

ALTERATION INVESTIGATION

of

HOLE K-14

841850

PETER PRICE

FEBRUARY 1977.

PETER PRICE  
CONSULTING GEOLOGIST  
ROOM 610, 44 VICTORIA STREET

February 24, 1977.

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 Hole K 14  
(500'-1000') Kim Claims, Kimberley Area, B.C.

The following relates to an examination of 42 thin sections from 21 specimens taken by J.W. Simpson.

(Note: 2 thin sections from each specimen were cut for closer identification of rocks and alteration).

The detail of the 42 thin sections studied is given in the accompanying notes and tables. A copy of the section showing the various rocks and alteration types for the entire hole (0-1000 ft.) is also included. (See page 2 of my report dated December 7, 1973 for a description of the Legend and general background used in making up this section).

Hole K 14 (500'-1000')

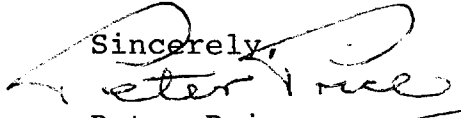
Hole K 14 was deepened from 500' to 1000' in 1976. It showed that the quartzites and argillites persisted to approximately 562', where it entered a group of intrusives which included normal diorite, fine grained diorite, and a quartz feldspar rock with minor amphibole (see notes and tables for details).

As partially demonstrated to you in this office (Jan. 26) K 14 showed an unusual amount of post-intrusive alteration. As these features are explained fully in the accompanying detailed notes for each thin section, it is unnecessary to repeat them here. I believe, however, that the intense alteration shown in the deepest section (1000') is highly significant, and may indicate that the lower diorite contact is close. Further, the unusual amount of chalcopyrite compared to that in the other holes which cut the diorite in this area is significant (cf. Holes K 7 and K 13). To check this, I had the specimens analysed by Toronto Technical Services Ltd. A copy of their results is included.

Opinion.

I believe that Hole K 14 should be deepened.

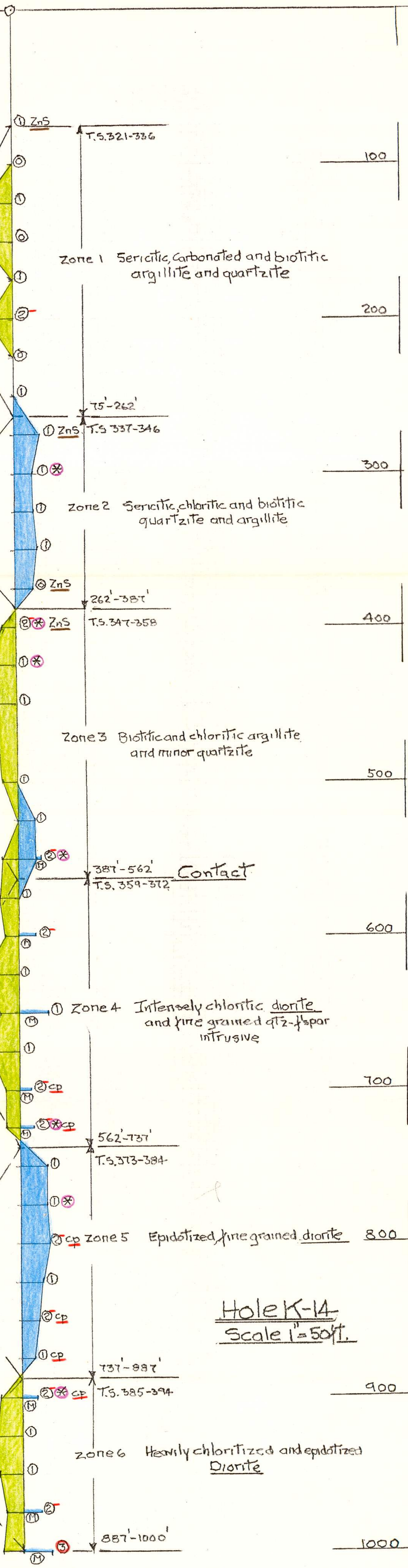
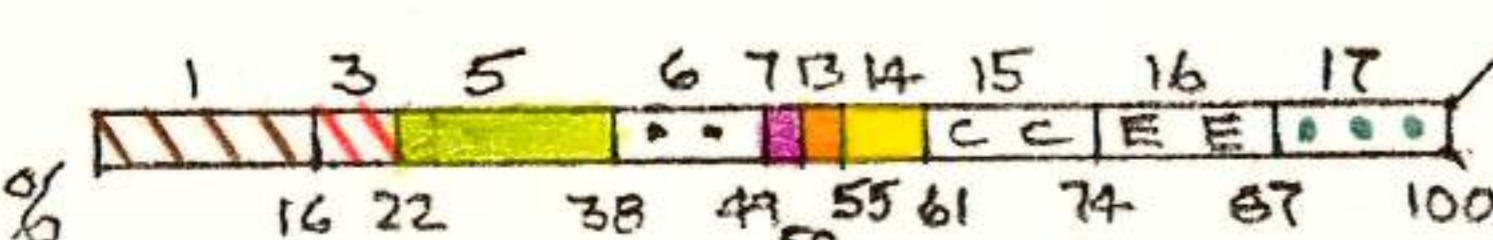
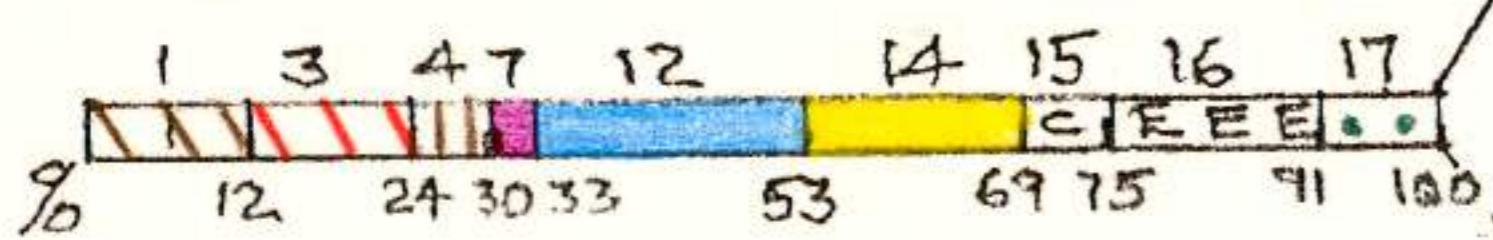
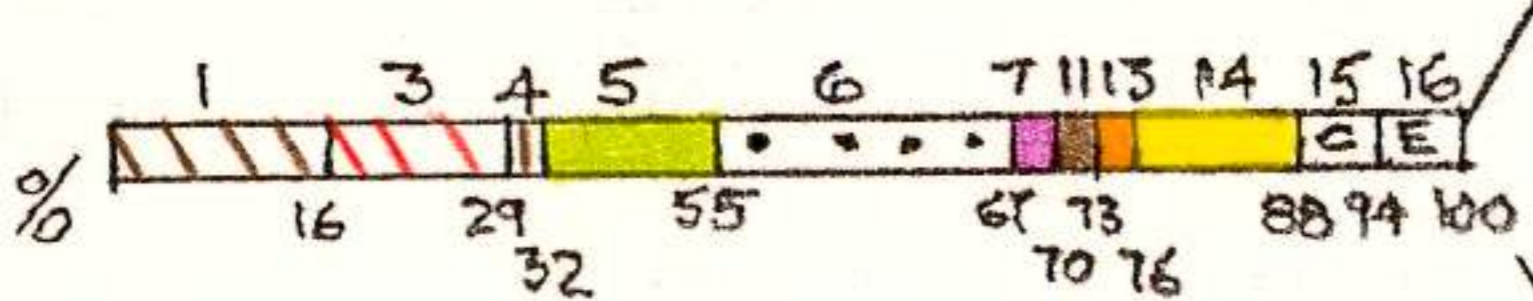
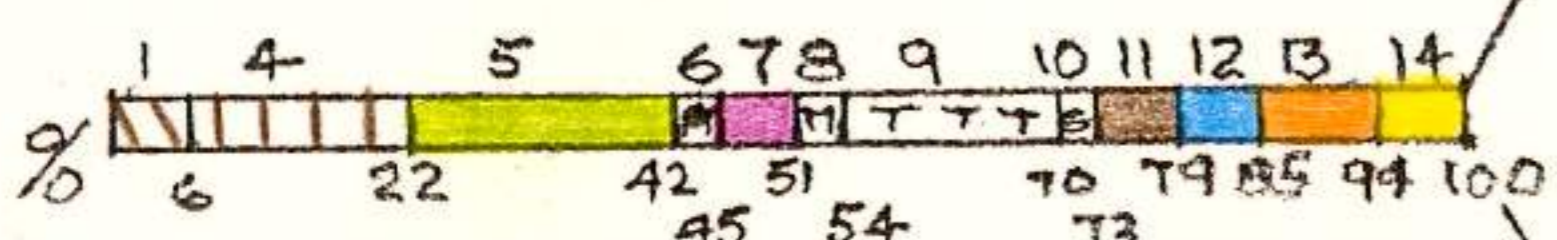
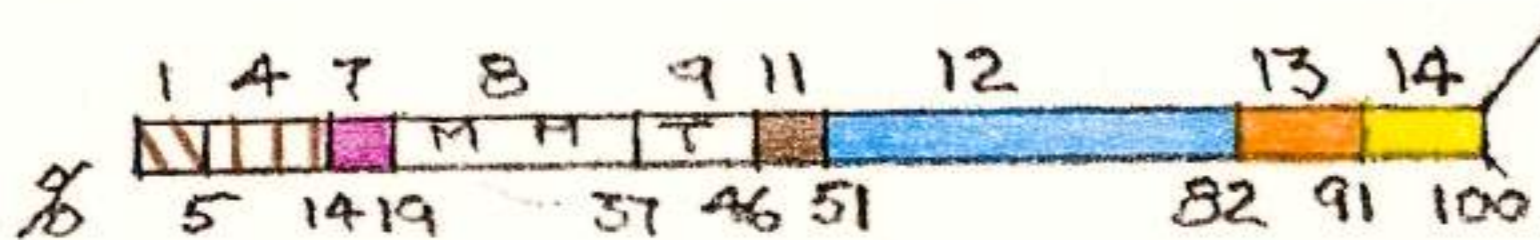
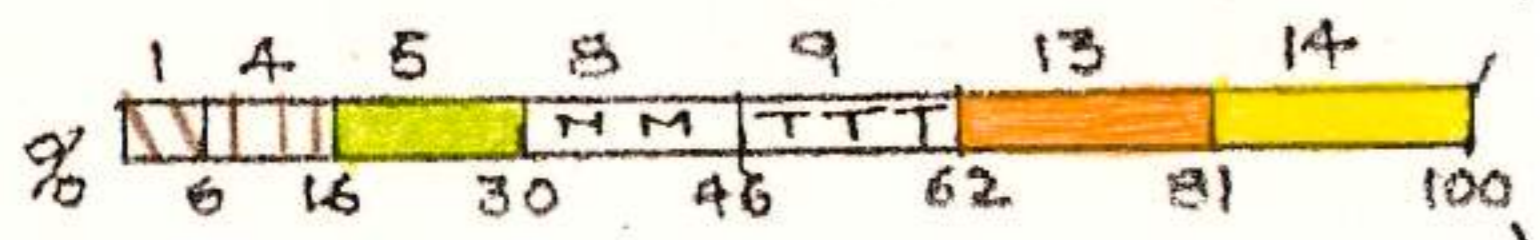
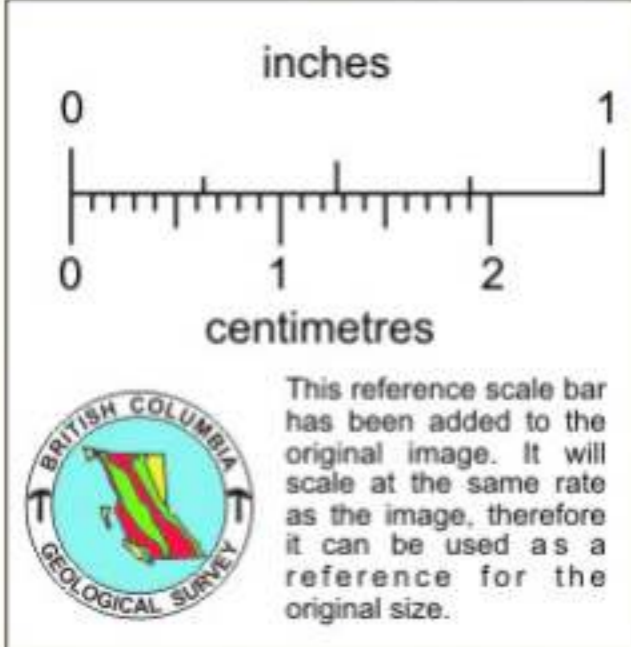
Sincerely,

  
Peter Price,  
Consulting Geologist.

# Legend

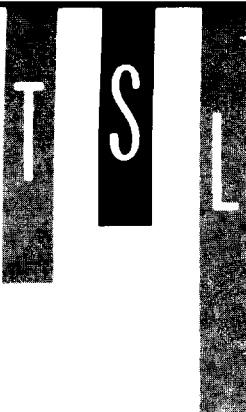
- 
- 1 Zn.
  - 2 Pb.
  - 3 Cu.
  - 4 Low Biref. Biotite (Higher Magnesium)
  - 5 Chlorite ① (Higher Magnesium)
  - 6 "Mixed"
  - 7 Pleochroics. ⊗
  - 8 Muscovite
  - 9 Tourmaline
  - 10 "Spots"
  - 11 High Biref. Biotite (Higher Iron)
  - 12 Chlorite ② (Higher Iron)
  - 13 "Heavy" Sericite
  - 14 "Well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





Hole K-14  
Scale 1" = 50ft.





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1301 FEWSTER DRIVE, MISSISSAUGA, ONT. L4W 1A2

TELEPHONE: (416) 625-1544

## CERTIFICATE OF ANALYSIS

SAMPLE(S) FROM P. Price,  
Room 610,  
44 Victoria St.,  
Toronto, Ontario.

SAMPLE(S) OF DRILL CORE

REPORT No.  
T - 02733

Inv. #4526

Copper (Cu) ppm    Lead (Pb) ppm    Zinc (Zn) ppm

K14 - 500	20	39	57
525	4	11	27
550	3	19	53
575	113	27	68
600	15	21	85
625	41	25	29
650	63	35	85
675	127	39	93
700	191	33	63
725	275	11	43
750	17	24	65
775	367	16	58
800	21	20	53
825	353	14	33
850	161	15	45
875	191	13	37
900	163	10	31
925	123	15	34
950	117	13	39
975	109	12	52
1000	103	23	59

Samples, Pulps and Rejects discarded after two months

DATE February 23rd, 1977.

SIGNED *Debra*



KIM HOLE K-14.

T.S. #s e 353 & 4 at 500'.

Rating 1 - good section to show a fine grained biotitic banded quartzite. Moderate bi-refrangent biotite is very fine grained, and is disseminated throughout section. The background quartz is also very fine grained, and there is a trace of feldspar. There is a trace of low bi-refrangent Chlorite 1 disseminated throughout section. Minute veinlets carrying gunk and secondary quartz cross the section. There are also traces of disseminated carbonates and tourmaline.

T.S.#s e 355 & 6 at 525'.

Rating 1 - good section to show a change to a fine grained heavily sericitic banded quartzite. Sericite is extremely heavy, especially in T.S.# 355. The north-west area of T.S.# 355 shows many porphyroblasts of feldspar? altered to gunk and moderate bi-refrangent Chlorite 2. Low bi-refrangent biotite also occurs as porphyroblasts, and is much less than in T.S.# 353. T.S.# 356 is somewhat coarser grained, and shows slightly less sericite. Again there is a trace of tourmaline.

T.S.#s e 357 & 8 at 550'.

Rating 2 - very good section to show a fine grained heavily biotitic quartzite. High bi-refrangent biotite is coarser grained than in preceding sections. There are also some complicated chlorites. The biotite has been attacked by both moderate bi-refrangent Chlorite 1 and Chlorite 2. However the former shows definite Chlorite 2 mixed, and a trace of pleochroic haloes.

T.S. #s e 359 & 6o at 575'.

Rating 1 - good section to show a change to a fairly coarse grained intensely altered feldspar quartz intrusive. This rock is not a limestone as logged. There is much primary amphibole with Z C 5deg. to 10deg (tremolite), but which has been intensely altered. The alteration consists of the following: (1) heavy moderate bi-refrangent Chlorite 1 in veinlets and disseminations and also attacking amphibole, (2) disseminated low bi-refrangent biotite, and (3) very heavy veinlets and disseminations of carbonates. There is also much leucoxene. QUESTION: is this rock a contact phase of the diorite?

T.S. #s e 361 & 2 at 600'.

Rating 2 - very good section to show the same feldspar quartz intrusive, but with definite changes in alteration. These are (1) extremely heavy veinlets and disseminations of low bi-refrangent Chlorite 1 with a trace of Chlorite 2 mixed, and (2) very heavy disseminated carbonates. There are no remnants of amphibole or biotite, so what mineral is replaced by chlorite is indeterminate. However there are indications that it has replaced feldspar.

T.S. #s e 363 & 4 at 625'.

Rating 1 - good section to show a change to an intensely altered fine grained quartz feldspar intrusive? The rock is so altered that it's original composition is difficult to determine. It appears to have been an interlocking mosaic of quartz and feldspar, so that it is probably a fine grained variation of the intrusives noted in the preceding sections. This view is supported by the presence of disseminated leucoxene. Dominant alterations are (1) extremely heavy carbonates, and (2) extremely heavy sericite. Further to this, the rock is cut by a network of quartz and carbonate veinlets.

T.S. #s e 365 & 6 at 650'.

Rating 1 - good section to show a change to a heavily altered diorite. There is much primary amphibole. Dominant alterations are (1) negative to heavy moderate bi-refrangent Chlorite 1 with a trace of Chlorite 2 mixed, (2) disseminated carbonates, and (3) disseminated low bi-refrangent biotite. There is also sericite after feldspar, and a trace of clinozoisite.

T.S. #s e 367 & 8 at 675'.

Rating 1 - good section to show a change to a rock which was logged as a fault zone, but which shows no sign of schistosity. At least 75% is gunk. The only other minerals are patches of quartz, and patches of high bi-refrangent Chlorite 1.

T.S. #s e 369 & 70 at 700'.

Rating 2 - very good section to show a normal diorite with much primary amphibole, but in which not only the amphibole, but also the background feldspars, are cut by a network of veinlets consisting of low bi-refrangent Chlorite 1 R.P., with very good Chlorite 2 mixed (see 71.0 & 19.3). The only other alteration of note is disseminated epidote, and a trace of chalcopyrite.

T.S. #s e 371 & 2 at 725'.

Rating 2 - very good section to show a chloritized diorite. It resembles preceding sections closely, the only exceptions being (1) epidote and clinozoisite are heavier, and (2) there is much more mixed Chlorite 2, and a trace of pleochroic haloes in the low bi-refrangent Chlorite 1 R.P. (see 78.9 & 25.7).

T.S. #s e 373 & 4 at 750'.

Rating 1 - good section to show a change to a fine grained diorite. It is relatively unaltered, but with the following exceptions: (1) there are veinlets and disseminations of secondary amphibole, especially with the sulphides, (2) there is a change to sparse well crystallized high bi-refrangent Chlorite 2, also with the sulphides (see 79.7 & 20.0), and (3) there is more than usual disseminated sulphides, but cannot see any chalcopyrite as logged.

T.S. #s e 375 & 6 at 775'.

Rating 1 - good section to show a rock which closely resembles T.S.#s 373 & 4, but with some changes in alteration: (1) there is more high bi-refrangent Chlorite 2 with a trace of pleochroic haloes (see 75.0 & 10.7), (2) there is less secondary amphibole, (3) there is minor low bi-refrangent biotite, and (4) some disseminated epidote. Again cannot see any chalcopyrite, either in specimen or thin section.

T.S. #s e 377 & 8 at 800'.

Rating 2 - very good section to show the same fine grained diorite, but which has been cut by mineralized veinlets. The sulphides consist of pyrrhotite with some pyrite, and a trace of chalcopyrite. Besides this, the veins consist of quartz, extremely heavy carbonates, low bi-refrangent biotite, and high bi-refrangent Chlorite 2 which accompanies the sulphides. The background diorite alteration is similar to the two preceding sections.

T.S. #s e 379 & 380 at 825'.

Rating 1 - good section to show a heavily epidotized amphibole-rich quartz diorite. Only traces of the background feldspars remain, having been almost completely replaced by epidote and some clinozoisite. There are minor carbonate veinlets, and minor moderate bi-refrangent Chlorite 2 disseminated crystals.

T.S.#s e 381 & 2 at 850'.

Rating 2 - very good section to show the same quartz diorite, but with a definite change in alteration. Dominant is heavy moderate bi-refrangent Chlorite 2, which occurs not only in veinlets and disseminations, but which has replaced much of the primary amphibole. There is only minor epidote and some carbonates, often occurring with the Chlorite 2 where amphibole has been replaced. There is a trace of chaloopyrite.

T.S. #s e 383 & 4 at 875'.

Rating 1 - good section to show a change to a diorite with very little quartz in background. It is however intensely altered as follows: (1) heavy low bi-refrangent Chlorite 2 in veinlets and patches, and after amphibole, (2) negative to heavy secondary amphibole, and (3) negative to heavy epidote and clinozoisite after feldspar. Again there is a trace of chalcopyrite.

T.S. #s e 385 & 6 at 900'.

Rating 2 - very good section to show a change to a heavily chloritized and epidotized diorite. Dominant alterations are (1) heavy epidote and clinozoisite after feldspar, and (2) negative to heavy veinlets and disseminations (and patches) of moderate bi-refrangent Chlorite 1 R.P. with much Chlorite 2 mixed and a trace of pleochroic haloes (see especially 78.8 & 30.2 and 74.1 & 24.7). There is also a moderate amount of secondary amphibole.



T.S. #s e 387 & 8 at 925'.

Rating 1 - good section to show a change to an epidotized quartz diorite. It is finer grained than preceding section and alteration is somewhat changed and consists of (1) heavy clinozoisite and moderate epidote, mainly after feldspar, (2) sericite after feldspar, and (3) negative to slight high bi-refrangent Chlorite 1 in veinlets and disseminations.

T.S. #s e 389 & 90 at 950'.

Rating 1 - good section to show a diorite which has been so intensely altered that the original background feldspars are almost completely replaced. The dominant alteration is the epidote group after feldspar, but in which clinozoisite is the most plentiful. There is also negative to slight high bi-refrangent Chlorite 1 and much leucoxene.

T.S. #s e 391 & 2 at 975'.

Rating 2 - very good section to show the same rock as in T.S.#s 389 & 390, but with the following changes in alteration: there is much more clinozoisite and more moderate bi-refrangent Chlorite 1 R.P., also sericite after feldspar, and some disseminated carbonates that result from the replacement of amphibole.

T.S. #s e 393 & 4 at 1000'.

Rating 3 - excellent section to show a definite change to a rock which can only be described as a quartz feldspar intrusive, but in which the intense alteration differs markedly from that in preceding sections. In this rock the dominant alteration is an extremely heavy network of veinlets consisting of moderate bi-refrangent Chlorite 1, with some Chlorite 2 mixed. The chlorite and very heavy sericite have almost completely obliterated the background feldspars. Further, there is fairly heavy late carbonate veinlets and disseminations. NOTE there is no amphibole or epidote group.

T.S. No.	Hole No.	Footage	Rating	Logged as:-	Rock shown by Thin Section:-
353-4	K-14	500	1	Fg. banded quartzite	Fg. biotitic banded quartzite
355-6	"	525	1	" " "	" heavily sericitic banded "
357-8	"	550	2	Banded biotitic "	" " biotitic quartzite
359-6	"	575	1	Greenish-gray dirty limestone	Intensely altered $\chi$ spar qtz. intrusive
361-2	"	600	2	Siliceous chloritic foliated rock	" chloritized " " "
363-4	"	625	1	" Fg. banded rock	" altered $\chi$ qtz $\chi$ spar intrusive?
365-6	"	650	1	Greenish-gray dirty limestone	Heavily " diorite
367-8	"	675	1	Fault zone?	? ? ?
369-6	"	700	2	c.g. diorite	Chloritized diorite
371-2	"	725	2	" "	" "
373-4	"	750	1	Medium-grained diorite, tr. cp.	Fg. diorite
375-6	"	775	1	" " " "	" "
377-8	"	800	2	" " " "	" " cut by mineralized qtz. carbonate veins
379-6	"	825	1	" " " cp?	Heavily epidotized amph-rich qtz. diorite
381-2	"	850	2	" " " "	Chloritized qtz. diorite
383-4	"	875	1	c.g. altered diorite	Heavily altered "
385-6	"	900	2	" " " tr. cp.	" chloritized + epidotized diorite
387-8	"	925	1	Fg. " " "	Epidotized qtz. diorite
389-6	"	950	1	" " " tr. cp.	Intensely altered "
391-2	"	975	2	" " " " "	" " "
393-4	"	1000	3	" diorite	" " qtz $\chi$ spar intrusive



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.)
				353 44	K-14	500	1	3.6 Tr diss. & V.	—
355 46	"	525	1	—	4.1 well after 1/2 spar?	—	—	—	—
357 48	"	550	2	4.0 Tr diss after bio	4.9 Tr after bio	—	6.0 Tr	9.8 H.Tr	—
359 460	"	575	1	after amph 4.2 Hea diss & V.	—	—	—	—	—
361 42	"	600	2	3.5 Ext hea diss & V	—	—	4.2 Tr	—	—
363 44	"	625	1	9.0 Tr. diss	—	—	—	—	—
365 46	"	650	1	after amph 4.9 well diss & V.	—	—	7.3 Tr	—	—
367 48	"	675	1	7.3 well diss patches	—	—	—	—	—
369 470	"	700	2	R.P. 3.9 well V.	—	—	2.8 well	—	—
371 42	"	725	2	R.P. 3.6 neg to well V.	—	—	3.7 well	9.3 H.Tr	—
373 44	"	750	1	—	6.8 sli V x'ls	—	—	—	—
375 46	"	775	1	—	V & diss x'ls 6.6 neg to well	—	—	—	10.0 <sup>+</sup> H.Tr
377 48	"	800	2	—	with sulph. & after amph 7.3 well V & diss	—	—	—	—
379 480	"	825	1	—	5.7 Tr diss x'ls	—	—	—	—
381 42	"	850	2	—	after amph 4.4 Hea V & diss	—	—	—	—
383 44	"	875	1	—	3.6 well V & diss	—	—	—	—
385 46	"	900	2	V and patches 5.9 R.P. neg to hea	—	—	3.9 well	7.9 H.Tr	—
387 48	"	925	1	V & diss 6.8 neg to sli	—	—	—	—	—
389 490	"	950	1	V & diss 6.0 neg to sli	—	—	—	—	—
391 42	"	975	2	R.P. 4.2 well diss & V.	—	—	4.9 well	—	—
393 44	"	1000	3	V & diss 5.8 ext hea	—	—	7.3 Tr	—	—

T.S. No. e	Hole No.	Foot-age	Rating	Amph.	Epidote	Biotite	Sericite	Quartz	Feldspar	Carbs.	Sulphides	'Gunk' (Sphene)
353 +4	K-14	500	1	—	—	Neg to hea. diss R2.3 col-L.B	Musc. sli diss	BK ext. hea + V	Tr diss	Sli diss	Py? Tr V diss	Gunk Tr. V. Tourmaline Tr
355 +6	"	525	1	—	—	Sli. diss. porph 1B.5 col.-L.B	Ser. ext hea K.g.	ditto	Neg to hea alt.	—	Py P.P.T. V. diss	ditto
357 +8	"	550	2	—	—	Hea diss. porph 21.3 LY.-D.B	Ser neg to well diss	BK ext hea	?	—	—	ditto
359 +60	"	575	1	Amph. Prim Hea alt.	—	Well diss 1B.5 col-L.Gr	—	BK well c.g.	BK hea c.g.	Hea diss + V	Py Tr diss	leucoxene well diss.
361 +62	"	600	2	—	—	—	Ser sli after f's par	BK hea c.g.	BK hea c.g.	Well to hea diss + V	—	ditto
363 +64	"	625	1	—	—	—	Ser ext hea diss after f's par	BK hea fg	BK sli fg	Ext hea diss + V	Py? sli diss + V	ditto
365 +66	"	650	1	Amph Prim Hea diss	Clino Tr diss	Well diss 21.6 col-L.B.	Ser sli	BK hea	BK hea	Well diss + V	Py? sli diss	ditto
367 +68	"	675	1	—	—	—	—	BK diss patches	—	Tr diss	—	Gunk ext hea
369 +70	"	700	2	Amph Prim Hea diss	Ep. well diss	—	—	BK sli diss	BK hea alt.	Sli diss	Cp Tr Py? well diss	leucoxene hea with ilmerite
371 +72	"	725	2	ditto	Ep. + Clino well diss + V	—	—	BK sli diss	BK ext hea alt	—	Cp Tr Py? well diss	ditto
373 +74	"	750	1	Amph sec. hea V diss	—	—	—	ditto	BK ext hea fg	Neg to well V or diss	Py? hea diss	Gunk sli
375 +76	"	775	1	Amph prim + sec well	Ep sli diss	Sli diss 1B.2 col-Br	—	—	ditto	Tr V.	ditto	ditto
377 +78	"	800	2	Amph sec. well V	ditto	Well V + diss 1B.8 LY.-D.Gr	—	Hea V + BK	ditto	Ext hea V.	Tr Cp V diss Py? well to hea	ditto
379 +80	"	825	1	Amph Prim ext. hea.	Ep + Clino hea after f's par	—	—	BK hea.	BK hea alt.	Well V	—	leucoxene well diss
381 +82	"	850	2	Amph Prim hea alt.	Ep sli. diss	—	—	BK hea	ditto	Well V + diss after f's par	Cp Tr Py? well diss	leuc. hea diss + Tr
383 +84	"	875	1	Amph Prim + Sec well	Ep + Clino hea after f's par	—	—	BK well	ditto alt.	Neg to well diss	Cp Tr Py? sli diss	ditto
385 +86	"	900	2	Amph Prim hea Sec sli	ditto	—	—	BK sli	BK hea alt	—	Ep. sli Py? Tr diss	ditto
387 +88	"	925	1	ditto	Clino hea Ep well	—	Ser sli after f's par	BK well	ditto	—	Py? Tr diss	ditto
389 +90	"	950	1	ditto	ditto	—	—	BK sli	ditto	—	—	ditto
391 +92	"	975	2	ditto	Clino ext hea Ep sli	—	Ser well after f's par	BK sli	ditto	Neg to well diss	?	ditto
393 +94	"	1000	3	—	—	—	Ser hea. after f's par	BK sli grano	BK very hea alt	Neg to hea V or diss	—	Gunk well diss