		Totals			4198	164	

Of the total hole footage, 269 feet were casing, so that in the total core footage of 3929', the 164 specimens taken represent an average spacing of about 24 feet. This rather close spacing was thought necessary to detect any general changes in alteration.

The above holes were drilled mainly to test gravity anomalies and showed nothing of obvious importance. The present study was undertaken to find out if any of the alteration features shown might be critical in assessing the present results, and hopefully to indicate other areas worthy of investigation.

Conclusion.

It is believed that the results of this study are such that real interest in the area covered by these claims - especially the western area - still remains and warrants further testing.

General.

The following is a summary of the geological setting of the Kim property:-

(1). The Sullivan orebody occurs at or near the contact of the Middle and Lower Aldridge. The surface geology on the Kim claims consists of various types of Aldridge intruded by diorite sills and/or dykes.

(2). Due to faulting, extensive overburden, etc.,it is still not clear whether the above contact might occur on the Kim claims within reasonable distance from surface. It is possible that it exists in the area drilled by Holes 1,5 & 8, but no distinguishing feature, such as conglomerate (see below), was encountered in these holes or in surface outcrop.

(3). The eastern claims undoubtedly contain large areas of the Creston formation, which unconformably overlies the Upper Aldridge.

(4). Numerous theories as to the origin of the Sullivan orebody have been advanced. They are:-

(a). It is ~~an~~ epigenetic hydrothermal replacement deposit. Various ages have been credited with it's formation, notably late Pre-Cambrian as against Late Cretaceous - Early Tertiary.

(b). Derived from euxenitic shales, the concentration being effected during a period of local granitization.

(c). Metals were introduced into a sedimentary basin by processes arising from, and associated with, a period of contemporaneous volcanism. These metals, presumably derived from the volcanic exhalations, became dispersed in the sea water and subsequently precipitated by biogenic agencies. Various processes such as compaction, diagenesis, subsequent re-grouping and re-mobilization, have been called upon to bring the orebody to it's present form.

Important. As in most geological controversies, it is doubtful if it will ever be entirely clear as to what was the dominant process, or if there was some combination of all three. For various reasons, I have some remaining affection for the hydrothermal origin, agreeing with some, but not all, of the Cominco geologists.

In any case, there are rather unusual alteration features closely associated with the Sullivan orebody. They are tourmalinization, albitization and chloritization.

Hence it would appear that in any search for a new orebody in the surrounding district, particular attention should be paid to the detection of any of these three types, no matter how weak or dispersed they are. This is especially true in regard to albite and chlorite, since they occur to a large extent in the hanging wall of the Sullivan orebody.

Other considerations.

(1). It is, of course, necessary to bear in mind that not all orebodies in the district would always have the three types mentioned above as dominant features. Possibly some other minerals would be definitive, e.g. biotite, sericite, clays etc.

(2). Nor should it be assumed that all orebodies would be "strata bound" even if the St.Eugene orebody was not present in the district.

(3). All the theories as to the origin of the Sullivan orebody listed above do not absolutely prohibit an orebody occuring at some other horizon than the Lower-Middle Aldridge contact with which the Sullivan is believed to be associated.

(4). Pyrrhotite in fine disseminations, as laminations or as small masses, have been noted throughout the Lower and Upper Aldridge, so that it is obvious that this mineral is not definitive as a horizon marker.

(5). The presence of a thick mass of conglomerate under the Sullivan orebody has also been assigned a role as a horizon marker and, in a vague way, some connection with the emplacement of the orebody.

(6). The presence of a "spotted" type of alteration has in general been assigned to the emplacement of the diorite masses, but this is still debatable, and is discussed at some length below.

(7). There appears to be some slight mineralization and alteration associated with the diorite masses themselves which deserve consideration.

All the above general features are listed in order that the alteration, textural and structural implications gained from the study of the 164 thin sections, can be judged in the context of the regional surroundings. Further, they contributed directly to the length of time needed for the microscope study and this, combined with the pressure of other work, has led to the delay in the completion of this report, (and also to it's somewhat unusual length!).

Mineralization and alteration features.

In general the following remarks are arranged roughly in respect to the several items listed above.

Mineralization. No obviously significant amounts of lead-zinc mineralization were encountered. Traces of galena and chalcopyrite were found, but quite often they occurred in small quartz-carbonate veinlets of no apparent importance. The question arises, of course, as to whether these veins could be "smoke" emanating from some deep mineralization, but nothing definite can be determined at this stage.

As a check on the microscope work, every alternate specimen was sent to Technical Service Laboratories of Toronto for determination of Copper, Lead and Zinc in parts per million. A copy of the individual results is included in this report. To assess the general results as to background etc., the following "whole hole" summary shows the averages for each hole:-

Whole Hole Averages.

Hole	No. of specs.	Average p.p.m. Cu.	Pb.	Zn.	Ratios Zn./Pb.	Cu./Zn.
K1	23	30	52	115	2.2	0.3
K2	8	78	28	36	1.3	2.2
K4	4	6	17	44	2.6	0.1
K5	19	43	49	46	0.9	0.9
K7	7	203	258	48	0.2	4.2
K8	12	25	47	35	0.7	0.7
K9	8	31	38	57	1.5	0.5

As a further check, the above results were divided into the different zones in the holes in which either biotite or sericite or "spots" were the dominant alteration types, or sometimes where the hole cut diorite. The following table gives the results for these zones, which are also set out in the sections of each hole accompanying this report:-

(see following page)

Dominant Alteration Group Averages.

Hole	Footage From-To	Percent Sericite	Percent Biotite	"Spots"	Average p.p.m. Cu.	Average p.p.m. Pb.	Average p.p.m. Zn.
K1	36-102	(Diorite)			22	20	62
	122-481	80	20	-	20	19	57
	514-587	25	75	-	30	35	125
	621-721	100	-	-	48	48	390
	755-951	22	78	-	51	116	86
	980-1173	45	10	45	17	70	72
K2	21-402	50	50	-	78	28	36
K4	175-398	100	-	-	6	17	44
K5	18-247	-	18	82	35	40	59
	260-493	20	60	20	54	71	51
	500-710	-	-	100	41	51	42
	729-866	(Diorite)			42	25	25
K7	36-134	75	25	-	223	100	47
	163-466	(Diorite)			188	376	49
K8	22-210	-	-	100	34	63	45
	235-435	40	10	50	16	48	27
	452-528	-	-	100	27	25	33
K9	32-329	36	64	-	31	38	57

The results given in the above tables can be summarized as follows:-

(1). Background p.p.m. are roughly:- Cu. 51-6p.p.m. (average 32), Pb. 51-19p.p.m. (average 37), and Zn. 62-25p.p.m. (average 45).

(2). Hole K1 shows the highest zinc results. The section from 514'-721' shows three to eight times background. As this result agrees so well with the microscope work, it is discussed in some detail below.

(3). The above table also shows that the "spotted" alteration did not exhibit any appreciable pick-up in any of the three metals tested. (see Hole 1. 980'-1173', Hole 5. 18'-710', and Hole 8. 22'-528')

(4). Hole 7 produced the best Cu. and Pb. results. The "whole hole" average shows 6 times background in Cu., and 7 times background in Pb., but no pick-up in Zn. The other holes which cut diorite (1 and 5) gave nothing comparable. The alteration features in Hole 7 are discussed in some detail below.

(5). Hole 2 shows twice background in Cu. but nothing comparable in Pb. and Zn. As this hole is the most easterly, it rates some mild attention.

Tourmaline. No definite increase in this mineral was detected. It's general habit is in very minute crystals randomly distributed throughout the sections in varying amounts. No definite association, either to other alteration minerals or to different rock types, was apparent. The only thin section which showed rather heavy tourmaline was EK-155 taken at 511' in Hole K8, which puts it in the vicinity of the possible Luke Creek Fault and close to a diorite contact.

Albite. Except where it occurs as original grains (generally in quartzite) no large increase in possible secondary albite was found in any of the holes, with the exception of Hole K1. As stated, this hole will be discussed in some detail below.

Chlorite. Note. The terminology used to describe the chlorites is the same as has been explained to you previously. Chlorite 1 is a general term for the higher magnesium types, and Chlorite 2 for the higher iron types. "Mixed" chlorite is the term used for both Chlorite 1 and 2 occuring in the same minute area and sometimes in the same chlorite crystal.

The tables attached to this report give the details of the chlorites (if any) found in the 164 thin sections. The abbreviations used are given in the list preceding the tables. Attached also is a table showing a summary of the various types of chlorite occuring in each hole. As explained to you, the Berek Compensator readings give a rough comparison of the relative amounts of magnesium and iron content.

The following is a summary of the various types of chlorite found, their relative frequency and significance, if any:-

(1). Of the 164 thin sections, 112 (68%) showed chlorites of various kinds.

(2). Only three sections showed chlorite in sufficient quantities to be called a dominant alteration, viz:- Nos.10 & 11 in heavily altered diorite near the collar of Hole K1, and No.123 in the heavily altered contact phase of the diorite in Hole K7.

(3). Chlorite occuring in minute veinlets with carbonates and/or pyrite was seen in 60 thin sections (54%). This is the prevalent habit.

(4). Chlorite occurs as an alteration of Biotite in 13 thin sections (12%).

(5). Porphyroblasts of Chlorite (after Biotite?) occur in 14 thin sections (13%). This is particularly plentiful in Hole K9. (see tables)

(6). Chlorite occupying spots in the "spotted" alteration in Holes K1, K5 and K8 occurs in 9 thin sections (20%) of the 45 thin sections showing this type of alteration.

All the above might be considered an overemphasis on this type of alteration, but it was thought advisable to give it a try in this area, in the hope that it might show some trends, however faint. Also it might act as a basic guide to compare any future results.

It is obvious that in no hole could Chlorite be called an overall dominant alteration. There appears to be some connection between it and the diorite and in some cases it appears to transect, and be later than, the "spotted" alteration. But the possibility that it could be used as a guide was not confirmed as far as present information goes.

Biotite and Sericite. The dominant alteration products occuring in all holes are Biotite and Sericite. The term "dominant" is somewhat general, since there are numerous cases where one or the other is dominant in very minute beds in the same thin section. In fact there is some evidence that the presence of either one may be a reflection of the original composition of the different beds, and thus may be a result of selective regional metamorphism, rather than the later introduction of hydrothermal material. In other words, do the more argillic beds show a higher percentage of sericite than the more quartzose beds, and vice-versa, insofar as the biotite is concerned ? The following tables give some information on this point:-

(see following page)

Biotite.

Hole	Total T.S.	No.showing Biotite	% of Total	Average Berek deg.
K1	46	25	54	19.0
K2	15	9	60	17.2
K4	11	4	36	13.9
K5	39	~~34~~	87	22.2
K7	13	7	54	20.8
K8	25	21	84	18.2
K9	15	13	87	15.1
Totals & averages	164	113	69%	19.2 deg.

Heavy Sericite.

Hole	Total T.S.	No.showing "heavy" sericite	% of Total	Ratio %Bio./ %Ser.
K1	46	21	46	1.2
K2	15	7	46	1.3
K4	11	10	91	0.4
K5	39	13	33	2.6
K7	13	3	23	2.3
K8	25	10	40	2.1
K9	15	12	80	1.1
Totals	164	76	46%	

In the above tables, since sericite is ubiquitous, only those showing "heavy" amounts are included. Biotite is generally on the same basis, or sufficiently well developed that a Berek Compensator reading could be made.

While it is true that the ratio of biotite to sericite is close to one in Holes K1,2 & 9, it is more than two in Holes K5, 7 & 8. (Hole K4 being in the Creston formation shows a very low ratio). A study of the relative amounts of argillite to quartzite in each hole shows that they do not follow these ratios closely. Moreover, there are numerous cases where later veinlets carrying biotite transect heavy sericite zones (see especially Hole K2). The relative amounts of iron in the biotite as given by the Berek readings do show that in the heavy sericite zones it is low (see Holes K4 & 9).

The situation is further complicated by the relative amounts of these two minerals present in the "spotted" zones, (see table, p.7 this report). This whole question is taken up in the section on this type of alteration.

The importance of these two minerals as a guide to future work is, at present, far from clear. It is believed, however, that enough variations exist to warrant their continued appraisal as more information on the area becomes available.

"Spotted" Alteration. This unusual type of alteration of the sediments is shown best in Holes K5 & 8. Hole K1 showed it only near the bottom (thin sections 50-54 inclusive). The "spots" are quite often visible to the unaided eye, but they range in size from 1 m.m. to 30 m.m., and in numerous cases their presence was detected only by the microscope.

They fall into two main groups,viz:-

(1). Sericitic matrix.

(a). "Spots" consist mainly of feldspar (microcline), sometimes as metacrysts and often showing a "crab-like" extension in and through the neighboring sericite.

(b). "Spots" consist entirely of quartz and minor biotite.

(2). <u>Quartz Biotite matrix.</u>

(a). "Spots" consist of quartz, biotite,sulphides and Chlorite 1.

(b). Quartz rimming quartz and biotite "spots".

The two types have been named "white" and "dark" according to their visual appearance. The latter might more properly be alluded to as "brown". The location of the "spotted" zones are shown graphically on the Longitudinal Projection of Holes K1,5 & 8 accompanying this report.

It is difficult to tell from the Longitudinal Projection what is the actual dip and strike <u>of the upper</u> limit of the "spotted" alteration. The upper limit of the heavily spotted biotite-rich zone occurs in T.S. E.K.101 @ 505' in Hole K5, and in T.S. E.K.151 @ 452' in Hole K8. These sections show considerable similarity. The spots are heavily mineralized and show much Chlorite 1 as well as biotite. If these thin sections represent the upper limit of the heavily spotted biotite-rich zone, then it has an entirely different strike to that of the Aldridge in this area. It's trace would be almost horizontal on the Longitudinal Projection, which would give it a true strike of approximately North-South, and an unknown dip. Thus it would diverge 45° from the strike of the Aldridge in this area, which is about N.45°E. and dips from 30° to 60° to the southeast.

All the above brings up the question of the origin of this "spotted" alteration. Is it due, in some fashion, to regional metamorphic effects stemming from the emplacement of the diorite? or, is it an unusual early, but preparatory alteration, preceding the emplacement of an orebody? The same problem occurs in the vicinity of the Sullivan Mine. In a paper entitled "Geology of the Sullivan Mine", given in 1945, Swanson and Gunning discussed this same alteration. Since it has an obvious bearing on the present problem, a copy of the section of this paper entitled "Biotite Spotted Sediments" is attached for reference.

It is clear that Swanson and Gunning preferred an origin related to the diorite, but the last paragraph expresses some doubts as to this simple explanation.

I believe that the "spotted" alteration zone found on the Kim Claims shows many features that would indicate that it is not related to the diorite intrusions. These are:-

(1). The surface exposures of the diorite contacts show no evidence of this type of alteration.

(2). Holes K7 & 9 drilled into and along strike of a large diorite mass show nothing of this type. The diorite cut at the bottom of Hole K5 is apparently an exception to the above. Here a "spotted" zone comes within a few feet of the diorite contact. However the sections closest to the diorite (Nos.111 & 112) show the same chloritic and carbonate alteration as in Hole K7. In K5 this appears to be superimposed on the "spotted" alteration.

(3). One surface exposure found by Scott and shown to me certainly contains spotted sediments, but it's location along Luke Creek suggests that it may be drag-faulted into it's present position, rather than being an effect of the diorite outcropping to the west.

So that on the basis of the present information, the origin of this type of alteration is in doubt. The possibility that it may relate to ore emplacement should surely be checked by further drilling.

The preceding remarks draw attention to one area that needs further work. The follow~~ing~~ lists two or possibly three more:-

Hole K1.

The thin sections taken from this hole showed some unusual microscopic and structural features in a zone extending from 444' to 980' (T.S. D.K.25-45 inclusive). The features are:-

(1). Very heavy sericite.

(2). Much veining by chlorite and carbonates.

(3). "Siliceous" zones cutting the bedding containing, besides quartz, much untwinned feldspar. The latter is very fine grained and optically indeterminate.

(4). Sphalerite associated with the zones and veinlets mentioned in (2).

(5). Intensive fracturing, minute faulting with some brecciation. And finally,

(6). Above average number of tourmaline crystals.

It was this zone which prompted me to get your permission to turn in alternate specimens for an assay of total Cu., Pb., and Zn. in p.p.m. This was done to extend and amplify the same type of sampling done by Leo Kirwan, so that a possible background in these metals could be confirmed. The individual results for each specimen are attached, and the average results for each hole, and separate zones in the same hole, have been given under the section on Mineralization (see p.p.5-8 this report). Backgrounds suggested were Cu.32 p.p.m., Pb.37 p.p.m. and Zn.45 p.p.m.

In Hole K1 the sampling indicated that the zone mentioned above should properly be divided as follows:-

	Footage		Average p.p.m.		
T.S.Nos.	From	To	Cu.	Pb.	Zn.
25 - 38	444'	789'	35	52	246
39 - 45	818'	980'	49	152	111
Averages	444'	980'	40	87	197

In the holes drilled to date, this zone, covering over 550' of core length, is the only one that shows consistent Zn. values well above background. Further, no other hole but K1 could have cut it's probable extensions.

I believe that this zone warrants further investigation.

Hole K7 (and K9).

These holes are the most northerly drilled to date. K7 was drilled near the eastern contact of a large mass of diorite which occurs on Claims 167, 166 and 185. Hole K9 was drilled from an area of argillaceous quartzite near the N.W. corner of Claim 51. They are given some attention here for the following reasons:-

(1). Hole K7 showed the best Cu. and Pb. results in the sampling. As noted on p.8 of this report, the "whole hole" averages were 6 times background in Cu. and 7 times background in Pb.,but no pick-up in Zn. Since the hole cut both sediments and diorite, the results should properly be divided as follows:-

	Footage			Average p.p.m.		
T.S.Nos.	From	To	Rock	Cu.	Pb.	Zn.
119 - 122	36'	134'	Seds.	223	100	47
123 - 131	163'	466'	Diorite	188	376	49
Averages	36'	466'		203	258	48

Kirwan's samples from this hole showed only background copper and lead in the sediments, and only background lead in the diorite. The 6 samples taken from the diorite, however, showed an average of 243 p.p.m.Cu. No samples were run for Zn. Thus there may be some doubt as to the Pb. results in my sampling, but good confirmation was obtained for the Cu. A few specks of chalcopyrite were noted in Kirwan's logging, but galena is not mentioned.

The main alteration features shown in the diorite are Epidote and Chlorite 1. Clinozoisite is present in unusual amounts. Alteration of the sediments is mainly heavy sericite and greenish biotite in veinlets. Carbonate as veinlets and disseminations are present in both rock types.

It is believed that the diorite has been subjected to a later alteration, carrying some weak copper values. This type of alteration often has been found by me over orebodies, so that I believe that this area should be checked along strike and at greater depth.

(2). Hole K[illegible]. The only reason for mentioning this hole here is that it is in the same general area. It cut heavily biotized sediments with varying amounts of sericite. The biotite shows a low iron content (see section on biotite, p.11).The core also shows an unusual amount of Chlorite 1 in mineralized veinlets, as well as porphyroblasts disseminated throughout the rock. Further, a rock which resembles a quartz pebble conglomerate occurs from 116' to 184' (T.S.161-164 inclusive). This is the only appearance of this rock type in the drilling to date.

Since no pick-up in the sample results for Cu.,Pb. and Zn. were shown, there is little interest in this hole at present. As stated before, it is only mentioned here because of the unusual features, and it's proximity to Hole K7.

Hole K2.

This hole is the most southerly, and was drilled near an old pit on a slightly mineralized shear zone, with quartz veins. In my sampling, only one sample, EK 55 @ 21' showed anything unusual, viz: 365 p.p.m. Cu. All the rest showed only low values in Cu.,Pb. and Zn. Kirwan's sampling averaged in p.p.m. Cu.89, Pb.36 and Zn.75 from 30' to 163'. This discrepancy warrants further attention, but nothing was detected from the alteration study to explain it. A trace of sphalerite was seen, but did not register in the zinc assays.

The results of Hole K2 in what appears to be the most easterly and southerly exposure of the Aldridge, and also in a general area where the structure is disturbed, indicates a closer study of the surface outcrops is needed.

Unless this turns up some interest, no further work is recommended.

Summary.

As explained in some detail above, the results of the 1968 drilling program have shown three locations which I believe warrant further work. They are:-

(1). Zone cut by Hole K1.

(2). Area of "spotted" alteration.

(3). Copper values in altered diorite cut by Hole K7.

The amount, location and attitude of future drilling should, I believe, be decided only after a full scale discussion involving your Toronto and Calgary staffs, as well as Scott and myself.

Respectfully submitted,

Peter Price,
Consulting Geologist.

Types of Chlorite present in Thin Sections showing this mineral.

Hole	Total T.S.	No. showing Chlorite	Types Chlorite 1		Chlorite 2		"Mixed"		Radioactive	
			No.T.S.	%	No.T.S.	%	No.T.S.	%	No.T.S.	%
K1	46	30	14	47	12	40	4	13	2	7
K2	15	9	2	22	6	67	1	11	3	3
K4	11	9	3	33	6	67	-	-	-	-
K5	39	29	13	44	8	28	8	29	4	14
K7	13	10	7	70	2	10	1	10	-	-
K8	25	17	12	71	4	23	1	6	1	6
K9	15	8	8	100	-	-	-	-	-	-
Totals	164	112	59	53%	38	34%	15	13%	10	9%