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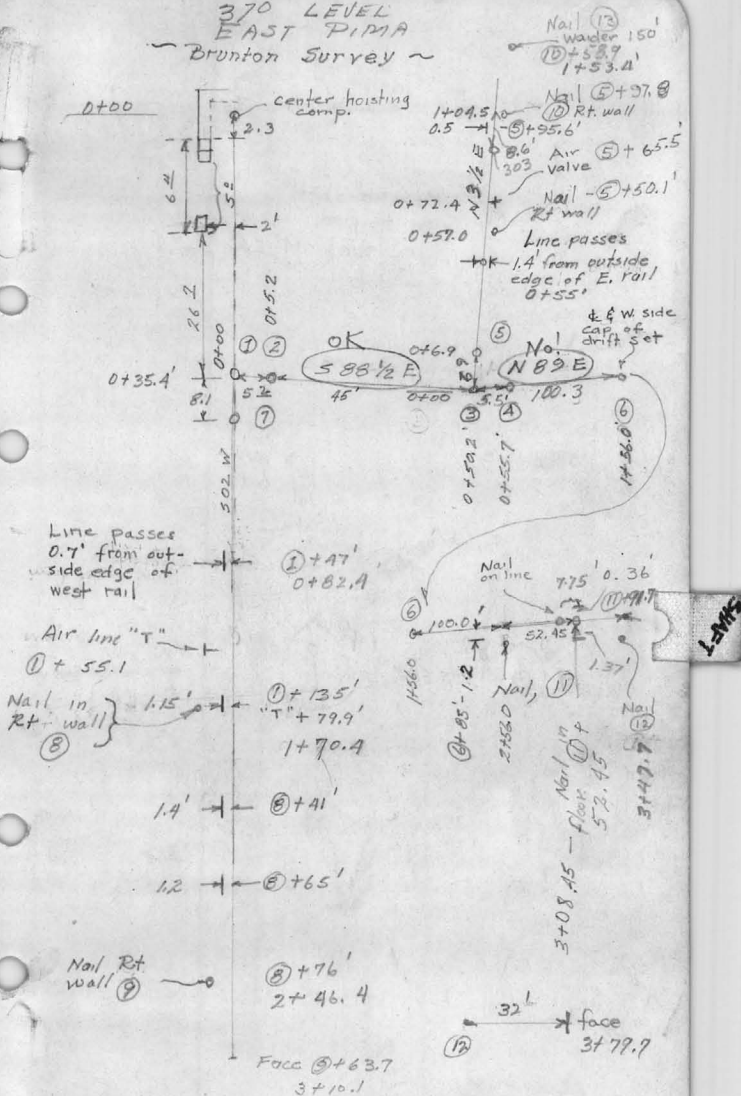
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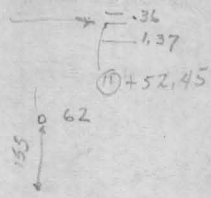
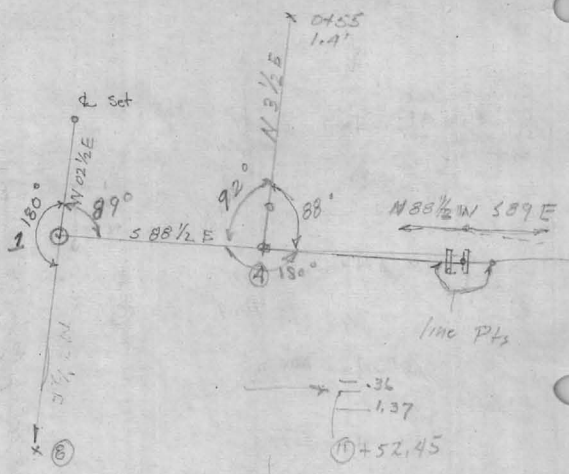
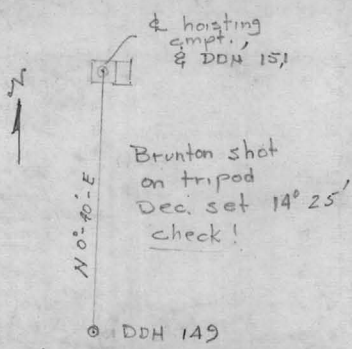
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370 LEVEL
EAST PIMA
~ Brunton Survey ~



shaft - 370 station
Track 369' - E/2827'
Jump to 374.7'

Notes from
original survey.
Brunton-tape J.E.K.
superceded



40.4
 1.5
 38.9
 104.5
 153.4

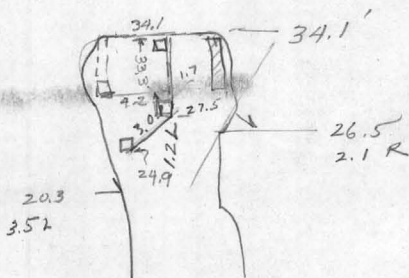
90°
 88 1/2
 1 1/2
 89.0

90 3/4
 86 1/2
 1 1/2
 88 0

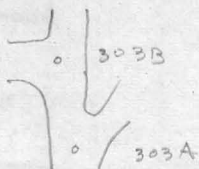
151
 295.4

$$\begin{array}{r} 27.5 \\ 5.8 \\ \hline 33.3 \end{array}$$

$$\begin{array}{r} 7.5 \\ 2.6 \\ \hline 24.9 \\ 4.6 \\ \hline 29.5 \end{array}$$



spad
306



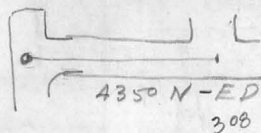
303A to 303B

Tape 0 @ 303A(-)12.1'

	L. R.		
4.0	3.1	2.8	
7.0	—	3.7	
10.0	—	5.5	
12.0	2.8	6.7 ⁺	
18.0	2.9	—	
20.4	3.4	4.3	Point
23.0	3.3	3.3	
24.5	6.3	—	
29.8	—	3.4	303B
32.0	3.8	—	on line
33.0	2.9	—	

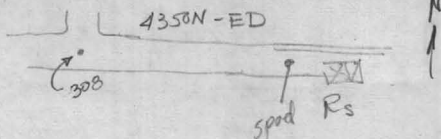


307



② 307

	\bar{L}	\bar{R}	
0.0	2.6	E. of W. wall - ND of ft.	
3.2	3.9		
3.4	3.3	8.5	
7.0	2.9	3.7	
10.0	3.4	3.0	
14.0	3.7	1.8	
20	-	2.4	
21.5	3.4	-	
25.5	4.6	-	
27.5	3.6	3.1	
28.8	-	2.4	
36.0	3.2	2.6	
46.0	3.2	2.8	
54.0	3.0	3.3	
57.5	3.6	2.8	
66.0	3.7	2.8	
70.0	4.6	3.1	
72.7	5.8	-	
78.7	-	2.4	ND to and spac (308)



@ 308	L	R	
0.0	-	2.4	
3.2	5.4	-	
6.0	4.0	2.1	
10.0	3.7	3.1	
14.0	2.9	-	
19.2	2.7	3.5	
23.4	-	3.8	
27.5	3.3 ^v	3.0	dike
28.4	3.3 ^v	-	dike
30.1	-	2.7 ^v	dike
30.8	-	2.4 ^v	dike
34.5	3.6	3.1	
42.1	2.7	2.8	
46.8	2.8	3.2	
50.0	-	2.7	
56.0	3.1	3.5	
66.0	3.4	3.4	
73.8	3.3 ^v	-	dike
75.2	3.3 ^v	-	dike
75.4	-	2.7 ^v	dike
77.7	-	2.5 ^v	dike
83.0	3.3		
84.8	3.4		
86.7	-	2.5 ^v	1" dike

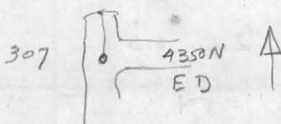
Continue on line
308 toward Rs

start taping at 308 + 87.0'

	L	R
1.8	3.5	—
2.4	4.0	—
6.5	3.2	2.4
13.0	3.5	2.8
18.0	2.8	3.0
20.1	2.8	3.1 —————> spad

line passes 1.0' N
of So. edge of So. rail

87.0
20.1
107.1

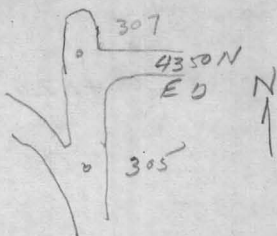


307 to face M.D. 1450 W

	L	R
0.0	1.7	—
3.2	2.4	3.7
8.2	3.0	3.1
9.2	2.7	3.1

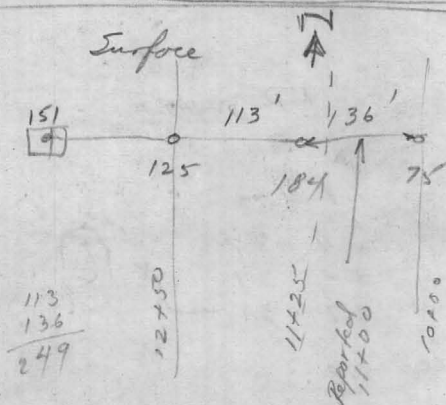
Face 9.8

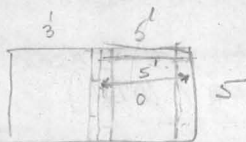




305' - 307

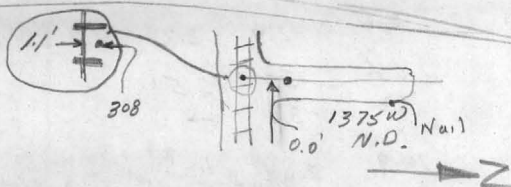
	L	R
0.0	-	2.7
1.7	-	2.3
7.0	-	2.7
9.7	4.2/3.2	3.2
12.4	-	4.0
14.4	2.6	6.5





8

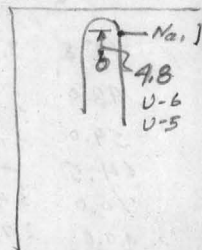
sets on 5' centers



0.0 @ — speed + 4.7'

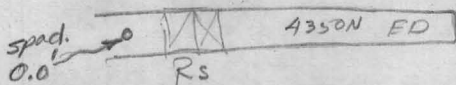
(-0.7	L	R		L	R
	-	5.4			
0.0	6.6	4.2	77	3.4	2.3
3.0	4.0	3.3	92.8	3.5	2.9
			dike		
10.0	2.8	3.1	98.5	3.4	2.9
17.5	2.8	3.4	99.5	2.9	—
20	—	1.9	101	—	2.8
29.5	3.0	2.8			
32.0	3.8	—			
40	2.6	2.8			
43.3	3.8	—			
47	3.0	—			
48	—	3.0			
50	—	2.1			
58	3.6	2.8			
66.3	3.3	3.1			
72.5	3.3	2.5			

Nail on
E. Wall - 100.2
Face 102'



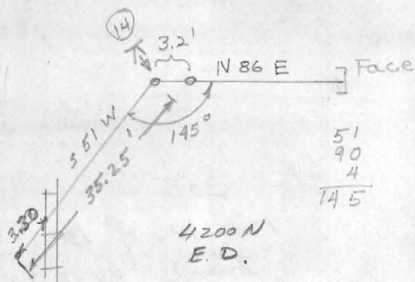
4350 N, E.D.

From spot Near 130
(at 308 + 107.1')



Dist L R

0.0	2.9	3.2	
6.6	3.0	2.5	
7.0	3.7	—	
10.9	$\frac{2.6 \text{ Post}}{3.6 \text{ wall}}$	$\frac{1.6 \text{ Post}}{2.6 \text{ wall}}$	Q Post
15.6	$\frac{2.7 \text{ P}}{3.5 \text{ W}}$	$\frac{2.1 \text{ P}}{2.7 \text{ W}}$	Q Post
18.6	2.5 P	2.2 P	Q Post
24.0	3.3	3.2	
25.6	2.3	—	
28.0	3.8	—	
32.0	1.8	2.6	
37.5	2.5	3.6	
40.8	4.1 ✓	—	
42.0	—	3.4 ✓	Fault
44.0	2.8	2.5	
45.8	3.7	—	
48.0	2.8	—	
59.0	2.8	3.8	
64.5	—	4.1	
70.0	3.4	2.6	
80.0	2.7	3.5	
85.0	3.7	—	
93.3	Face — squarish		

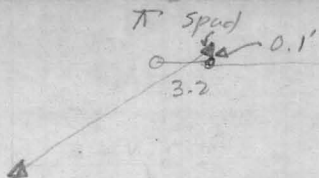


51
90
4
145

(14)	L	R	towards Face
0'	2.2	3.6	
3.0	3.7	3.1	
8.0	3.3	2.8	Wardler's 50'
17.6	2.3	3.1	Mark at 21.4
21.0	2.6	3.3	
25.1	2.9	3.5	
27.1	Face		

50.0
- 21.4
28.6'

(14) hanging line is 28.6' along advance.



Sta 308

120' W. of 130

Track 2830.76

306

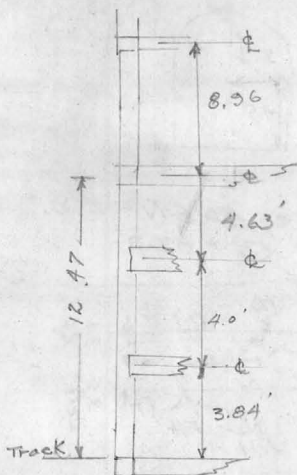
30' East 148

Track 2830.22

303 B

14' East of 62

Track 2830.09



61 - 348.68
2846.62 El.

62 - 357.64
2837.66 El

63 - 370.11
2825.19 Track El.

New collar elev.

3195.96

3195.3

.66

3196

370.1

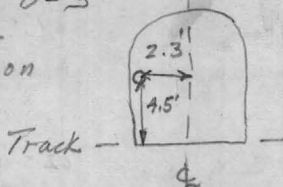
2825.9

3.2

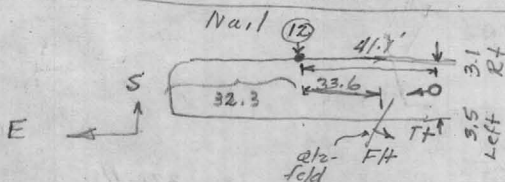
2829.1

X-section ~
Detail of station
set.

collar
location



Face 4015N- E.D.
@ 12 + 32.0'

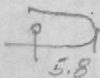
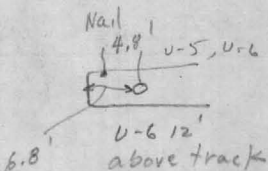


V-4

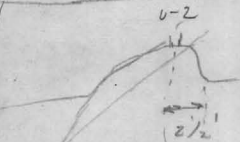
Collar location

E.D. 4015 N

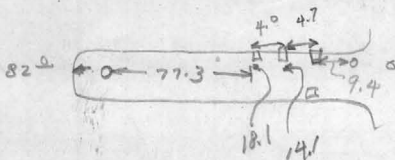
$$\begin{array}{r} 41.1 \\ 32.3 \\ \hline 73.4 \end{array}$$



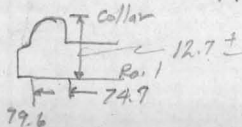
U-7
U-8



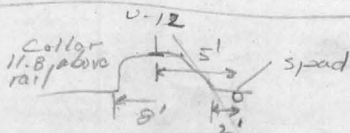
82.0
77.3
4.7



X-See



4200 WD

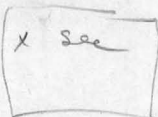


62
56
118

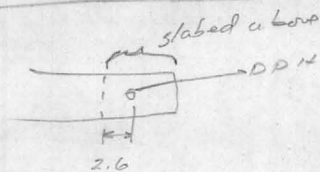
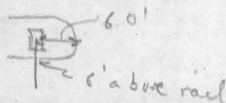
4330 N
Right of
2.6

U-11

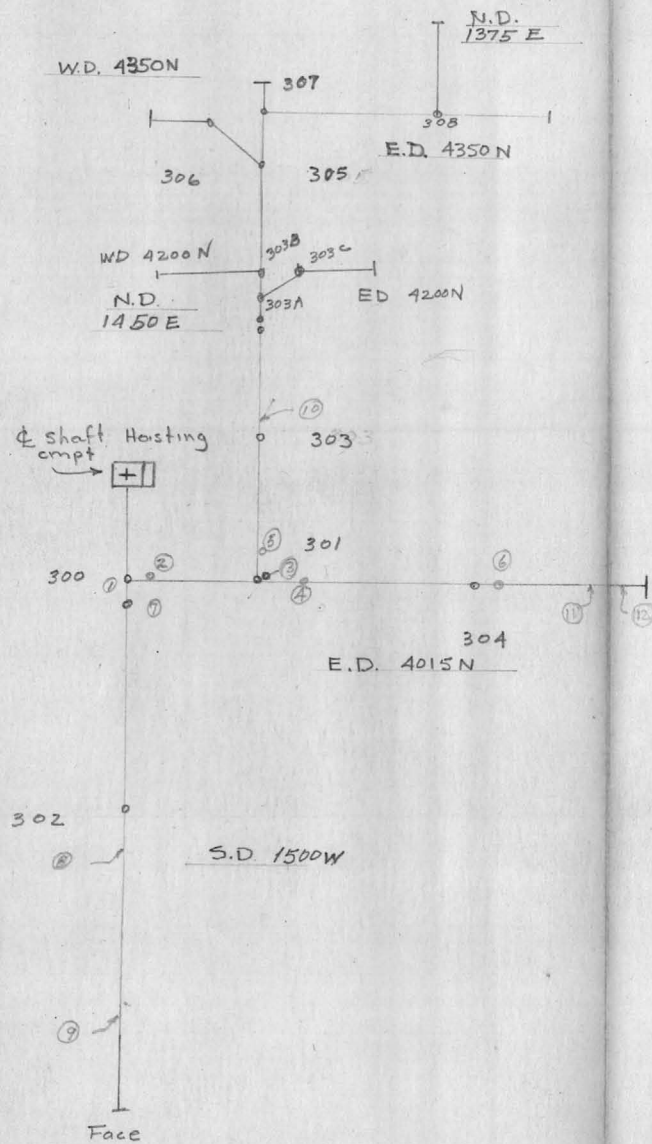
1375 E



1375 ND



4200 ED



Sta	Co-ord.
300	362,648.1 N 766,227.3 E
301	362,648.1 766,276.8
302	362,551.5 766,226.8
303	362,744.1 766,280.7
304	362,648.5 766,373.6
305	362,968.0 766,281.8
306	362,985.2 766,256.2
307	362,986.1 766,281.9
308	362,987.5 766,360.2

- DDH -

U-1	362,607.4 766,227.9	62 - 362,833.4 766,177.8
U-2	362,607.8 766,227.9	148 - 362,984.9 766,225.5
U-3	362,655.3 766,606.0	

Line	Brg	Dist	
300-301	N 89-57 E	49.5	
300-302	S 0-17 W	96.6	
302-Face	S 0-0 W	177.8	SD 1500 W Sept 1958
301-303	N 2-17 E	96.1	
301-304	N 89-45 E	96.8	
304-Face	N 88-58 E	233.1	
303-305	N 0-18 E	223.8	
303-307	N 0-18 E	242.0	
305-306	N 56-02 W	30.9	
306-Face	N 81-42 W	29.8	WD 4350 N Dec 13, 1958
303-303A	N 01-10 E		
303-303B	N 01-01 E		
303B-Face	N 88-47 W	435	4200 W.D. Feb, 59
303A-303C	N 54-24 E		
303C-Face	N 86-35 E		4200 E.D. Feb, 59
307-308	N 89-01 E		
308-Face	N 00-11 W		1375 N.D. Feb 59
308-Face	N 89-49 E		4350 E.D. Feb 59

Transit survey
road locations
Missouri Shoft

TR. MK. REG. U.S. PAT. OFF.

DDH 149

370-3750 N - 1500 W R Rail 2829.02

21R	0.0 - 9.0	9.0'	5.11
23R	9.0 - 13.9	4.9	7.3 + track
25R	13.9 - 18.7	4.8	
27R	18.7 - 24.6	5.9	
29R	24.6 - 30.2	5.6	
31R	30.2 - 35.4	5.2	
33R	35.4 - 40.9	5.5	
35R	40.9 - 45.1	4.2	
37R	45.1 - 50.9	5.8	
39R	50.9 - 56.5		

Top

DDH 148

370-4350 N - 1500 W R Rail 2830.25

22R	0.0 - 9.0	9.0	
24R	9.0 - 13.7	4.7	7.3 +
26R	13.7 - 18.6	4.9	Track
28R	18.6 - 24.5	5.9	
30R	24.5 - 29.7	5.2	
32R	29.7 - 34.8	5.1	
34R	34.8 - 39.2	4.4	
36R	39.2 - 44.0	4.8	
38R	44.0 - 49.2	5.2	
40R	49.2 - 54.6	5.4	

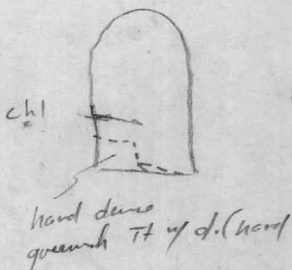
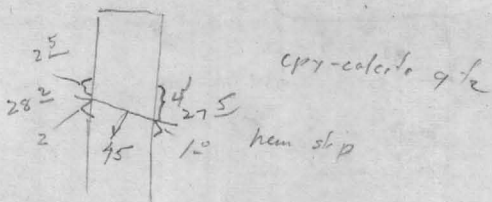
- Top -

0.0 = 7.2' above track
 (370-4200 N W. Rs) Rail
 370-4200 N 1450 W Rs 2830.17

1 R	0 - 9.0	9.0	1.76	1.66
3 R	9.0 - 14.0	5.0	6.92	6.40
5 R	14.0 - 18.6	4.6		3.05
7 R	18.6 - 23.9	5.3		
9 R	23.9 - 28.1	4.2		
11 R	28.1 - 32.6	4.5		
13 R	32.6 - 37.3	4.7		
15 R	37.3 - 42.9 ^{2886.17}	5.6		
17 R	42.9 - 48.8 ^{2890.1}	5.9		
19 R	48.8 - 52.7	3.9		

Rail (370-4350 N E. Rs) 0.0 = 7.2' above track
 2831.41 370-4350 N 1250 W R

2 R	0 - 8.5	8.5	2.47	2.46
4 R	8.5 - 13.5	5.0	2.97	2.71
6 R	13.5 - 17.7	4.2		2.97
8 R	17.7 - 21.5	3.8		
10 R	21.5 - 26.9	5.4		
12 R	26.9 - 31.5	4.6		
14 R	31.5 - 35.9	4.4		
16 R	35.9 - 40.9 ^{2885.81}	5.0		
18 R	40.9 - 47.2 ^{2890.46}	4.3		
20 R	47.2 - 51.8	4.6		



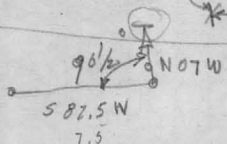
Cu sparse

ED 70'

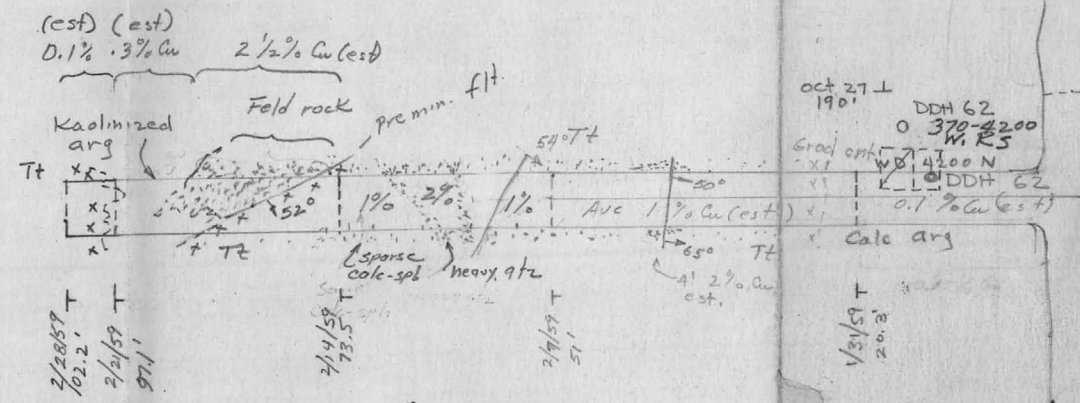
+
R
73.7

Chalk work
* 3.80

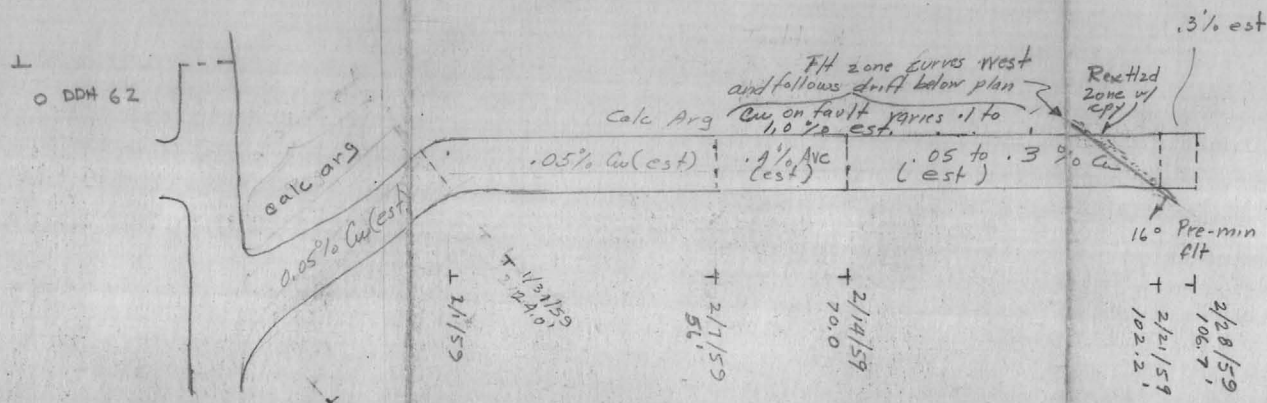
83
2.5
905

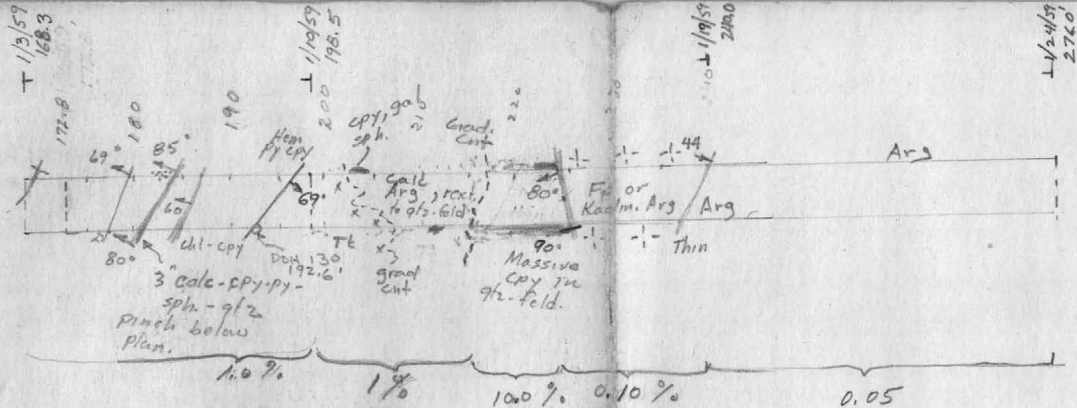


Phos - found
shar raise on
tracing



MISSION
 370 level
 WD 42.09 N
 ED 42.00 N
 TR.MK. REG. U.S. PAT. OFF.





370 E.D. 4350 N.

Footage	No	Assay est.	Assay	Face Assay est.
148.6				
153.2	268D	1.2	.84	1.5
158.3	270D	2.0	1.72	
163.3	272D	1.7	.78	
168.3	274D	1.0	.69	1.3
172.8	276D	.4	.51	
178.1	278D	$\frac{1}{3}$ 1.5 $\frac{1}{3}$.50	
183.3	280D	1.5		
188.3	282D	1.0		
193.6	284D	.8		
198.5	286D	.4		
204.1	288D	.5		Fit. 1.2 %
208.1	289D	1.0 Ave		
213.3	290D	2.0 $\frac{2.0}{2.0}$		
218.8	292D	10.0		
	293D	12.0		

July 1, 58

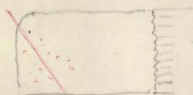
370 SD @ 26.4

July 3, 58

370 SD @ 51.0'

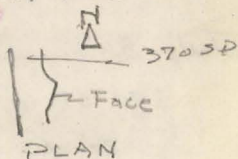
Tt. low-gr ore - py - qtz.
in sparse but moderately large
diss. patches. Some veinlets.

370 ED slab round face



N 75 E
60° SE

Looking into face



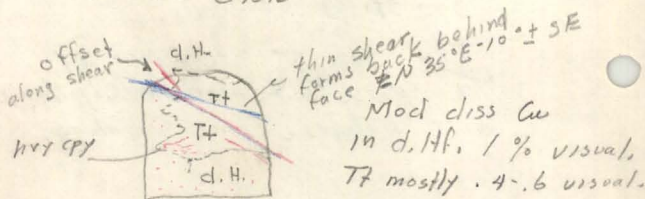
July 7

370 SD @ 56.2

Rock Tt. Sparse py-cpy.
about .2 visual.

No structures.

370 ED @ 10.5



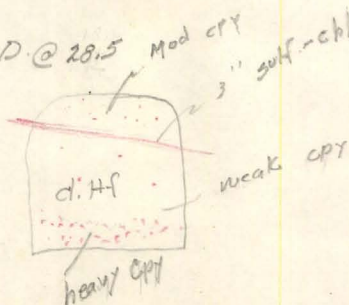
July 8

370 SD @

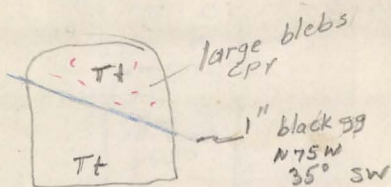
Tt. No Struct. Py-cpy diss;
.8 vis.

July 10

370 ED @ 28.5 Mod cpy



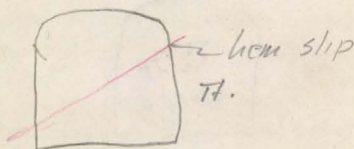
July 10
370 SD @ 83.9



July 11

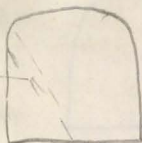
370 SD @ 88.8

33.3



370 ED @ 33.3

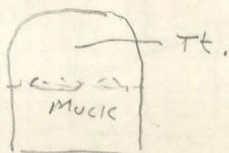
suggestion
of string



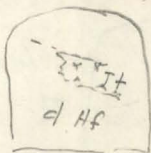
d.Hf. py-cpy in
med gr. diss
throughout,
1.2 % visual

July 16

370 S.D. @ 126.5



370 E.D. @ 62.5



July

370 S.D. @ 136.7

hard Tt.
little drop.



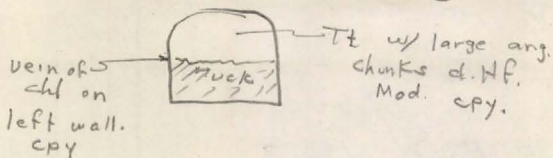
1/8" irreg
qtz-cpx-px
vein,
N 45° E ±

370 E.D. @ 68.8



wk gl.ss
sulf.

370 N.D. 1450 E @ 11.0'



July 22

S.D. - soft Tt w/ drop.

N.D. - d.Hf. but Tr of grist in spots.

July 24

S.D. Tt. w/drop.

NE Jls Mineralized on left wall
Sulf. sparse

E.D. P. Hf. good cpy.

1' from face N-S. qtz - cpy 1/2" vein.

30 M3

ED 150

ND 86

370 ED. 156.3



filling
post-chl.

370 ED @ 168



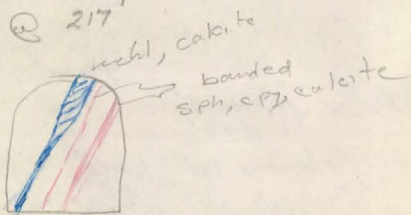
stk Toms from
B. w in drift
d + Mb to NE in Face

E.D.
129' been 15' t in fault zone
w/ Mb. - spotty sulf. + sph

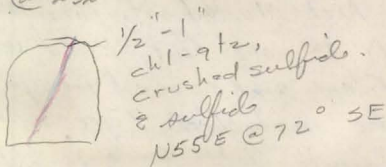
N.D. 68' passed Reb. of Mb
1.11/10 or maybe

S.D. 187.

S.D. @ 217'



SD @ 232'



S.D. 237.6

Pick up little more sulfide

57 @

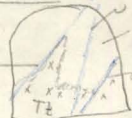
9 + 20'
256.4'

Aug 26

N 20° E NE } banded
py. poral
slip.
Feld or
Calc. org.?

1/8" chl,
hem.

carries diss. and
py-cpy along cuts.
conc. along cuts.
3-4% Cu.
est.



N 25 E
70° NE
Thin seam
chl.

1/8" hem,
chl, py.
Pre-ore &
Poss. post-ore
sl. p.

Good cut Tt to
at face

236.4
2°
256.4

Note - Micro in oil
shows chop. Binocular
scqs show fine-gr
granular, sugary texture.

N.D. @ 10 + 44'
148'

Relations not clear

In Calc. org. or dol. Mb.
wk diss py-cpy. Pttly grntzd.
grades from Tt a few feet so.

of face. - Microscopic check mod
shows carbonate w/ dropside. Also
more efferv. than apparent in check
underground.

E.D. @ 6 + 42' - 198'

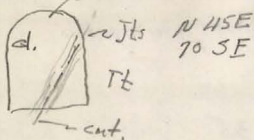
Not Mucked out. This round
is the one that opened water
flow and caused pump to
be installed. Face a bore
muck dry. Consid. chl
rock.

Aug 27

N.D @ 148' + 5' round ± not
mucked. Same as 148' face.

S.D. @ 256.4' + 5' round ± Not
mucked. Drop Hf. like previous
face.

Aug 28
 J.D. @ ^{midler} 268.5 some ore left side face. .5% est.



N.D. @
 Marble.

E.D. @ 256.4 + 5 + 5 = 256 ±
 Drop. Ht., .8 + % G. Several
 NE slips.
 Not mucked.

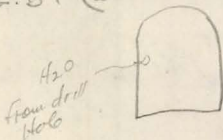
S.D. @ 273.7 Aug 29



R.H.
 Some py-cpy
 .4 - .6 %

window of fault
 in face, possibly Tt.

E.D. @ 204.7



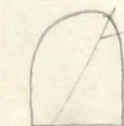
chloritic Drop. Ht.

N.D. @ 160.3 + 5' Round
 Not Mucked. - Mb

N.D. (10) + 61

Calc. org. weak banding of dark material dips gently W.

S.D. (9) + 35



N33°E
70° ±

cut off by a
slip 2' behind face
in back, this slip
being a minor branch
of the one just further
behind, making water,

S.D. @ 282.7



E.D. 209.5

N.D. 167.3

S.D. 292.7 T₁ low-gr ore

E.D. 219.0 T₁ + di - Just past NE open water course

N.D. 176.3 - Calc. org

N.D. $\textcircled{D} + 83.5 = 188.0$

$\begin{array}{r} 104.5 \\ 83.5 \\ \hline 21.0 \end{array}$

Calc. arg.

Contact w/ Tt $15 \pm$ NW @ 40° SW
@ $\textcircled{D} + 39 \pm = 144'$

E.D. @ $\textcircled{D} + 18 = 234'$

$\begin{array}{r} 156 \\ 78 \\ \hline 134 \end{array}$



N 43° E
78° SE

2' fault zone, Bx Tt,
with banded py-calcite,
much chert.

S.D. @ $\textcircled{D} + 60'$



FeH

py-sph, round slob
along cont.

Penetrated Feld rock, dips
steeply SEth 60°

S.D. - Final 306.3

N.D. " 190.0

E.D. 254 - Tt

E.D. @ 276.5' Due E @
280' converted 80° S
to J.E.K.



TF both sides
slightly soaked
or powdered

+ .8%

E.D. @ 316 (J.E.K.)

Face in qtz-feld rock
of 8-10% Cu est. Py & cpy
heavy. No structure apparent

E.D. @ 316 + 1 round - same

E.D. @ 336 - qtz-feld. - Not mucked.
less cpy & py in face - 2-3% est.
Coarser-gr feld rock in upper 1'.
face. Round muck looks slightly
better. Saw massive qtz.

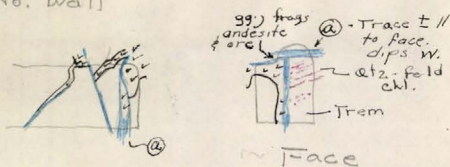
E.D. 332.8 - Warden.

Feld + drop. in muck.

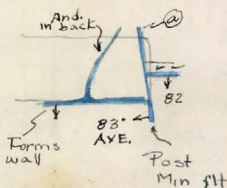
~~E.D.~~

E.D. Face 292.8 (JEK)

No. wall



in Face



Plan

1" = 20'

E.D. ⑪ + 85' = 341'

contact with Felsite porph.
Contact obscure. appears to be
along 3th NE str & about 50° NW dip.
Round not marked. face 10' post
cut.

last face 349' waster

E.D. ⑫ + 102.5 = 358.5

cut w/ arg.

@ 368.6 (waster = 372 JK cont.)
13½' of arg. to face -
in arg.

46
39
85
236
341

93½
9
102½
286
356.5

15 1/2 25.2 -



3084.5

45.2

353.6

25.2

378.8

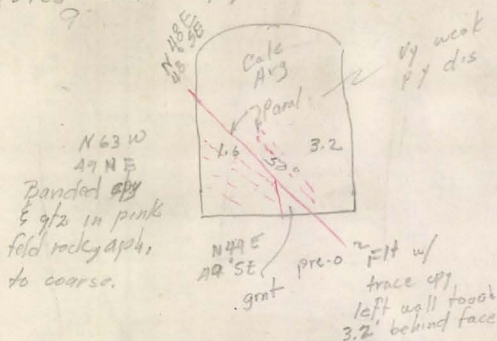
@ 378.8 JEK

Argillite

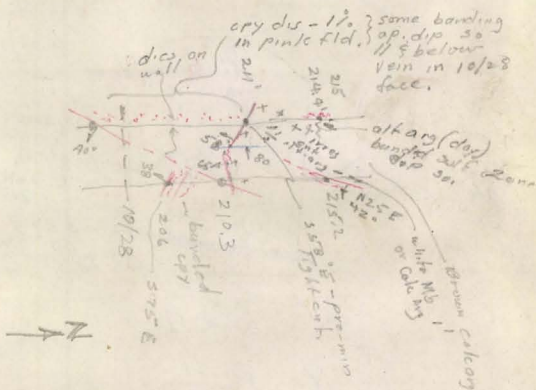
cut 15 1/2' back @ 363.5

Notes - Expanded program

9

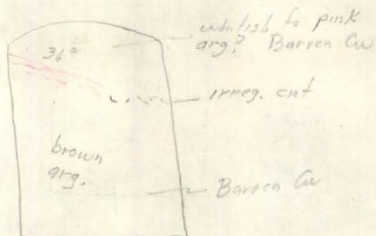


Oct 28
 202.0' W.
 N. D.



Sketch of walls
 Oct 30 1958

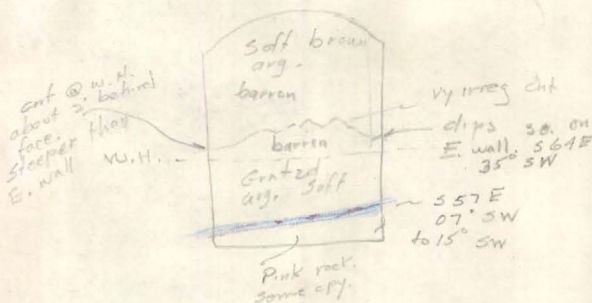
banded
9/2-salt



No. Drift

224.9

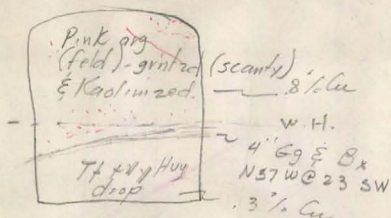
Oct 30, 1958



No. Drift

235.1'

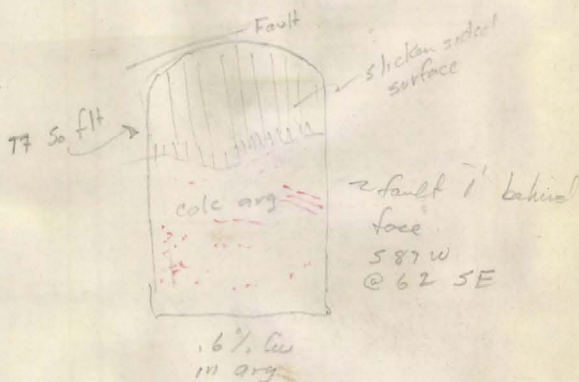
Oct. 31



No Drift
239.4' W

Mucked clean
Nov 1, Saturday.

Nov. 3 _____ weekly report

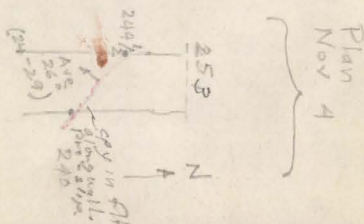


225
19 1/2
244 1/2

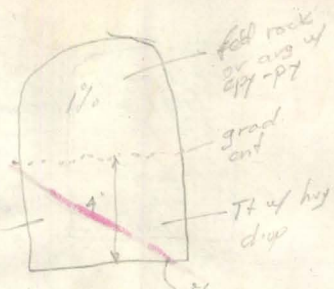
19 1/2

15

N. D. @ 253' W
Nov. 4



Face makes
H₂O drip.



local conc.
py-qtz

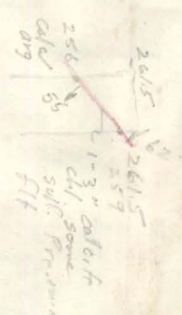
fold rock
or arg w/
qtz-py

grad.
cont.

Tt w/ hvy
dip

Thin chl calc sulf.
N 58° E
55° SE

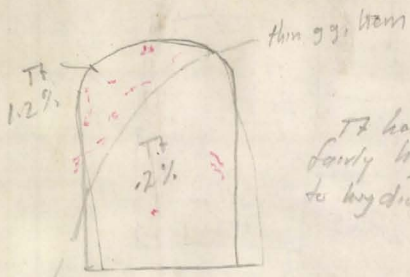
No. Drift
261.5'
Nov 6



→ N

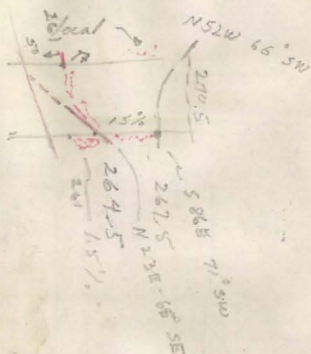
drift sketch - Nov 6
No Drift

250
261

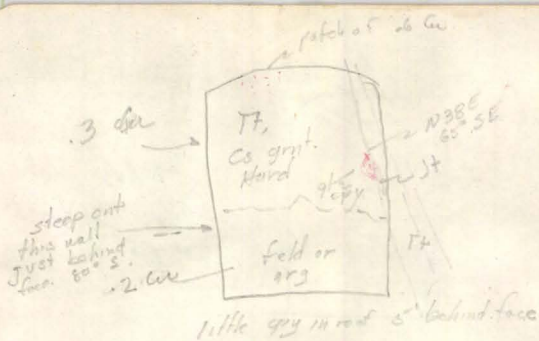


Tf has fairly big drop. to big drop.

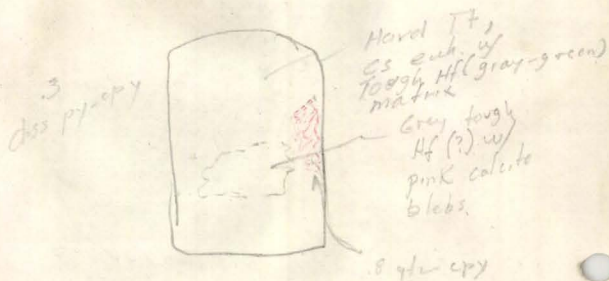
N.D. 270.5 Nov 7, 1958



Sketch plan- Nov 7



N.D. - 280'
Nov. 8, 1958

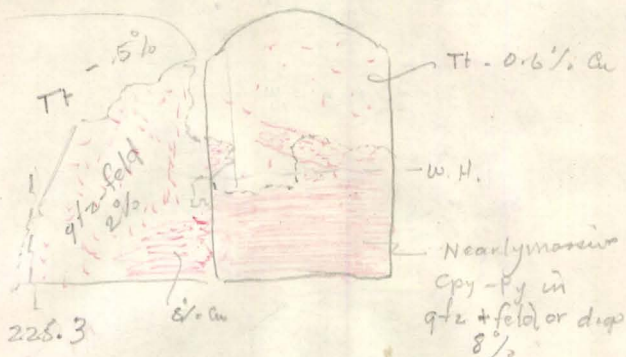


by calc arg or sil. M.S. patch
carried on both wall just below white
ends 1' behind
N.D. 284' face, irreg steep
cut

Nov 10, 1958

Blasted and mucked Sat
Nov 8

— weekly report

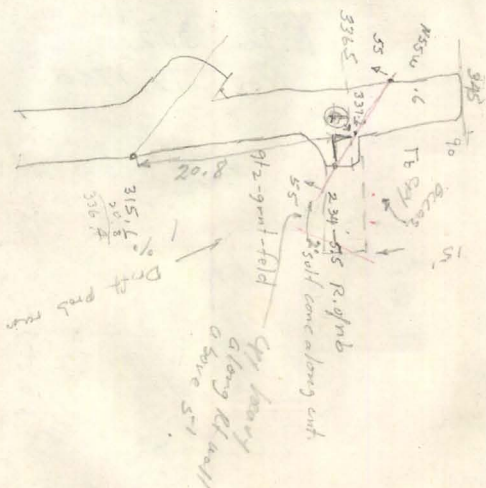


North Drift

330.8

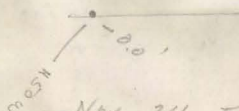
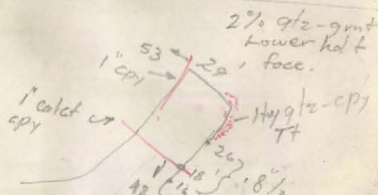
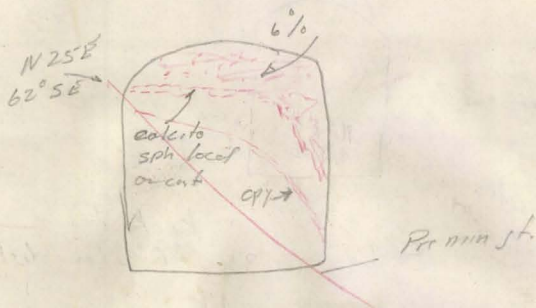
Nov 15 - Mucked Sat.

weekly rept.



51
20.8
336.4

E.D. 4350 N
151



Nov 24 Face
Wd rift terrace

ED 33.6
WD 40.3

$\frac{1}{2}$ m cpy - sph - calcite

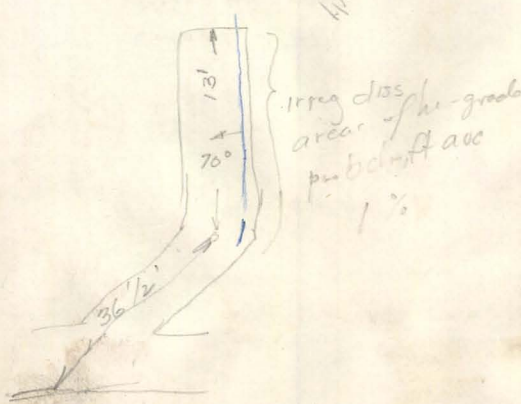
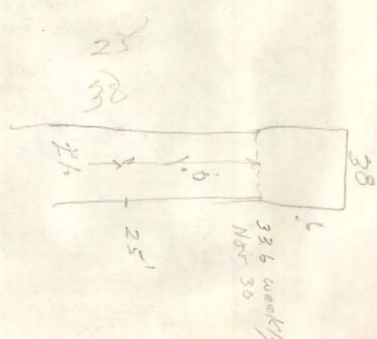
thin Hem
qtz - cpy

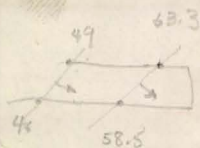
calc.
sph cpy



N 28 E
42 SE
thin slip

E.D. @ 3.8 Rock Th.
0.67. Can diss





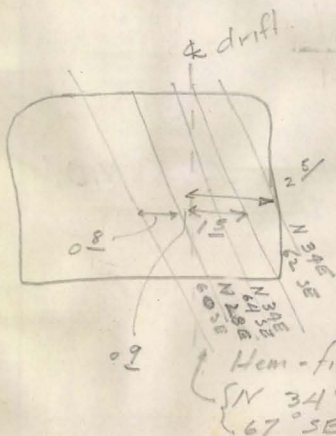
E.D. 4350N

face of 80 ft.

T₁ w/ Hwy dips .3 % Cu

H₂O seepage from slips stk

NW 2' behind face



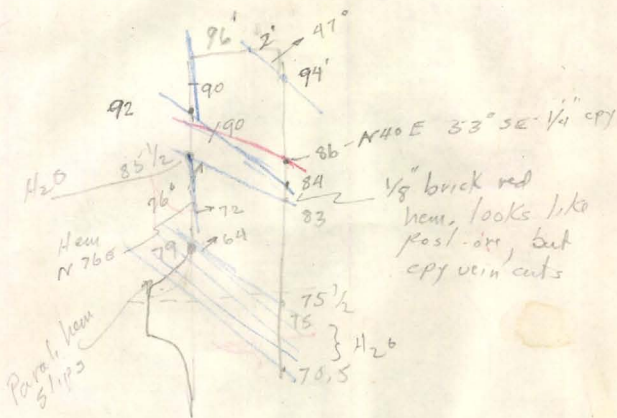
Hem-filled slips

{ N 34° E
67° SE

slab N.D.

1375 W

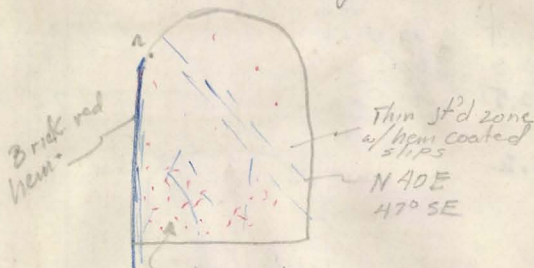
2



Sketch 1375 N.D.

Dec 12

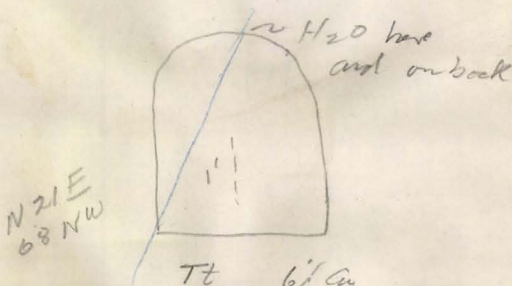
Rock. Tt. Euh. gnt
w/ heavy dip



heavy diss py.
Rock fractured and laced
by hem. slips. Post-py. but
very little movement.

4350 N - E.D. 96'

Dec 12

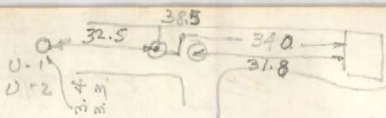


Tt 6 1/2 Cu

Sand dip

N.D. 4350 N
21'

Dec 17



38.5

34.0

72.5

3.7

76.2

43.5

32.5

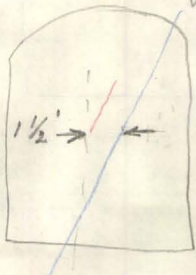
76.0

32.5

31.8

8.1

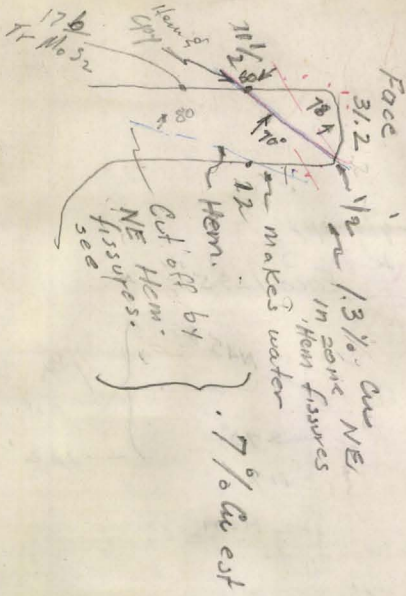
72.4 de



74.8 % Cu

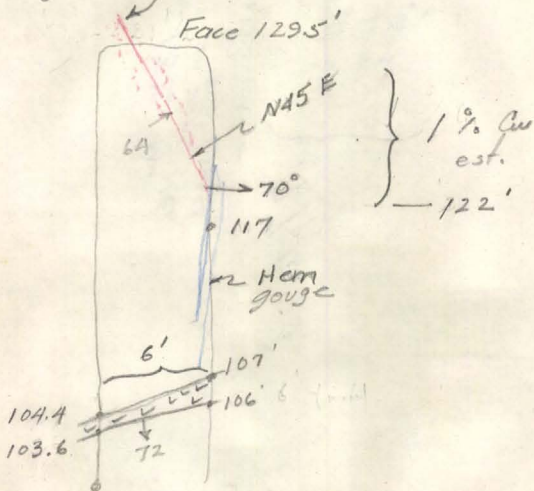
ND-6350 27'

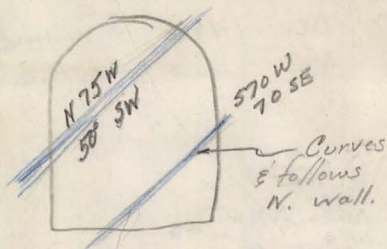
Dec 19



2' grnt-qtz-cpx

Face 129.5'





62.0 58.0
Supt. Meas.

1 % Cu (est)

W. Drift 4350 N
62.0' - Supt Meas

153
129.5

23.5

4350 N - E. D - 153' face, cut by
and dike.

End week - Dec 27

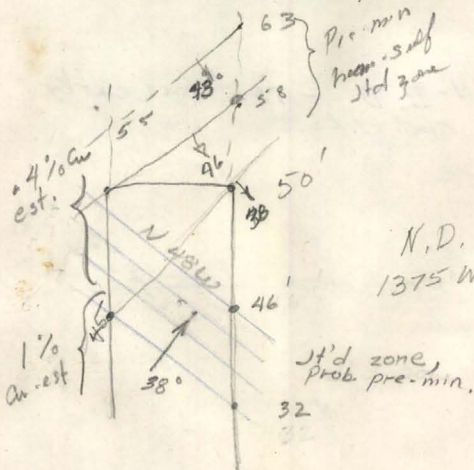
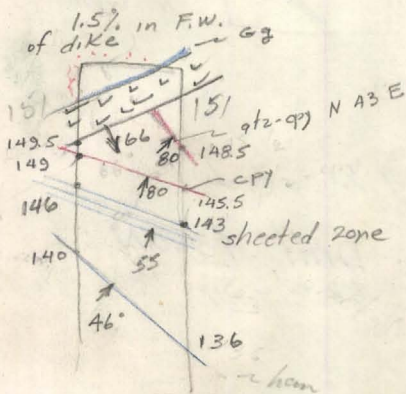
Week - 12/27/58

ED 148.6' + 1 Round blasted
NO 46.3' + 1 Round blasted

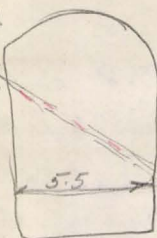
46.3

3, 2

15.1



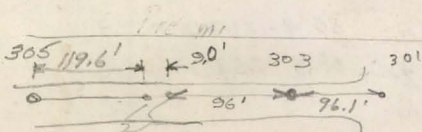
Penetrates wall
47.5'
w.H (+) 3.2'



Py w/ weak
cp, diss.
air - .3%

Pre min
std zone
w.H.

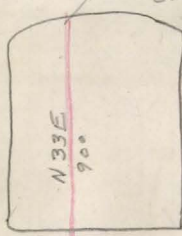
N.D. 1375
56.0'



Spools
for hanging lines.
N.D. 1450 E

96
9
119.6
224.6

Tt.
3% diss
air
1/8 Hem-cpy and
curves and
inters so wall
2.4' behind face,
at 4.1' so. of
face penetration



E.D. 4350 N
168.3'
Jan 3 1959

N.D. 59.8 end of week
Jan 3/58

No structure

Estimate assay - Mock

E D

N D

148.6 - 153.2

46.3 - 50.6

268 D - 1.2%

265 D - .3

158.3 270-D - 2%

55.4 - 267 D - .5

163.3 272-D - 1.75

59.8 - 269 D - .8

168.3 274-D - 1.01

172.8 276-D -

168.3 - End of week Jan 3/58



E.D. 4350 N

Sketch Jan 5

Jan 10 end of week

E D. 4350 N

198.5'

N.D. 1375 N

84.8'

MISSION
370 Level
Underground
TR. MK. REG. U.S. PAT. OFF.

weak
diss cpy
.5% est

thin seam
blue ss

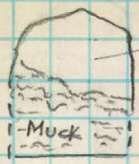
Hvy diss
cpy - qtz (minor)
2% est

And. dike. No Cu

Face at 84.8'

1/10/59
N.D. 1375 W

Py-cpy, post
ore crushing.
On face along
fault est.
1 or 2%



Face broke
on chloritic
gouge-fault
zone.
N 21° E at
76° SE

1/12/59
E.D. 4350N

Face at 204.3'

And. dike - No Cu

.6%
est

.8%
est

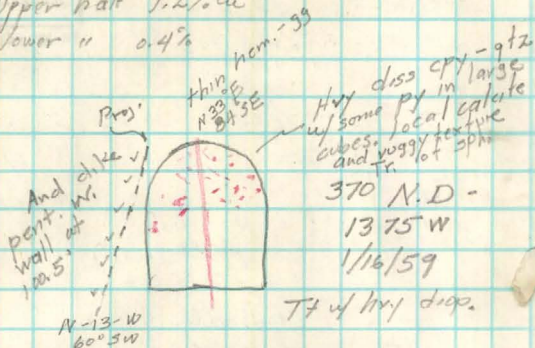
diss Py-cpy

1/12/59
ND 1375

Face at 89.0'

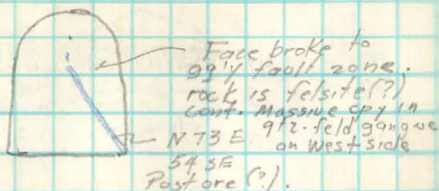
Est Cu

Face Upper half 1.2% Cu
 " Lower " 0.4%



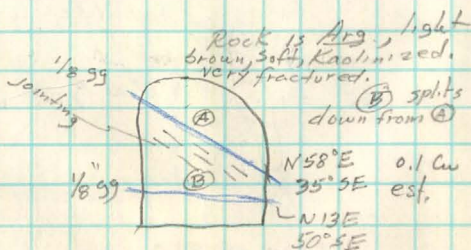
Face at 103.5

370 ED
 A350 N
 1/16/59



Face at 224.6'

370 E.D.
 A350 N
 1/19/59



Face at 245.5'

ORIGINAL OPR. 191 BY J. C. PARKER

structureless grey brown
arg. Cu 0.05% est. - irreg
fractures w/ sulf.

MISSION
370 Level
underground
TR. MK. REG. U.S. PAT. OFF.

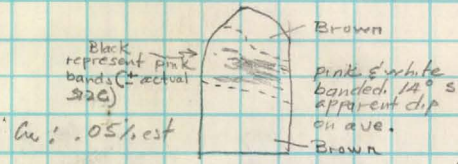
Face at 355.1

370 4350 ED 1/21/59

Arg. Brown. Cu content 0.05%
est.

Face at 261.5'

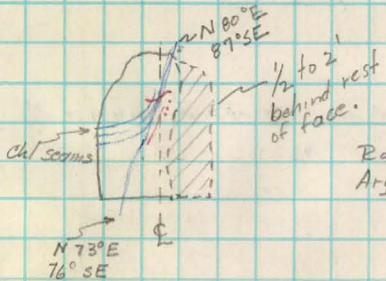
370 4350 E.D. 1/21/59



Rock is Brown Arg, except
as shown banded.

1/28/59
370 ED
4200 N

Face of slab round
(6.0' wairder meas.)

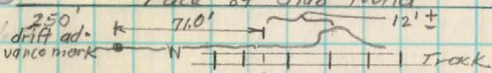


Rock is brown
Arg, slightly calc.

1/28/59
370 WD
4200 N

(5.6' wairder meas.)

Face of slab round



Sketch Plan
slabs 4200 N

Not to scale

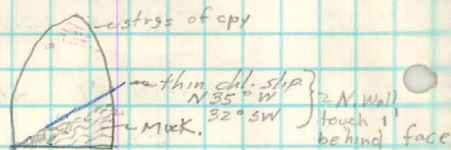
Left, from E. rail
① 9.9'
② 10.4'

LEFAX, PHILADELPHIA 7, PA., MADE IN U.S.A.

Note: Face broke
"V-shape" ~ Max point
is 1.5' in front of
sketch plane.

Cu content: .16%
Sparse py except
as shown

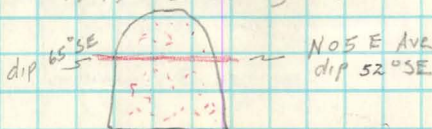
Rock is brown
Arg w/ slight
pink streaking
& mottling.



370 WD Face at 15.3' (wardler) - Max depth
4200 N
1/30/59 E. Rail 1450 ND + 17.1' W.

Jan 31/59 End of week
4200 W.D. 20.3' 4200 ED 24.0'

Rock: Tt. - uniform. Cu: 2%
cpy-py diss throughout est.



370 WD
4200 N
2/5/59 Face at 39.5' (wardler)
E. Rail 1450 N.D + 13.2'

Miss/ow
370 Level
Underground

TR. MK. REG. U.S. PAT. OFF.

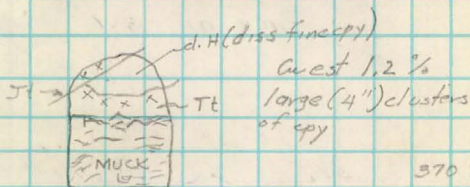
Arg. brown, hard.

Some ext(?) w/ low-grade
Self. in up. rt-hand corner.

Face at 55.7 Ft. (Wardler)

1st line point in turn on drift + 27.7'

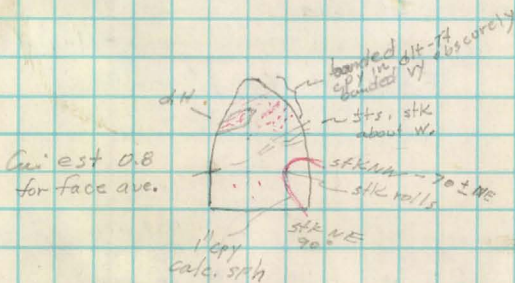
End of week. Feb. 7, 1959



370 WD
4200 N
2/10/59

Face at 47.7 ft. (Wardler)

DDH 62 + 39.6 ft.



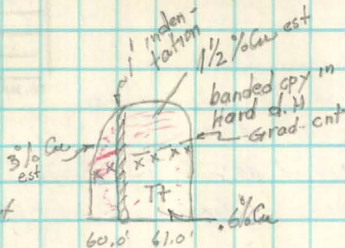
370 WD
4200 N
2/11/59

Wardler's 50' mark = DDH 62 + 39.6'

Face at DDH 62 + 44.7'
= 56.1' Wardler

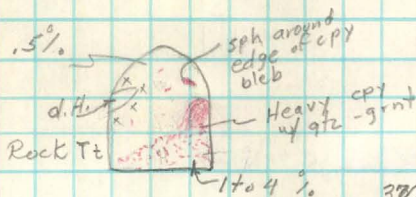
E.D. 4200 N 2/11/59
Face still at 55.7'

Ave Cu est
1%



370 WD
4200 N
2/12/59

Face at 61.0'



Cu est: Ave of face
1.5 % Cu

370 WD
4200 N
2/13/59

Face at 65.4'



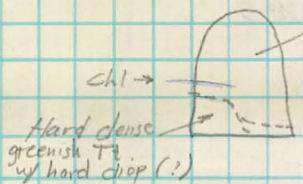
370 ED
4200 N
2/13/59

Face at 65.2'

370 W.D 4200 N - Face just
blasted. Not mucked or washed.

Tactite with prob about 1% diss Cu.

2/14/59 70.0' + 1 round (73.5')



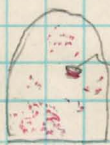
Arg

Cu - very
sparse.

370 ED
4200 N
2/14/59

Face at 70.0'

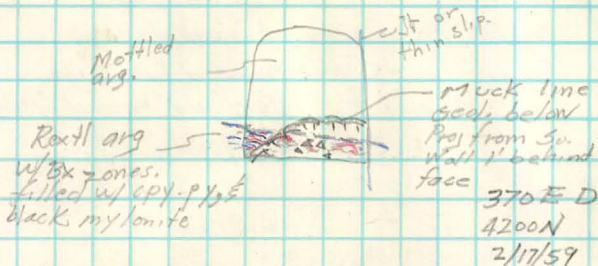
END of Week 2/14/59



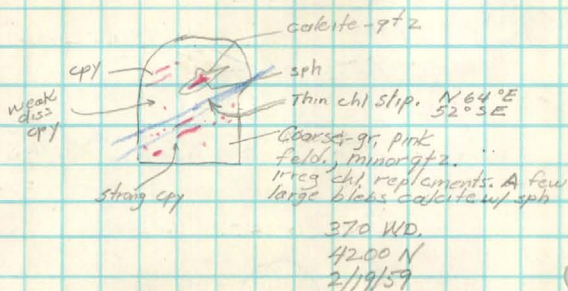
Tactite,
calcite
PY-CPY,
Some sph

370 WD
4200 N
2/16/59

Face at 73.5'

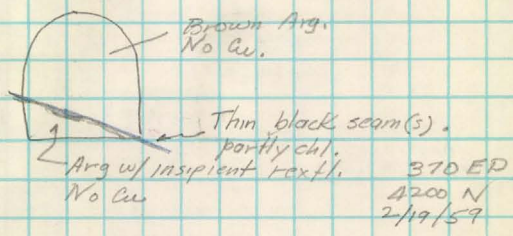


Face at 78.5°

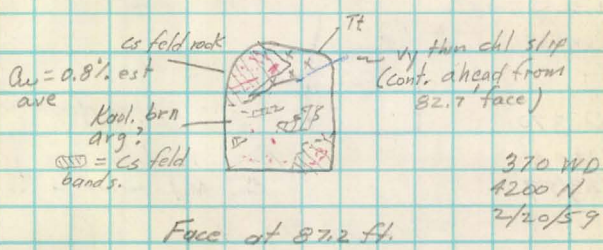


Face at 82.7°

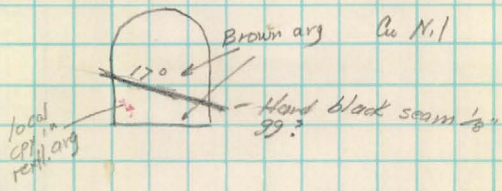
MISSION
370 Level
(Underground)
TR. MK. REG. U.S. PAT. OFF.



Face at 87.5 ft.



Face at 87.2 ft.



Aw est 0.2%

Some diss py
Tr. sph

Brown bands
of grnt
q/z-feld.

some
grnt.
med. calc arg

Kaol.
arg.?
Broken.

370 WD

4200 N

2/23/59

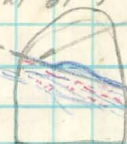
Face at 97.1'

39 24

changes from flat along wall
and swings up at 89°
W. H. at 94°.

N 49 W app
16° SW

Fault zone



black gr

thin s.p.s. - discontinuous
& banded gr

ED 370

4200 N

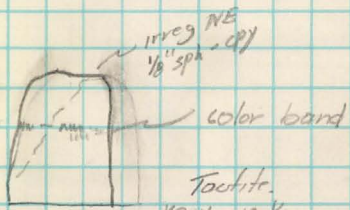
2/23/59

Rock is brown arg.
Aw N.1 except in fault.

Face at 102.2 ft.

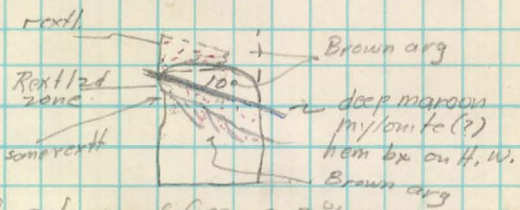
End of Week 2/27/50

Cur est 0.1%



370 W.D.
4200 N
3/1/59

Tactite.
Very weak
diss sulf.
Face at 102.0



Cur est - ave of face 0.2%
0.4-2% in rextl zones.

370 E.D.
4200 N
3/1/59

Face at 106.7

End of week 2/28/59

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

April 25, 1939

AIR MAIL

Mr. L. E. Hart, Chief Geologist
American Smelting and Refining Company
120 Broadway
New York 5, New York

SUMMARY GEOLOGICAL REPORT
Mission Underground Workings

Dear Sir:

This letter contains a summary of the results of the Mission underground work to date, and a comparison between these results and those obtained in surface diamond drilling, as requested by Mr. Pope. In a broad sense, but within inherent limitations, the underground work supports the validity of the ore reserve estimate.

A report with maps, sections and other detailed information supporting this summary is in preparation. In the meantime reference can be made to interim reports of November 21 and 25, 1938 by Klundson and Richard, which are similar in form and content to the detailed report being prepared.

A sheet (Attachment A) of two long sections (EW and NE, 1" = 500') showing the district geological environment of the Mission ore zone is attached. The underground workings and the "ultimate" pit appear on these sections. (As being of possible general interest, an additional long section (Attachment B) showing the water supply source and surface topography from the ore body easterly to the Santa Cruz River also is attached.)

The workings were laid out primarily to secure bulk metallurgical samples and at the same time gather some detail on the character and distribution of copper values, structure, and other geological features. Subsequently, the program was expanded to include additional drifting, underground diamond drilling, and raising on four of the surface drill holes. As a result, general structural concepts have been confirmed, but copper values have proved to be somewhat more erratic in local distribution than was interpreted from the surface drill hole information. In the matter of grade comparisons, the average of the calculated ore blocks is substantially higher than that of the underground work. This difference, however, is not to be regarded as a real measure of the accuracy of the ore estimate, as it derives largely from unsymmetric, partial sampling of a relatively small part of the ore body. The results can be viewed in their proper perspective only on sections and plans. In the absence of these, certain fundamental factors will be briefly reviewed.

As can be seen on Attachment A, the underground workings penetrate a relatively small part of an ore body. Grade variations from point to point are considerable -- from a few tenths up to 1% Cu. In other words these workings constitute a small "sample" of the total ore body; and in carrying on a so-called "check" of ore estimation, this small sample can show an appreciable difference, with this difference still being acceptable because it is within the range of probability.

The rather small part of the ore body which is presently under consideration is comprised of a number of ore lenses. As pictured on the ore reserve geological sections, these lenses mostly had low angle dips. The underground drifts and drill holes now demonstrate that these lenses are somewhat more irregular in shape than was originally pictured; however, most importantly, there is no indicated change in volume of individual lenses. In regard to copper content of these individual lenses, and disregarding the geometry imposed by the polygons ore estimation method, comparison of assays between surface drill holes and underground drifts and drill holes within a single lens show variations of as much as 40%, but usually within 10 or 20%. These variations are expectable and within an allowable range, considering particularly that the workings tend to follow along the low-angle mineralization trends rather than crosscutting them.

In the ore reserve calculations the occasional high assays were not arbitrarily reduced, the theory being that high grade pods would exist between drill holes here and there in the ore body with sufficient frequency that the high values should be given the same volume weight as lower values are given. For example, in the underground work the two east drifts crossed the East Fault and disclosed that it consists of an irregular, vein-like zone of high grade ore. One drift averaged 3.57% Cu for 30 feet; the other 8.94% Cu for 25 feet. Hole U-4 was angled down through this zone; it averaged 2.19% Cu for 170 feet, with a 16-foot portion of this averaging 7.60% Cu. This near-vertical zone, amounting to possibly a million tons or more, was missed by the vertical, surface holes. For this reason the appreciable amount of copper in this zone does not appear directly in our ore calculation polygons at that position. This copper will be gained in mining, however, and must thus compensate for any of these high grade polygons which might, by chance, have been over-weighted in other parts of the ore body.

In our opinion the foregoing methods of comparison represent the proper approach in analyzing the correspondence between ore estimation and underground drift and drill hole assays; and, acceptable variations are indicated.

Another approach involves comparison of (a) the grade of individual polygons of the ore reserve with (b) the underground drill hole and drift assays falling within these polygons. While this method produces results which can be boiled down to one single ratio, it is objectionable in the following respects: (1) The adjusted polygon method of ore estimation derives its accuracy from the gross compensating effect of large numbers of

grade-polygons. Considered individually, the grade of each polygon is more-or-less erroneous; as the number of polygons increases, the overall accuracy improves. (2) Each polygon is a regular geometric figure, set up for convenience of value measurement, which only approaches the true shape and position of the ore lens. For example, a polygon representing a 40' average of 10.23% Cu in hole 130 was, for structural reasons, drawn around the hole with an elongation to one side. Underground hole U-11 penetrated this elongated end of the polygon at a distance of 125' from hole 130. It cut 40' of ore averaging 10.64% Cu. This intercept corresponds precisely to the one in hole 130, but it is 20' lower in elevation and, consequently, is only partly reflected in the straight arithmetic comparison of drill hole and polygon. (3) Due to the low-angle attitude of most ore lenses in the Mission deposit, horizontal workings tend to be situated along internal mineralization layers. The assays from these workings are, therefore, subject to being unrepresentative in contrast to vertical drill holes which have a more crosscutting relationship.

Within the above limitations the following comparisons are made:

Drifts and Grade-Polygons

Avg. of drifts (weighted)	41.21% Cu
Avg. of polygons (weighted)	1.80
Tons of rock in polygons	.9 mil.
Footage of drifts	1,622.0'
Footage of surface drill holes	360.0'

Underground Drill Holes and Grade-Polygons

Avg. of drill holes (weighted)	1.66
Avg. of polygons (weighted)	1.82
Tons of rock in polygons	2.7 mil.
Footage of underground drill holes	614.0'
Footage of surface drill holes	960.0'

*Comparison of assays of grab sack samples from the raises with assays of bulk samples put through the sampling plant indicates that the grab sack samples are consistently low by 1/2%. Hence, the grab sack assays from the drifts have been upgraded 1/2%.

The average of the underground drill hole core assays is within 9% of the average of the 24 grade-polygons penetrated by the underground drill holes. In 11 instances the drill core ran higher than the polygon; in 13 instances, lower. Considering (a) the small number of polygons involved, (b) the very high grade of some of the polygons, and (c) the relatively low footage of penetrations by underground holes, the correspondence is very close. In fact, it may be fortuitous.

The average of drift assays, however, is 33% less than the average of grade-polygons penetrated. This is a wide divergence, and should probably

April 25, 1979

be considered as the extreme range of acceptability. In view of the limitations expressed in the foregoing and other paragraphs, as well as the fact that these drift samples do not by any means reflect the values of copper in the host fault zone, there appears to be no cause for concern in regard to the validity of the ore reserve estimate as a whole.

The bulk samples from raises driven along drill holes are intended for assay comparisons with the corresponding drill cores. They of course give essentially no data for making ore reserve tonnage comparisons. The data assays for 154' of raises are at hand.

Avg. of bulk samples from 154' of raises	1.90% Cu
Weighted avg. of corresponding cores	2.3% Cu
Avg. core recovery	97.0 %

The raises cut a few intercepts of waste but were mostly in ore. The average grade of the raise assays, however, is much higher than the average grade of ore in the ore body, .90% Cu. The entire ore body contains 14,704' of drill hole in ore. The raises, then, constitute a comparison of 1.1% of total drill hole in ore.

The bulk assays are 18% lower than the core assays. Detailed run-of-muck mapping in the raises clearly demonstrates the erratic distribution of copper from one wall of the raise to another. This, together with the facts (a) that the area of the raise compared to the area of the core is on the order of 100 to 1, and (b) that only 1.1% of the total core in ore is represented, demonstrates that the average variation of the cores is within an acceptable range. From a statistical standpoint something on the order of 1000 feet of raises would be required to reach close correspondence.

Yours very truly,

KENNETH RICHARDS
J. H. Cartwright

KR
JHE/da
Attachment: Two sheets of sections
cc: BHP - 2 w/att.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

June 16, 1959

MEMORANDUM FOR H. E. RICHARD

MISSION UNDERGROUND
Geologic Report
May 3 - 30, 1959

During the subject period drill hole U-13 was completed at 165.0 feet. Kino formation was drilled to this depth without indication of the East fault.

Since underground drilling and digging are completed, a final report has been submitted. This will be the last period report on the underground program.

A summary log on U-13 is attached.

JOHN E. KINNISON ✓

JEK/ds
Attachment

J E Kinnison

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

May 8, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week April 26-May 2, 1959

During the subject week the 370-3750N, 1500W Raise was completed at 56.5 feet above the sill.

DDH U-3 advanced to 96.5' penetrating conglomerate and argillite of the Kino formation. Py and very minor cpy are sparsely disseminated.

DDH X-264, on the San Xavier Reservation, was drilled to 452.1 feet. The post-mineral basalt was penetrated, and a few feet of post-mineral conglomerate was covered below it. The contact between these two units is a steep fault. The main fault zone separating post-mineral rocks from mineralized rocks below was encountered at 447 feet, and is 5 feet thick. Argillite, altered and mineralized, occurs below the fault. No oxidation is present on the fault or below it.

Summary logs are attached.

JOHN E. KINNISON

JEK/ds
Attachments

PRELIMINARY GEOLOGIC LOG

Location 1375 N. Drift
6' S of Face
East Wall

Collar Elev.	<u>6' Above Track</u>
Bearing:	Due East
Angle:	(-) 20°

MISSION UNDERGROUND

DESCRIPTION

Argillite and pebble conglomerate. Pale Gray-green to reddish brown. Cu content rare.

66

Pebbly argillite. Bleached argillite, pale tan and pink colors, with occasional pebbles. Cu content rare.

72.8

85

Conglomerate. Locally bleached. Cu content rare.

84.0

85

Sandy argillite and arkose. Gray to tan. Cu content rare.

96.5

Assay Data
% Cu (Core)

56.0

60.9

03

60.9

65.1

.03

65.1

68.5

04

68.5

72.8

03

72.8

76.2

03

John E. Kinnison

5-2-59

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

April 28, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week April 19-25, 1959

During the subject week the 370-4350N, 1500W Raise (DDH 149) was completed at a height of 54.6 feet above the sill. The 370-3750N, 1500W Raise was advanced to 50.9 feet.

DDH U-13 was collared and drilled to 48.0 feet. This hole cored tactite with weak to strong copper content, and then penetrated Kino formation argillite and conglomerate at 35.3'. A summary log is attached.

On the San Xavier Reservation, DDH X-264 advanced to 424.0 feet in post-mineral basalt. A summary log is attached.

JOHN E. KINNISON

JEK/ds
Attachments

ASARCO

D. D. Hole No. U-11

PRELIMINARY GEOLOGIC LOG

MISSION UNDERGROUNDLocation 370-4350N
East Drift
5.0' W of 308
Survey SpadDepth of Hole 84.3' (Bottom)Collar Elev. Track
Angle -90°

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

84.3 (Bottom)

From	To	Assay Data % Cu (Core)	From	To	Assay Data % Cu (Core)
26.5	31.7	0.45			
31.7	34.2	0.72			
34.2	35.8	2.07			
35.8	39.0	1.50			
39.0	42.6	1.09			
42.6	45.9	3.06			
45.9	47.7	4.63			
47.7	51.9	23.78			
51.9	56.5	3.08			
56.5	59.8	6.64			
59.8	64.0	7.31			
64.0	69.0	10.99			
69.0	71.8	11.90			
71.8	74.6	6.62			
74.6	76.5	4.86			
76.5	81.5	15.25			
81.5	84.3	13.26			
Bottom					

John E. Kinnison4-25-79

ASARCO

PRELIMINARY GEOLOGIC LOG

MISSION UNDERGROUND

D. D. Hole No. U-12

Location 370-4350N
East Drift
5.0' W of 308
Survey Spad

Depth of Hole 15.0 (Bottom)

Collar Elev. 11.8' above Track
Angle +90°

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

15.0 (Bottom)

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

0.0 3.7 0.42

3.7 7.0 0.59

7.0 11.6 0.08

11.6 15.0 0.43

Bottom

John E. Kinnison

4-25-59

PRELIMINARY GEOLOGIC LOG

Location 1375 N. Drift

6' S of Face, E Wall

Depth of Hole 48.0'

Collar Elev. 6' above track
Bearing Due East, Angle -20°

MISSION UNDERGROUND

FOOT	APPROX. CORE RECOVERY %	DESCRIPTION
0.0		<u>Tactite</u> - Generally fine grained, green to yellow-brown garnet which is transitional to hornfelsic material in some zones. Occasional bleaching and alteration. Disseminations and veinlets of hematite and molybdenite. Patches of weak chloritization and epidotization common. Local siliceous zones. Cpy, py and traces of spial throughout but concentrated adjacent to, and in, these siliceous zones. Cu content ranges weak to very strong.
35.3	85	<u>Argillite, Sandy Argillite and Pebble Conglomerate.</u> Occurs below a broken ct. It is light reddish tan to gray green and somewhat limy to gray and siliceous. The lighter, limy zones are weakly chloritic and epidotized, while the gray intervals exhibit a matrix closely resembling a graywacke. A few patches display very minute, anhedral to euhedral feldspars. Few traces of very fine grained moly, py, and cpy. Cu content ranges rare to sparse.

(continued next sheet)

[illegible]

ASARCO

D. D. Hole No. U-13 (continued)

PRELIMINARY GEOLOGIC LOG

Location _____

MISSION UNDERGROUND

Depth of Hole _____

Collar Elev. _____

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

40.4

87

Andesite - Contact clean, and forming an angle of 45-50° with the ♀ of the core. Hk is typical. Few scattered traces of v.f. grained py. Cu content rare.

44.2

94

Argillite and/or Sandy Argillite. Occurs beyond a similar ct. and is similar to that preceding the andesite. Cu content rare.

48.0

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

28.9

32.0

1.64

32.0

35.3

.45

35.3

38.8

.09

38.8

40.4

.01

40.4

44.2

.03

44.2

48.0

.02

48.0

52.5

.01

52.5

56.0

.01

John E. Kinnison

4-25-59

ASARCO

PRELIMINARY GEOLOGIC LOG

D. D. Hole No. X-264

Location XX.25

366.25

Depth of Hole 424.0

Collar Elev. 3205.9' (Ground)

SAN XAVIER

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

374.6

95

Basalt - Hematite red, very fine grained, and exhibiting
intercepts of calcite and/or zeolite amygdaloids. Lower
portions display evidence of shearing and healing.
Partial leaching of the amygdaloids and occurrence of
chlorite common. No mineralization observed.

424.0

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

Core runs not assayed

John E. Kinnison

4-25-59

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

April 23, 1959

MEMORANDUM FOR K. E. RICHARDMISSION GEOLOGIC REPORT
Underground Exploration
4 Weeks, 3/22 - 4/18/59

During the past 4-week period, raises on DDH 62 and DDH 130 were completed, at heights of 52.7 and 51.8 feet respectively above the sill. Raises on DDH 148 and DDH 149 are being driven currently, and are 39 feet and 32 feet respectively above the sill. These raises are being mapped currently and will be reported on separately.

DDH's U-8, U-9, U-10, U-11 and U-12 were completed. Summary geologic logs are attached. U-8 was drilled up through the upper contact of the argillite unit in the 4200N East drift, at 55.4'. U-9 penetrated the zone of feldspar and high-grade Cu penetrated in the 4200N West drift. U-11 and U-12 were drilled entirely in tactite with weak to very strong Cu content. U-11, below 47.7' to the bottom of the hole at 84.3', contains quartz and very heavy to locally massive chalcopryite.

Set up for DDH U-13 has been made. This hole bears due east at (-) 20°, and will drill through the projection of the East fault below the Bottom thrust.

A surface DDH on San Xavier Tract II, X-264, was collared and reached a depth of 375 feet. Bedrock is at 208', and is underlain by Black Mountain-type basalt to the present depth. Boyles Bros. is currently using a chain pull-down rig, and will switch to wire line D.D. after penetrating the contact of post- and pre-mineral rocks. A summary log is attached.

JOHN E. KINNISON

JEK/ds
Attachments

ASARCO

D. D. Hole No. U-8

PRELIMINARY GEOLOGIC LOG

Location 370-4200N
East Drift
5.8' W of FaceMISSION UNDERGROUNDDepth of Hole 70.1 (Bottom)Collar Elev. 13.6' above track
Angle +90°

FOOT	APPROX. CORE RECOVERY %	DESCRIPTION
51.4	80	<u>Sandy Argillite - Brown. Appears gradational from lower argillite. Cu content weak.</u>
55.4	95	<u>Tactite - Occurs above a gradational zone of pink, recrystallized argillite. Garnet appears to be replacing the earlier, brecciated diopside hornfels. Cu content moderate.</u>
65.1	98	<u>Mineralized Fault Zone - Chloritic alteration and banded cov. Some py and sph. Shearing dips 30-50°. Cu content strong.</u>
67.5	85	<u>Hornfels - Gradational from chloritic alteration of below zone. A dense, gray to flesh colored rock which resembles argillite. Micro. inspection reveals 100% diopside-hedenbergite in extremely fine grained aggregates. Cu content weak.</u>
70.1 (Bottom)		

From	To	Assay Data % Cu (Core)	From	To	Assay Data % Cu (Core)
25.4	32.4	0.09			
32.4	37.2	0.74			
37.2	44.0	0.04			
44.0	48.1	0.02			
48.1	51.4	0.03			
51.4	54.4	0.01			
54.4	60.1	0.28			
60.1	65.1	0.43			
65.1	67.5	0.41			
67.5	70.1	0.04			
Bottom					

J. E. Kinnison

4-18-59

ASARCO

D. D. Hole No. U-9

PRELIMINARY GEOLOGIC LOG

Location 370-4200N
West Drift
4.7' E of FaceMISSION UNDERGROUNDDepth of Hole 61.2 (Bottom)Collar Elev. Track
Angle -90°

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

0.0 - 1.7 Set Collar - No Core

1.7	77	Tactite - Fine grained, vitreous, green-brown garnet displaying a fairly high percentage of feldspathic and/or hornfelsic material. Initial portion of run brecciated and healed with chlorite, cpy, and the feldspathic and hornfelsic material. Cu content moderate to very strong.
-----	----	---

7.3	82	Feldspathized Tactite - Similar to last run but containing large pods of a coarse-grained intergrowth of feldspar, quartz, and calcite. Cpy occurs in large round grains and as irregular shapes throughout the feldspathic zones. Cu content very strong.
-----	----	--

15.5	82	Tactite - An admixture of heavy diopside and fine-grained yellow garnet. Small areas have been feldspathized. Cpy in grains and larger blebs. Cu content moderate.
------	----	--

22.3		<u>Diopside Hornfels - Gradational from last run. Dense,</u>
------	--	--

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

0.0	1.7	No recovery
1.7	5.5	0.40
5.5	9.8	3.33
9.8	15.7	6.16
15.7	18.7	0.60
18.7	23.7	1.35
23.7	27.9	0.96
27.9	31.2	0.65
31.2	35.7	0.23
35.7	38.7	0.55
38.7	42.9	1.02
42.9	48.2	0.68
48.2	49.8	0.35
49.8	53.7	0.89
53.7	55.1	0.14
55.1	57.2	2.91
57.2	59.4	8.50
59.4	61.2	0.73

Bottom

(Continued next page)

PRELIMINARY GEOLOGIC LOG

Location _____

MISSION UNDERGROUND

Depth of Hole _____

Collar Elev. _____

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

White to cream colored, and varying somewhat in apparent hardness. Occasional zones transitional to garnet or fibrous silicates. Cpy in scattered disseminations, blebs, and stringers. Cu content ranges weak to strong.

10.8



Tactite - Gradational from above. Very fine-grained, olive green garnet mixed with other silicates. Cpy-py disseminated in grains and hairlike stringers of hematite-sulphide. Cu content moderate to strong.

55.1

98

Breccia - Pre-mineral. A rock similar to the previous run grades immediately into a breccia of garnet and diopside fragments. The fragments are generally small, and display cpy and minor sphalerite. Calcite abundant in matrix. Cpy also occurs in large bchs with replacement texture on the edges and in granular aggregates. Last 0.4' is pinkish recrystallized(?) aravillite. Cu content very strong.

59.4

Feldspathic Rock and Tactite - The former, probably recrystal-

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

96

lized argillite, is dense and pinkish and grades into tactite at 60.0'. This exhibits some chlorite and hematite. Cu content moderate.

61.2 (Bottom)

John E. Kinnison

4-18-50

ASARCO

D. D. Hole No. U-10

PRELIMINARY GEOLOGIC LOG

Location 370-4200N
West Drift
4.7' E. of FaceMISSION UNDERGROUNDDepth of Hole 14.5' (Bottom)Collar Elev. 12.7'± above track
Angle +20°

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

0.0

59

Dioric Hornfels - Very fine-grained, soft, and white.
Some scattered garnet, with the last foot grading into
tactite. Cpy in disseminated grains up to 1/8" in diameter.
Cu content strong to very strong.14.5 (Bottom)

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

0.0

5.3

1.36

5.3

10.3

1.43

10.3

14.5

0.58

BottomJohn E. Kinnison4-18-59

PRELIMINARY GEOLOGIC LOG

Location 370-4350N
East Drift
5.0' W of 308
Survey Sped

Collar Elev. Track
Angle -90°

DESCRIPTION

1.6

87

Tactite - Medium to fine grained, yellow brown to green gray garnet with occasional zones of admixed diopside and a few small blebs of feldspathic development. Between 48 to 52' it grades to nearly massive quartz and cpy. Horn-tite and some calcite throughout. Cpy and some py in disse-minations, blebs, stringers, and veinlets. Scattered traces of epidote and sphalerite. Ca content ranges from weak in the upper portions to very strong in the middle and lower portions. Below 47.7 the rock is dominated by gtz-garnet with very strong to massive cpy and lesser py.

84.3 (Bottom)

Assay Data
% Cu (Core)

0.0	1.6	No recovery
1.6	2.5	0.50
2.5	5.9	0.53
5.9	10.3	0.23
10.3	15.7	0.29
15.7	19.1	3.76
19.1	23.5	0.42
23.5	26.5	0.20

4-18-59

PRELIMINARY GEOLOGIC LOG

Location 370-4350W

Depth of Hole 15.0 (Bottom)

Collar Elev. 11.8' above Track

MISSION UNDERGROUND

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

90

Tactite - Granular, yellow to yellow brown garnet with small amounts of admixed diopside and sparsely disseminated hematite. At 2.4' a silicified zone bearing some cpy dips 55°. Scattered disseminations of cpy and py throughout. Cu content weak to moderate.

15.0 (Bottom)

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

~~No copy data available to date.~~

3.7

24

7.0



7.0

11.6

20

11.6

15.0

23

Bottom

John E. Kimbison

4-18-59

ASARCO

PRELIMINARY GEOLOGIC LOG

D. D. Hole No. X-264Location XL.25366.25Depth of Hole 374.6Collar Elev. 3205.9SAN XAVIER

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

0.0 - 208.0		DRILLED WITH ROCK BIT	Overburden - Composed of alluvial sands and gravels.
208.0	"		Basalt - Bedrock contact established from driller's report and character samples. The basalt is hematite red, very fine grained, and exhibits minute (clm), white plagioclase feldspar phenocrysts. Fragments bear appreciable magnetite and indicate some zones of weathering.
214.7			
	100		Basalt - Similar to above. Hematite red and very fine grained. Some zones exhibit a felty texture, while others display elongated blebs or amygdules of white calcite. Mottled and brown in some areas. No mineralization or alteration observed.
217.0-260.0		Drilled with	
		Rock Bit	Basalt - Character samples indicate it to be similar to above.
260.0			
	80		Basalt - Similar to above but not exhibiting a visible felty texture. Some zones highly brecciated and healed. Thin calcite on fractures. No mineralization or alteration observed.

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

CORE RUNS NOT ASSAYED

(Continued next page)

ASARCO

D. D. Hole No. X-264 - continued

PRELIMINARY GEOLOGIC LOG

Location _____

SAN XAVIER

Depth of Hole _____

Collar Elev. _____

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

262.0-305.7 DRILLED WITH ROCK BIT Basalt - Character samples indicate it to be similar to above.

305.790

Basalt - Similar to above. Generally more broken, but not exhibiting as much healed brecciation. No mineralization or alteration observed.

307.7-330.0 Drilled with rock bit

Basalt - Character samples indicate it to be similar to above.

330.095

Basalt - Similar to above. Mottled from hematite red to rust brown, and exhibiting some zones of calcite blebs or amygdulæ, a few veinlets and scattered pods of quartz, and occasional clusters and vein deposits of zeolites. Breakage and some gouge common. Core magnetic throughout. No mineralization or alteration observed.

374.6

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)John E. Kinnison4-18-59

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

March 27, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week March 15-21, 1959

During the subject week the 370-4200N, 1450W Raise (DDH 62) was advanced to 37 feet, and the 370-4350N, 1250W Raise was advanced to 36 feet. Geology is essentially conformed to the drill hole logs.

Diamond Drill Hole U-8 was drilled to 51.4 feet, in essentially barren argillite. A summary geology log is attached.

JOHN E. KINTISON

JEK/ds
Attachment

ASARCO

PRELIMINARY GEOLOGIC LOG

MISSION UNDERGROUNDD. D. Hole No. U-8Location 370-4200N,
East Drift
5.8' W of FaceDepth of Hole 51.4'Collar Elev. 13.6' above track
Angle (+) 90°

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

9.6

93

Argillite, similar to that cored last week. Hard and dense,
gray. Locally pinkish and recrystallized, with
an occasional thin band of garnet-cpy. Cu con-
tent: nil to weak.

51.4

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

0.0

1.3

.11

1.3

5.9

.11

5.9

9.6

.11

9.6

13.4

.04

13.4

17.2

Nil

17.2

22.1

.01

22.1

25.4

.42

cc: KRichard
JEKinnison
Lab

John E. Kinnison

3-27-59

PRELIMINARY GEOLOGIC LOG

Location 370-4200N
North Drift
5' W of Face

Depth of Hole 61.1 (Bottom)

Collar Elev.	<u>Track</u>
Angle	(-) 90°

APPROX. CORE
RECOVERY %

DESCRIPTION

Bottomed and described previously.

[illegible]

John E. Kinnison

3-27-59

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

March 18, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week March 7-14, 1959

During the subject week the 370-4200N, W.Rs. (DDH 62) was advanced to 28.1 feet above the sill, and the 370-4350N, E. Rs (DDH 130) was advanced to 26.9 feet above the sill. Rocks penetrated by both raises were tactite and local feldspar rock or argillite. Cu content has been high in the E.Rs and variable from high to low in the W.Rs.

DDH U-7 was completed at 61.1 feet after penetrating 32 feet of mineralized tactite below barren argillite. DDH U-8 was collared and drilled 9.6 feet, all in barren argillite. Summary logs are attached.

JOHN E. KINNISON ✓

JEK/ds
Attachments

PRELIMINARY GEOLOGIC LOG

Location 370-4200N
N. Drift 5'
W of Face

Depth of Hole 61.1 (Bottom)

Collar Elev.	<u>Track</u>
Angle	(-) 90°

DESCRIPTION

Argillite, similar to previous runs. Gray, very dense and hard. Grades abruptly into next unit. Cu content nil, except for the last one foot, where Cu is moderately diss.

Hornfels. Dense greenish rock, composed of diopside(?) and actinolite(?). Hematite is abundant. Garnet occurs locally. Pre-mineral shears dip 50° and are abundant between 34 and 35.9, and also occur above. This entire alteration unit may be related to this shear zone. Cu content - variable from weak to strong.

Tactite. Yellow-brown garnet with variable amounts of admixed diopside. Cu content - variable:
35.9-43.6 weak to moderate
43.6-61.1 moderate to strong.

61.1 Bottom

Assay Data
% Cu (Core)

.49

.03

.02

.06

.07

.04

.05

3-14-59

PRELIMINARY GEOLOGIC LOG

Location 370-4200N
East Drift
5.8' W of Face

Collar Elev. 13.6' above track
Angle (+) 90°

MISSION UNDERGROUND

APPROX. CORE
RECOVERY %

DESCRIPTION

Starting Bit. A few fragments of Argillite recovered.

1.3

85

Argillite. Dense, hard, gray to mottled pink and green. Trace of sulphides. Cu content - nil.

9.6

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

NONE AVAILABLE

~~John E. Kinnison~~

~~3-14-59~~

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

March 11, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week March 1-7, 1959

During the subject week two raises were being advanced. These are on DDH 62 (370-4200N, W.Rs) and DDH 130 (370-4350N, E.Rs), and at the end of the week were 19 ft. and 18 ft. respectively, above the sill. Raises are being mapped as driven, and will be reported on separately.

No drifting was done. The attached preliminary sketch map, subject to revision, now shows all drift muck assays.

DDH U-6 was collared and completed at 13.7 ft., and DDH U-7 was collared and drilled to 20.6 ft. Summary geologic logs are attached. Final assays from DDH's 190 and U-5 are attached.

JOHN E. KINNISON ✓

JEK/ds

PRELIMINARY GEOLOGIC LOG

Location 370-1375W
N Drift, 6.8'
South of Face

Depth of Hole 61.2 (Bottom)

Collar Elev.	Track
Angle	(-) 90°

MISSION UNDERGROUND

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

Reported on previously. See week
February 22-28, 1959.

From	To	Assay Data % Cu (Core)	From	To	Assay Data % Cu (Core)
2.0	5.7	.28			
5.7	9.7	.52			
9.7	14.8	.92			
14.8	18.7	.38			
18.7	21.2	.23			
21.2	25.3	1.18			
25.3	26.0	9.02			
26.0	28.3	.15			
28.3	28.7	6.86			
28.7	31.6	9.10			
31.6	33.7	1.96			
33.7	36.3	1.22			
36.3	40.7	.25			
40.7	43.9	.03			
43.9	47.3	Tr.			
47.3	52.4	.02			cc: KRichard
52.4	56.4	Tr.			JEKinnison
56.4	61.2	Nil			Iab

John E. Kinnison

~~3-7-59~~

PRELIMINARY GEOLOGIC LOG

Location 370-1375N.
N Drift, 6.8'
South of Face

Collar Elev. Track +12'
Angle: (+) 90°

MISSION UNDERGROUND

FOOT	APPROX. CORE RECOVERY %	DESCRIPTION
0.0		
	45	Tactite. Heavy py and cpy. Cu content - strong.
1.0		
	98	Andesite. Upper contact dips 68°. Cu content - nil.
6.2		
	80	Tactite. Cu content variable, from weak to strong. Very strong qtz-cpy (vein?) from 10.7-11.8.
13.7		
Bottom		

[illegible]

~~John E. Kinnison~~
~~3-7-59~~

ASARCO

PRELIMINARY GEOLOGIC LOG

D. D. Hole No. U-7

Location 370-4200N
East Drift, 5'±
West of Face

Depth of Hole 20.6 (drilling)

Collar Elev. Track

Angle: (-) 90°

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

0 to 1.0'

Starting bit - no core.

1.0

Argillite. Weak calcareous, pale pink and green to
about 7'. Below it is not calcareous, and is light
gray. Rock is very hard and entirely aphanitic.
Strong Cu: 2.0-3.0'. Elsewhere Cu content is nil.

20.6

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

NONE AVAILABLE

cc: Richard
Kimison
Lab

John B. Kimison

3-7-59

ASARCO

PRELIMINARY GEOLOGIC LOG

D. D. Hole No. 190

Location 54 + 00N

5 + 00E

Depth of Hole 1523.9 (Bottom)

Collar Elev. 3131.2

MISSION

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

Reported on previously. See weekly
report January 25-31, 1959.

From To Assay Data
% Cu (Core)

From To Assay Data
% Cu (Core)

1057.1	1067.7	Tr.
1081.8	1095.6	.01
1142.1	1152.1	Tr.
1194.1	1202.7	Tr.
1248.2	1256.1	.06
1281.7	1290.3	.01
1349.0	1359.0	.01
1389.1	1399.1	Tr.
1444.6	1454.7	Tr.
1488.7	1498.8	Tr.

cc: KRichard
JMcKinnison
Lab

John E. Kinnison

3-7-59

JEK

D. D. Hole No. U-5

Location 370-1450W
N. Drift, 5th
So. of Face

Depth of Hole 61.2 (Bottom)

Collar Elev _____ Track _____
Angle (-) 90°

FOOT	APPROX. CORE RECOVERY %	DESCRIPTION
0 - 2.0	-	Collar reaming.
2.0	80	<u>Tactite.</u> Very little diop. Principally granular garnet. Cu content - weak to 9.7; moderate to very strong to 26.0'.
26.0	100	<u>Andesite.</u> Post-ore; part of the "A" fault zone. No copper.
28.3	80	<u>Tactite.</u> Cu content very strong.
31.6	90	<u>Argillite,</u> pink recrystallized and calcareous, grades to black argillite toward bottom of intercept. This is probably Kino fm. Contact with tactite above is blurred and slightly gradational. Cu content - weak.
42.5	90	<u>Conglomerate.</u> Black arkosic matrix. Kino formation. Cu content - Nil.
61.2	BOTTOM	

[illegible]

JOHN E. KENNISON

2-28-59

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

March 4, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGICAL REPORT
Underground Exploration
Week Feb. 22 - 28, 1959

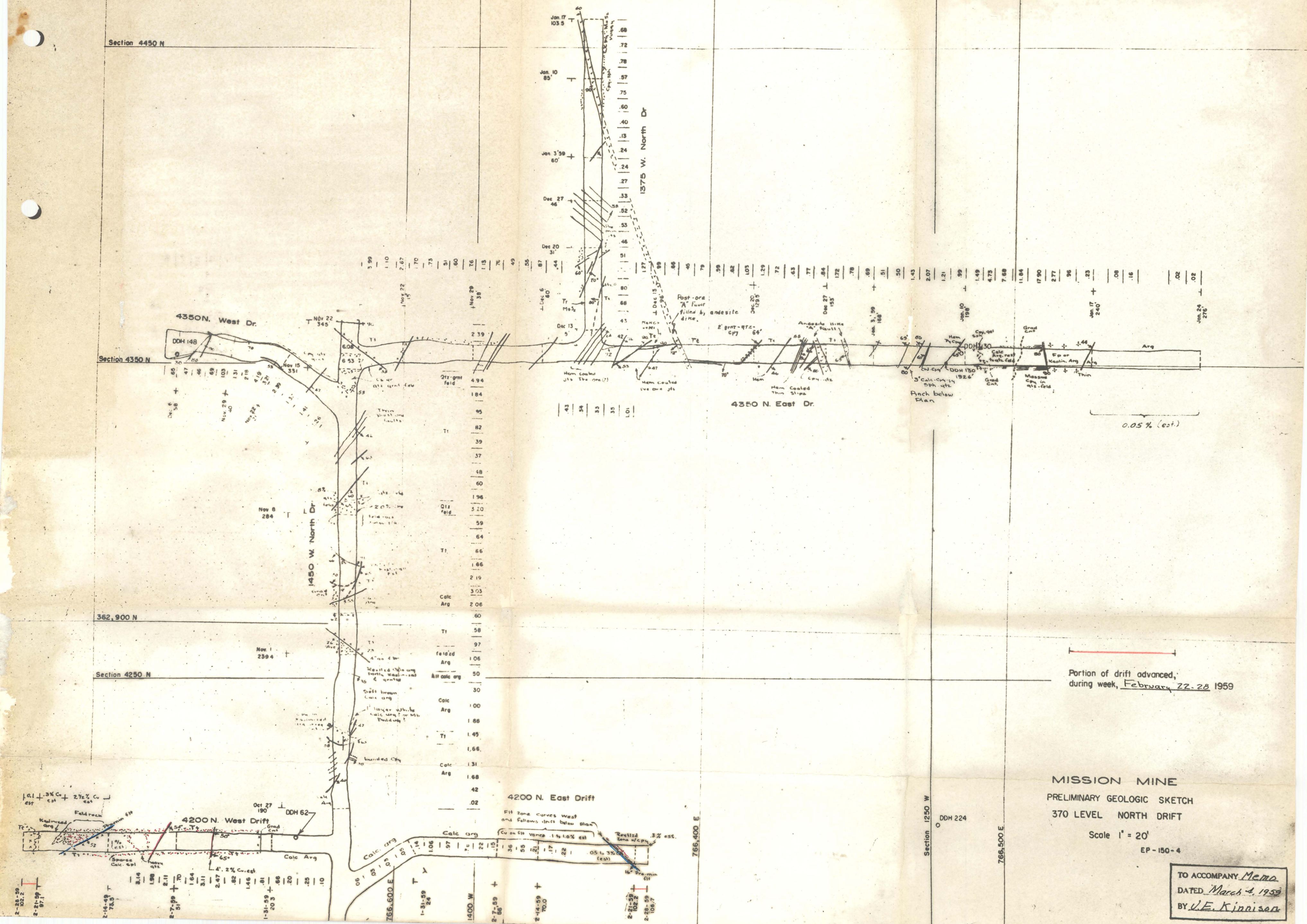
During the subject week the 370-4200N East drift was advanced 5 feet to its completion at 107 feet, and the 370-4200N West drift was advanced 5 feet to its completion at 102 feet. Diamond Drill stations were cut from the back at the faces of both drifts. The attached preliminary sketch, subject to revision, shows the salient geological features and available drift assays.

Two raises, on DDH's 62 and 130, were started and are about 9 feet above the sill.

D.D.H. U-5 was drilled from the collar to its final depth of 61.2 feet (see attached summary log). This hole penetrated argillite and conglomerate of the Kino formation, and may represent either a horse of Kino formation along the No. 1 thrust (other similar penetrations by surface drill holes were interpreted in this manner) or the footwall below the Bottom thrust.

JOHN E. KINNISON

Attachment
JEK/ds



TO ACCOMPANY Memo
DATED March 4, 1959
BY J.E. Kinnison

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

February 24, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week Feb. 15-21, 1959

During the subject week the 370-4200N West drift was advanced 22.6 feet and the 370-4200N East drift was advanced 32.2 feet. The attached preliminary sketch, subject to revision, shows the salient geologic features and available drift assays.

The West drift advanced through tactite with high-grade ore, and penetrated weakly garnetized and highly kaolinized calcareous argillite. The East drift continued to advance through barren calcareous argillite, cut by a low-angle pre-mineral fault zone with associated recrystallization and local chalcopyrite.

Set up for underground hole U-5 was completed, but coring has not yet been started.

JOHN E. KINNISON

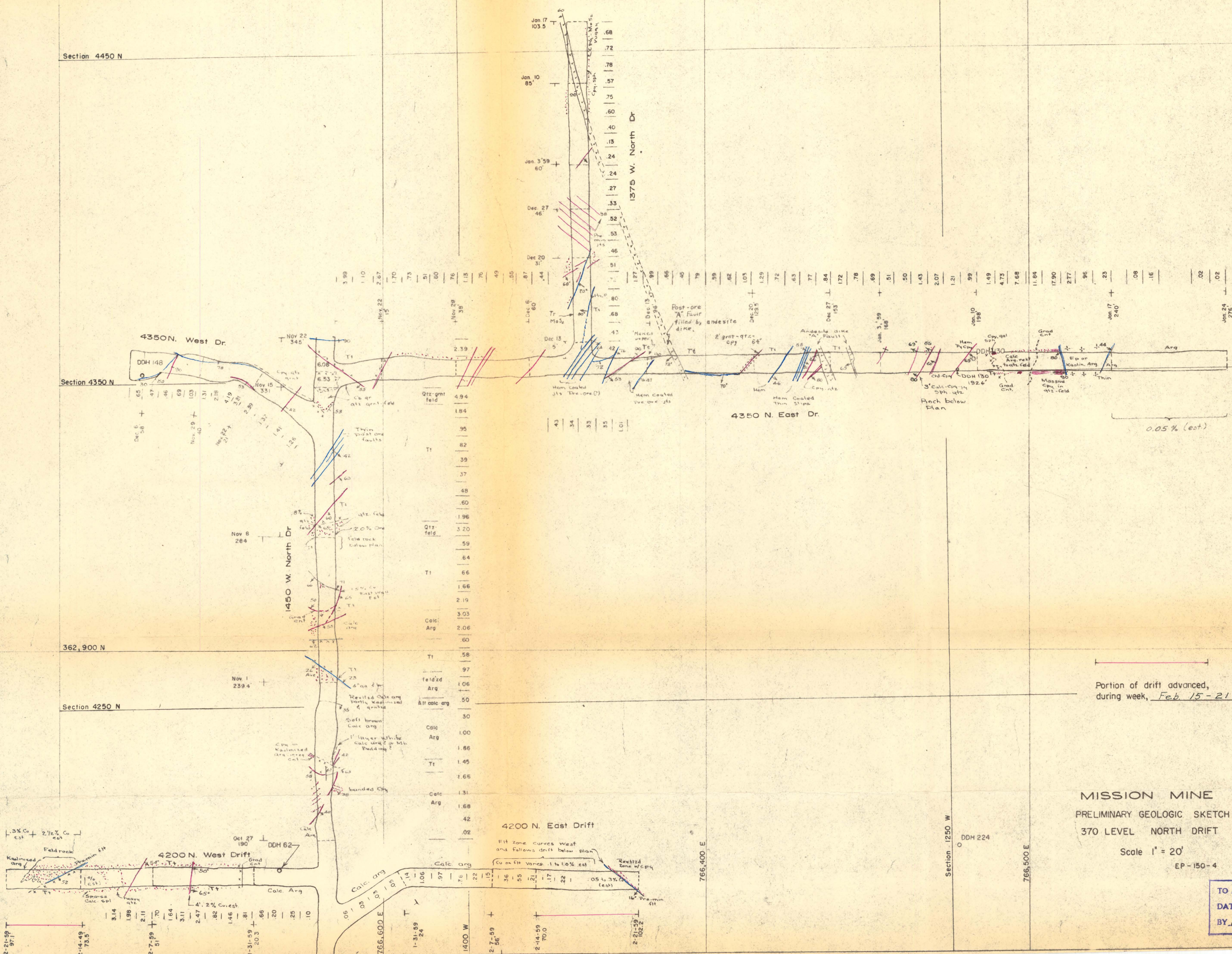
JEK/ds
Attachment

Section 4450 N

Section 4350 N

362,900 N

Section 4250 N



AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

February 18, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week Feb. 8 - 14, 1959

During the subject week the 370-4200N East drift was advanced 14 feet, and the 370-4200N West drift was advanced 22.5 feet. The attached preliminary sketch, subject to revision, shows the salient features and the available drift assays.

The East drift advanced through barren argillite, overlying recrystallized argillite and tactite in the bottom 2 feet of the drift. This zone carries about one per cent Cu (estimated). The West drift advanced entirely in tactite with a moderate to high-grade Cu content.

Additional assays from U-4, bottomed in January and previously reported on, are attached.

JOHN E. KINNISON 

JEK/ds
Attachment

ASARCO

PRELIMINARY GEOLOGIC LOG

MISSION

D. D. Hole No. U-4

Location 73.5' W. of Face

E. D. 4015N

Depth of Hole 190.0 (Bottom)

Collar Elev. Track

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

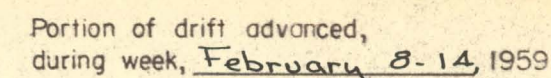
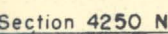
Hole bottomed and reported on previous logs.

From	To	Assay Data % Cu (Core)	From	To	Assay Data % Cu (Core)
138.2	143.0	2.38			
143.0	148.0	2.72			
148.0	152.0	0.11			
152.0	154.1	0.05			
154.1	157.0	3.63			
157.0	162.0	0.99			
162.0	165.1	1.74			
165.1	168.2	10.67			
168.2	173.0	4.40			
173.0	178.1	8.50			
178.1	180.8	8.05			
180.8	183.1	0.18			
183.1	186.4	0.48			
186.4	190.0	0.14			
Bottom					
cc: KERichard					
JEKinnison					
Lab					

J.E.Kinnison

2/14/59

Section 4350 N



EP - 150 - 4

TO ACCOMPANY Memo
DATED Feb. 18, 1959
BY J. E. Kinnison

JEK

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona
February 9, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week Feb. 1 - 7, 1959

During the subject week the 370-4200N East drift was advanced 32 feet, and the 370-4200N West drift was advanced 31 feet. The West drift penetrated tactite with medium to high-grade Cu ore, while the East drift remained in essentially barren calcareous argillite. The attached preliminary sketch, subject to revision, shows the salient geologic features and available drift assays.

A portable sampling plant was received at the shaft, and is now installed with the exception of some minor mechanical adjustments.

Additional assays from U-4, bottomed in January and reported on previously, are attached.

JOHN E. KINNISON

JEK/ds
Attachment

ASARCO

PRELIMINARY GEOLOGIC LOG

MISSION UNDERGROUND

D. D. Hole No. U-4
Location E.D., 4015N
73.5' W. of Face
Depth of Hole 190.0 (Bottom)
Collar Elev. Track

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

Hole bottomed and reported on previous
logs.

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

108.2	112.2	1.65
112.2	117.0	4.45
117.0	122.0	3.55
122.0	124.5	3.40
124.5	129.5	3.71
129.5	131.4	1.93
131.4	133.0	0.11
133.0	136.2	.08
136.2	138.2	.48

cc: KERichard
JEKinnison
Lab

John E. Kinnison

2/7/59

JEK

P-10.10.1

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

February 6, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week Jan. 25-31, 1959

During the subject week the 4200 East drift and the 4200 West drift both were started and advanced 24.0 feet and 20.3 feet respectively. The rock is calcareous argillite with very weakly disseminated py and cpy. The last 5 feet of the West drift shows slight silicification(?) or other alteration, and contains low grade disseminated Cu.

DDH 62 was penetrated in the West drift.

The attached preliminary sketch, subject to revision, shows the salient geologic features, and available drift assays.

DDH 190, on the surface, was bottomed in unmineralized Sierrita granite, at 1523.9 feet. A summary geologic log is attached.

No underground drilling was done.

JOHN E. KINNISON ✓

JEK/ds
Attachments

ASARCO

PRELIMINARY GEOLOGIC LOG

D. D. Hole No. 190

Location 54400N

5400E

Depth of Hole 1523.9 (Bottom)

Collar Elev. 3131⁺

MISSION

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

1484.7

98

Granite. Coarse-grained granite with flakes of mus-
covite and/or biotite, altered to chlorite.

1523.9

Bottom

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

900.2

910.3

.01

945.0

955.3

.02

955.3

959.9

.05

959.9

968.4

.01

968.4

978.8

.02

1003.2

1008.0

.04

cc: KRichard
JEKinnison
Lab

J. E. KINNISON

2-3-59

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

January 27, 1959

Mr. L. H. Hart
Chief Geologist
New York Office

MISSION GEOLOGIC REPORT
Underground Exploration
Week Jan. 18-24, 1959

Dear Sir:

Attached is a copy of Mr. Kinnison's weekly
geologic progress report.

Yours very truly,

Original Signed By
K. Richard

KENYON RICHARD

Attachment
KR/ds
cc: DJPope - w/att.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

January 27, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week Jan. 18-24, 1959

During the subject week the 4350 East drift was advanced 36 feet to its completion at 276.0'. The rock is argillite, partly kaolinized, with sparse disseminated sulphides. The attached preliminary sketch, subject to revision, shows the salient features.

DDH U-4 was drilled through the East fault zone to its bottom at 190.0'. To a depth of 180.8' the rock is pre-mineral breccia and garnetized rock with very heavy cpy. The remaining penetration, east of the East fault, is argillite and felsite porphyry. A summary geologic log is attached.

Available drift assays are shown on the sketch plan.

DDH 190, on the surface, drilled through a thick conglomerate bed, and penetrated redbeds below. This conglomerate, characterized by a coarse-grained arkosic matrix of probably granitic derivation, is apparently a formation within the redbed sequence. These rocks are all fresh and unmineralized. Traces of pyrite may be of sedimentary origin. Unmineralized Sierrita granite was penetrated at 1478', below a sheared zone 12 feet thick. A summary geologic log is attached.

JOHN E. KINNISON

Attachment
JEK/ds

ASARCO

PRELIMINARY GEOLOGIC LOG

D. D. Hole No. U-4Location E.D., 4015N73.5' W. of FaceDepth of Hole 190.0 (Bottom)Collar Elev. TrackMISSION UNDERGROUND

FOOT	APPROX. CORE RECOVERY %	DESCRIPTION
162.0	95	Breccia, consisting of angular fragments of argillite "floating" in a quartz matrix, interspaced with a breccia or angular conglomerate, which is locally recrystallized. Cpy is heavily diss, and locally massive. Cu content strong.
165.1	95	Tactite, consisting of varying amounts of quartz, garnet, feldspar, epidote and actinolite. First 3' is a massive feldspar rock. Cpy is heavily diss to massive. Very rare breccia texture is shown definitely, but whole intercept may be a heavily sulphidized pre-mineral breccia. Cu content very strong.
180.8	80	Arkose. Light grey to white, fine-grained. Cpy and py are weakly diss. The last 2.2' are felsite porphyry. Cu content weak to sparse.
190.0		Bottom

From	To	Assay Data % Cu (Core)	From	To	Assay Data % Cu (Core)
33.0	36.9	.96	99.8	102.3	1.39
36.9	39.9	2.06	102.3	105.1	2.82
39.9	45.0	1.73	105.1	108.2	.04
45.0	46.0	.28			
46.0	49.0	1.98			
49.0	53.4	.19			
53.4	56.0	1.54			
56.0	58.2	2.45			
58.2	62.9	.57			
62.9	67.4	.93			
67.4	72.4	5.50			
72.4	77.2	.72			
77.2	82.1	.65			
82.1	87.9	.51			
87.9	91.2	1.05			
91.2	93.2	.71			
93.2	96.0	.17			
96.0	97.8	1.15			
97.8	99.8	.89			

cc: KRichard
JKinnison
LabJ. E. Kinnison1-24-59

ASARCO

D. D. Hole No. 190

PRELIMINARY GEOLOGIC LOG

Location _____

MISSIONDepth of Hole 1484.7 (drilling)

Collar Elev. _____

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

1114.4	Conglomerate, similar to previous runs, coarse arkosic matrix with large feldspar grains. Very sparse sulphides. Cu content - nil.
1152.1	Conglomerate, similar to above, and Agillite, brown with serpentine alteration, are interbedded. Cu content - nil.
1199.0	Red arkose and siltstone, dipping generally 70°. 45° dips appear near 1248', and vertical dips appear near 1399'. Cu content - nil.
1464.0	Fault zone. Sheared redbeds with local breccia in the shear planes.
1477.9	Granite. Coarse-grained with wispy chlorite. Cu content - nil.
1484.7	

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

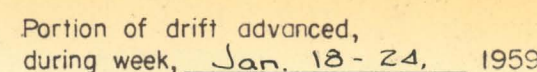
658.0	667.8	.01
712.2	722.2	.02
752.1	762.1	.01
809.6	819.6	Tr
857.1	869.3	.01

cc: KRichard
JECinnison
Lab

J. E. Kinnison1-24-59

Section 4350 N

Section 4250 N



TO ACCOMPANY Memo
DATED Jan. 27, 1959
BY J. E. Kinnison

MISSION MINE
PRELIMINARY GEOLOGIC SKETCH
370 LEVEL NORTH DRIFT

Scale 1" = 20'

EP - 150 - 4

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona
January 21, 1959

Mr. L. H. Hart
Chief Geologist
New York Office

MISSION GEOLOGIC REPORT
Underground Exploration
Week Jan. 11-17, 1959

Dear Sir:

Attached is a copy of Mr. Kinnison's weekly geologic
progress report.

Yours very truly,

Original Signed By
K. Richard

KENYON RICHARD

Attachment
KR/ds
cc: DJPope - w/att.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

January 20, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week Jan. 11-17, 1959

During the subject week the 370-1375 North drift was advanced 18.5 feet to its completion at 103.5 feet, and the 370-4350 East drift was advanced 42.0 feet. The attached preliminary sketch, subject to revision, shows the salient features.

The East drift penetrated quartz-feldspar rock with high grade to locally massive chalcopyrite. This unit is terminated along a fault against felsite, which has probably intruded the East fault. Cu content elsewhere in this week's advances is moderate to strong.

To date DDH 130 and DDH 148 have been found in the drifts, essentially at the location predicted by Saegart's geophysical survey. A slab round was shot to open DDH 148.

DDH U-4 encountered a pre-mineral breccia zone which is undoubtedly the East fault, with strong Cu mineralization (see attached summary log). The zone is wider than anticipated and is not yet drilled through.

The surface DDH 190 now in progress with Boyles Bros. wire line drill has reached a depth of 1114.0 feet. It has penetrated essentially unaltered and unmineralized redbeds with steep dips, and recently a steeply dipping conglomerate (see attached summary log). Assays are taken at about 50-foot intervals as a check measure, and more frequently where any sulphides are seen.

JOHN E. KINNISON ✓

JEK/ds
Attachments

ASARCO

D. D. Hole No. U-4

PRELIMINARY GEOLOGIC LOG

Location East Drift, 4015N73' West of FaceMISSION UNDERGROUNDDepth of Hole 162.0 (drilling)Collar Elev. TrackAngle (-) 56°

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

93.2	75	Tactite, similar to preceding runs. Brown massive garnet. Qtz-cpy veins cut the core at 15-25° angles to center line, and are bordered by an actinolite alteration halo. Cu content: strong.
105.1		
	100	Andesite. Upper and lower contacts 50° and 35° to core center line. No mineralization present.
108.2		
	65	Tactite, similar to that above andesite. Cu content: strong.
112.2	80	Beginning of East Fault zone. Breccia, tactite fragments. Argillite fragments below 120'. Heavy cpy-py filling of breccia. Cu content: strong.
124.5	98	Feldspar rock. Pink, aphanitic. Local wisps of chlorite. Heavy cpy-py in small diss grains. Heavy silicification below 129.5'. Cu content: strong.
131.4		
	95	Breccia. Angular, sharp-edged argillite fragments "floating" in qtz. Occasional clusters of sulphides. Cu content: weak.

From	To	Assay Data- %-Cu-(Core)-	From	To	Assay Data- %-Cu-(Core)-
138.2					
	100				
148.0	93				
162.0					
From	To	% Cu			
2.9	6.5	.87			
6.5	9.9	.76			
9.9	14.3	4.40			
14.3	18.1	.70			
18.1	21.8	1.60			
21.8	25.7	1.13			
25.7	28.7	.65			
28.7	33.0	1.28			

CC: KRichard
JKinnison
Lab

J. E. Kinnison

1-17-59

ASARCO

PRELIMINARY GEOLOGIC LOG

D. D. Hole No. 190Location 54 + 00 N5 + 00 EDepth of Hole 1114.4 (drilling)Collar Elev. 3131 ±MISSION

Re-entered D.D.H. 12/26/58. Boyles Bros., wire line drill

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

256.3	95	Red to purple arkose and siltstone, with occasional bed of light-gray arkose. Well stratified; dips vary 70-80°. Rocks are essentially unmineralized. No alteration present.
945	95	Arkose, light tan, medium-grained. Some disc. py. Very minor sphalerite-cpy in thin qtz veins. Cu content: sparse.
1008	95	Red arkose and siltstone. Steeply dipping. No alteration or mineralization.
1048.0	95	Conglomerate. Well indurated, weak epidote alteration. Fragments are igneous (felsite) and argillite. Rock is generally massive, but occasional stratification dips steeply. Py very sparse, and very rare grains of cpy. Cu content: sparse.
1114.4		

From To Assay Data
% Cu (Core)

From To Assay Data
% Cu (Core)

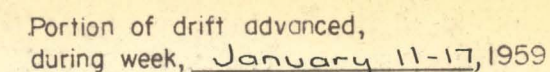
292.1	296.9	.01
352.9	358.5	.01
397.3	402.0	.01
446.5	449.0	.01
495.3	502.4	.02
502.4	512.4	.02
562.9	568.6	.01
601.6	606.7	.06

cc: Richard
J. Kinnison ✓
Lab

J. E. Kinnison

1-17-59

Section 4350 N



TO ACCOMPANY Memo
DATED Jan. 20, 1959
BY J. E. Kinnison

MISSION MINE
PRELIMINARY GEOLOGIC SKETCH
370 LEVEL NORTH DRIFT

Scale 1" = 20'

EP - 150 - 4

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

January 15, 1959

MEMORANDUM FOR KENYON RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week January 3 - 10, 1959

During the subject week the 370-4350 East drift was advanced 31 feet and the 370-1375 North drift was advanced 25 feet. The attached preliminary sketch, subject to revision, shows the salient features.

Both advances were in tactite, with generally high Cu content. In the East drift several N.E. calcite-cpy-py-hematite veins were penetrated, but these show no relation to disseminated ore. In the North drift an andesite dike -- part of the "A" fault system -- is nearly parallel to the drift.

DDH U-4 was collared and drilled to a depth of 93.2 feet. The penetration was all in tactite with generally high Cu content. A summary geologic log is attached.

Available drift assays are shown on the sketch plan.

JOHN E. KINNISON ✓

JEK/ds
Attachment

PRELIMINARY GEOLOGIC LOG

Location 75' West of face

370-4015 E.D.

Depth of Hole 91.2 (Drilling)

Collar Elev. Track

Angle $(-)$ 56°

MISSION UNDERGROUND

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

Reaming. A few fragments of tactite w/strong cpy recovered.

2.9

20

Tactite. Yellow brown garnet with sparse diop. Py and cpy are dissem., and occur rarely as veins. Qtz is a common associate of the sulphides. Hematite is present in small amounts. Rock is very similar over entire penetration. 68.8-71.5' is quartz-garnet tactite w/very heavy cpy. 89.0-90.0' is a zone of parallel close-spaced sulphide veinlets, forming an angle of 18° with core center line. Cu content: strong to 72', moderate to 93.2'.

93.2

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

~~NOT AVAILABLE~~

cc: KERichard
JEKinnison
leb

John E. Kinnison

~~1-10-59~~

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

January 8, 1959

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week 12-28-58 - 1-3-59

During the subject week the 370-4350 East drift was advanced 15 feet, and the 370-1375 North drift was advanced 14 feet. The attached preliminary sketch, subject to revision, shows the salient features.

Both advances were in Tactite, with moderate to high Cu content. Another andesite dike - parallel to the first two - was penetrated in the East drift.

DDH U-3 was continued to the bottom at 152.4 feet. The penetration was argillite with very weak Cu content. A summary geologic log is attached.

Available drift assays are shown on the sketch plan.

JOHN E. KINNISON

JEK/ds

ASARCO

PRELIMINARY GEOLOGIC LOG

D. D. Hole No. U-3Location Face of E.D.4015 N.MISSION UNDERGROUNDDepth of Hole 152.4 (Bottom)Collar Elev. 3' above track
Angle: (+) 3° at collar

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

151.680Argillite, similar to previous run. Cu content: Nil
to sparse.152.4Bottom

From

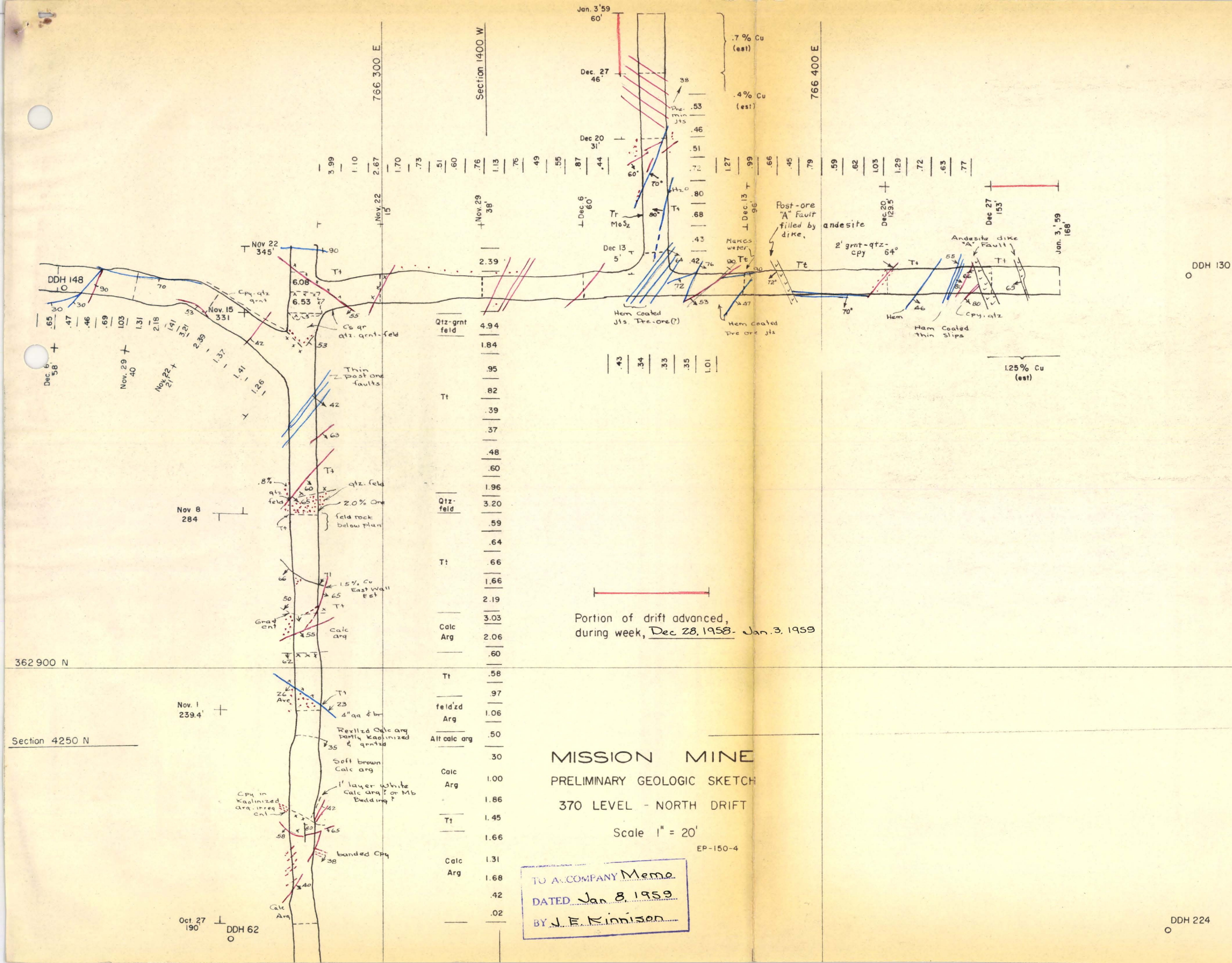
To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)65.270.9.05134.9138.0.0170.974.9.02138.0144.8.0374.980.7.03144.8148.5.0680.783.7.03148.5151.6.0383.787.2.03151.6152.4.0287.290.9.02Bottom90.992.7.0292.795.9.0195.998.8.0298.8100.9.07100.9105.9.01105.9109.9.03109.9113.0.04113.0115.9.01115.9117.9.01117.9120.9.02120.9125.9.02125.9130.9.03130.9134.9Nilcc: KRichard
JMKinnison
LabJohn E. Kinnison1-3-59



DDH 224

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona
December 29, 1958

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week Dec. 20-Dec. 27, 1958

During the subject week the 370-4350 East drift was advanced 23.5 feet, and the 370-1375 North drift was advanced 15 feet. The attached preliminary sketch, subject to revision, shows the salient features.

Both advances were in tactite, with moderate to high Cu content. A second andesite dike, more or less parallel to the first (see last week's report - Dec. 13-20), was penetrated in the East drift. There is considerable development of chlorite near the dike, and some brecciation and gouge on the footwall. This dike probably marks part of the "A" fault zone, and because of the greater amount of gouge and breccia this fault might be supposed to have been the principal plane of slippage. Tactite in the footwall is considerably higher in grade than that on the hanging wall.

DDH U-3 was continued to 148.5 feet, and penetrated argillite and conglomerate with very low Cu content. Some of the argillites show tuffaceous aspects. A summary geologic log is attached.

Available drift assays are shown on the sketch plan.

JOHN E. KINNISON ✓

JEK/ds
Attachments

ASARCO

PRELIMINARY GEOLOGIC LOG

D. D. Hole No. U-3Location Face of E.D.4015HDepth of Hole 148.5 (Drilling)Collar Elev. +3' above trackBrg. N 73° EAngle at collar (+) 3°MISSION UNDERGROUND

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

100.9

90

Argillite. Gradational from conglomerate. Brown, slightly sandy. 112-116' contains sulphide veins with post-mineral crushing, and strong clay alteration. Veins make about 25° angle with core center line. Cu content: moderate(?) in veined area, 112-116', Nil to sparse elsewhere.

125.9

85

Argillite and arkose, interbedded. First 4' of argillite is reddish with small felsite fragments. Arkose contains many small 1-2 mm rock fragments. Bedding lamination in argillite 50° more or less to core center line. Argillites are sandy to 151 ft., but beyond this point are dense and aphanitic.

148.5

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

54.2

57.4

.01

57.4

61.7

.02

61.7

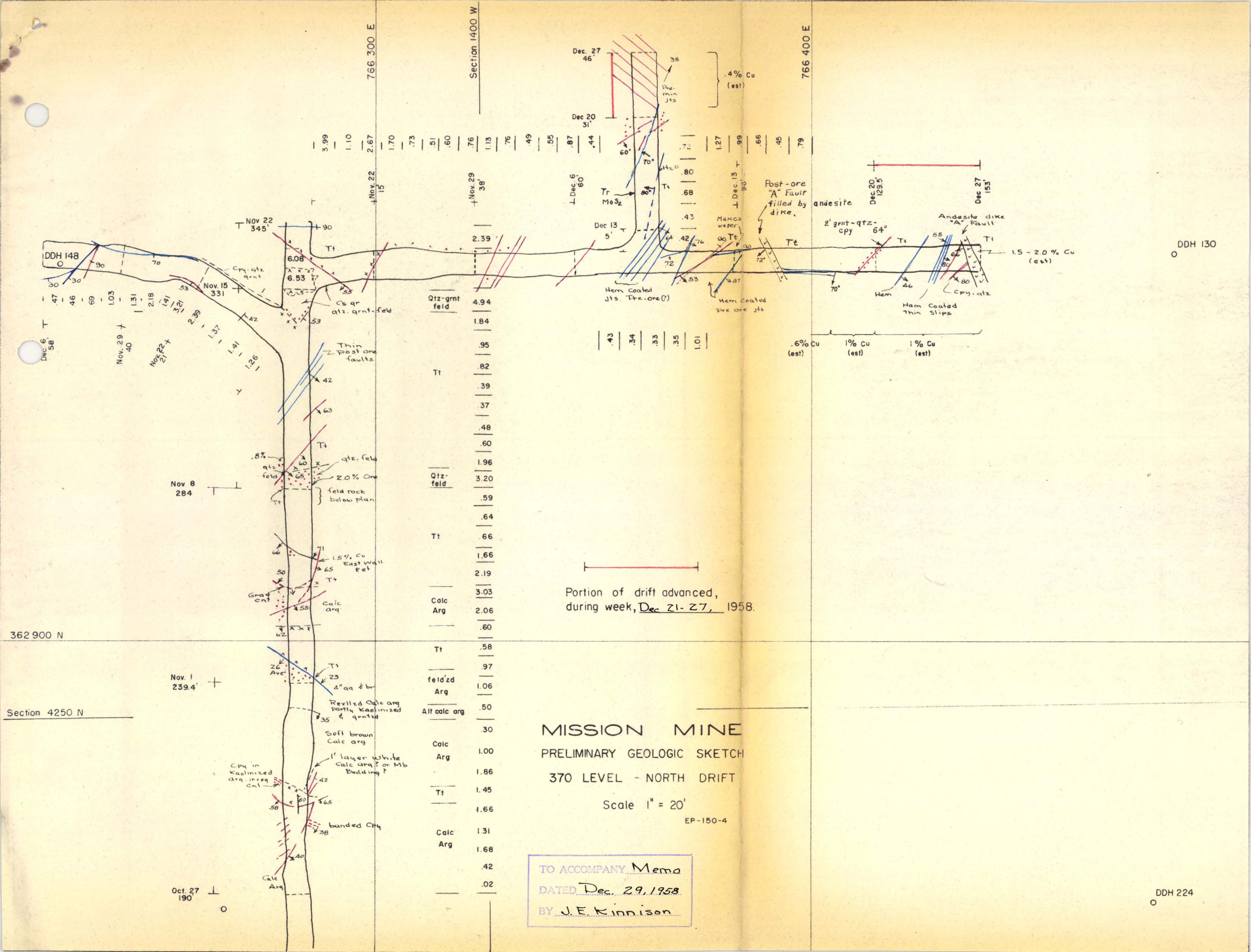
65.2

.03

cc: KRichard
JEKinnison
Lab

John E. Kinnison

December 27, 1958



MISSION MINE
PRELIMINARY GEOLOGIC SKETCH
370 LEVEL - NORTH DRIFT

Scale 1" = 20'

EP-150-4

TO ACCOMPANY Memo
DATED Dec. 29, 1958
BY J.E. Kinnison

DDH 130

DDH 224

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

December 24, 1958

MEMORANDUM FOR KENYON RICHARDMISSION GEOLOGIC REPORT
Underground Exploration
Week Dec. 13 - Dec. 20

During the subject week the 370-4350 East drift was advanced 33 1/2 feet and the 370-1375 North drift was advanced 26 feet. The attached preliminary sketch, subject to revision, shows the salient features.

Both advances were in tactite, with apparently low to moderate Cu content, increasing in grade near the faces. However, by comparison to my previous estimates -- which have been low in this area -- the rock may contain more Cu than I have estimated (see attached sketch). If so, it is in the form of fairly fine-grained disseminated chalcocopyrite.

The most significant feature disclosed by this week's advance is a 1-foot thick andesite dike striking north-northwest and dipping about 70° southwest. Although there is no appreciable difference in the rocks on either side of this dike, I feel that it must be the post-ore "A" fault (Mission geological report, Nov. 1958, and original 100-scale geologic sections) which is commonly intruded by andesite, and which was anticipated to be penetrated by the 4350 East drift. As you recall, the fault was not penetrated in the 4015 East drift, as expected, but may have been separated at drift location by another fault. The verification of this fault is important, because in the ore reserve calculation it was used as a boundary line for a number of polygons.

Available drift assays are shown on the sketch plan.

DDH U-3 was continued, penetrating argillite and conglomerate with generally very sparse sulphides. A few short intercepts may contain enough chalcocopyrite to form low ore-grade material. A summary geologic log is attached.

JOHN E. KINNISON

JEK/as
Attachments

ASARCO

D. D. Hole No. U-3

PRELIMINARY GEOLOGIC LOG

Location FACE, E.D.
4015NMISSION UNDERGROUNDDepth of Hole 100.9 (Drilling)Collar Elev. About 3' above trackBrg: N 73° EAngle: + 3° at collar

FOOT	APPROX. CORE RECOVERY %	DESCRIPTION
39.4	95	<u>Conglomerate; brown arkosic matrix. Local stratification at 45° to core centerline. Sulphides sparse. Cu content: Nil to sparse.</u>
54.2	95	<u>Arkose; fine-grained, light-gray. A few pebble zones at 45° to core center-line. Sulphides sparse. Cu content: Nil to sparse.</u>
68.0	80	<u>Conglomerate; brown arkosic matrix. Py and Cpy diss in occasional veinlet. Cu content: weak to 74.9, moderate or weak to 80.7.</u>
80.7	65	<u>Arkose; white, fine-grained, fairly soft with vuggy texture. Py and cpy diss. Cu content; moderate.</u>
83.7	70	<u>Arkose; brown, hard. Gradational with previous run. Py and cpy diss locally in abundant tiny grains. Cu content: weak to moderate.</u>
94.0	90	<u>Conglomerate; brown arkosic matrix. Py and cpy locally</u>
From	To	Assay Data % Cu (Core)
From	To	Assay Data % Cu (Core)
1.4	6.0	.07
6.0	8.2	.02
8.2	9.6	.05
9.6	14.4	.02
14.4	18.8	.06
18.8	22.7	.03
22.7	26.2	.03
26.2	29.2	.03
29.2	32.8	.05
32.8	36.1	.01
36.1	39.4	.02
39.4	43.4	.03
43.4	47.9	.01
47.9	51.1	.03
51.1	54.2	.01
dissem. From 99-100.9, core is cut by thin qtz-cpy-py veins ranging in attitude from 45-80° to core center line. Cu content: weak to moderate. 100.9		
cc: KRichard JKinnison Lab		

John E. Kinnison

Dec. 20, 1958

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

December 17, 1958

MEMORANDUM FOR K. E. RICHARDMISSION GEOLOGIC REPORT
Underground Exploration
Week Dec. 6 - Dec. 13

During the subject week the 370-4350 East drift was advanced 36 feet and the 370-1375 North drift was started and advanced 5 feet. The attached preliminary sketch, subject to revision, shows the salient features.

Both advances were in tactite with fairly heavy admixed diopside. Cu content is low.

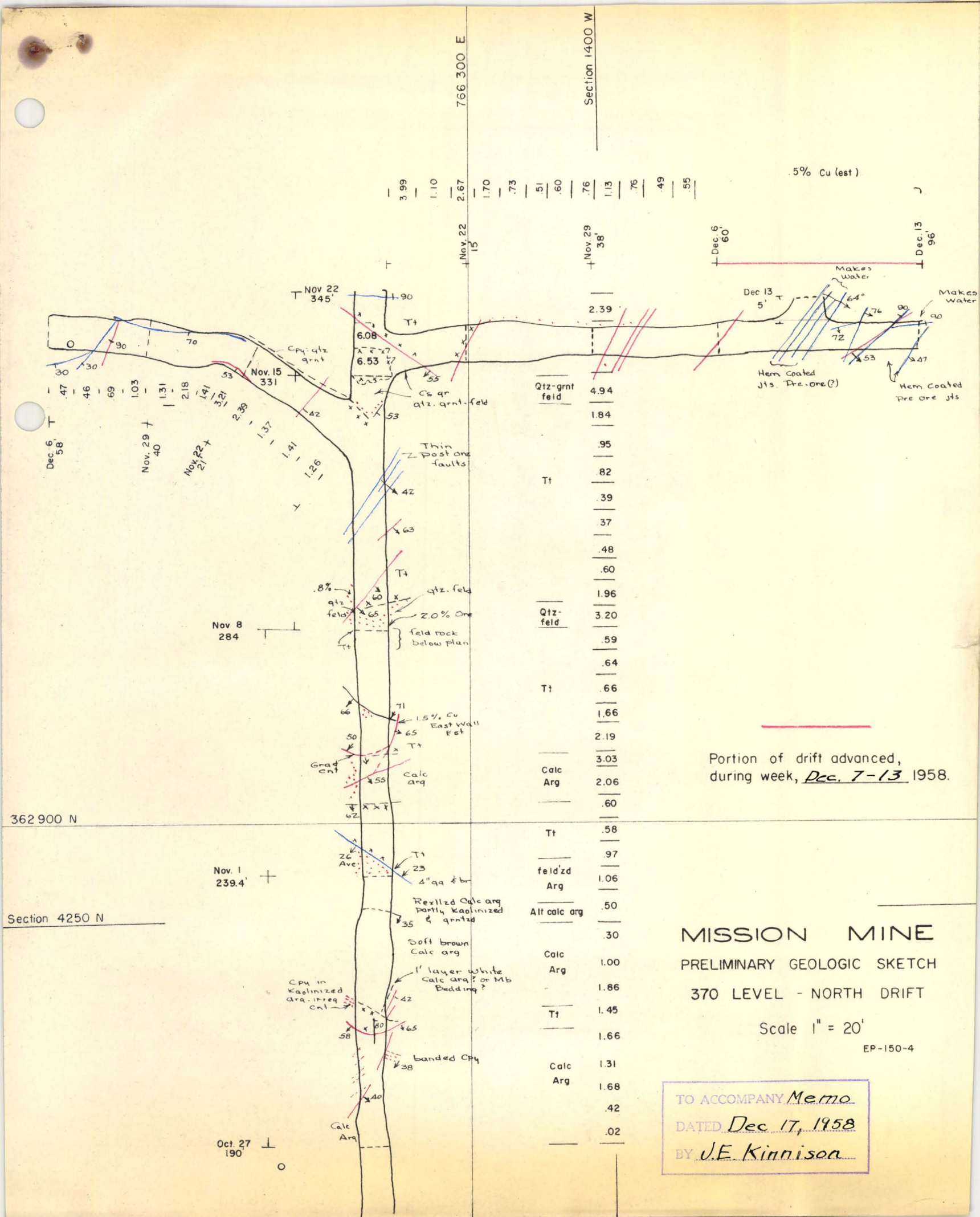
A series of parallel, northeast striking pre-mineral(?) fissures are conspicuous in the 4350 East drift. These fissures show some post-mineral movement, but possibly of very small magnitude. Brick-red hematite, either a primary mineral or crushed primary specularite, coats many of these fissures.

Available drift assays are shown on the sketch plan.

DDH U-3 was started, and a preliminary geologic log is attached.

JOHN E. KINNISON ✓

JEK/ds



PRELIMINARY GEOLOGIC LOG

Location Face 4015

E.D., 370 Level

Depth of Hole 39.4 (Drilling)

Collar Elev. + 3' above track

Brg. - N 73° E
Angle at collar (+) 3°

MISSION UNDERGROUND

FOOT	APPROX. CORE RECOVERY %	DESCRIPTION
0		
1.4	0	Rockbit
6.0	90	Sandy argillite and arkose with occasional pebbles. Bedding at 40-60° angle with core center line. Cu content: weak.
8.2	96	Andesite. East contact, 40° angle with core center line. A tiny stringer of py is the only sulphide. Cu content: Nil.
39.4	90	Conglomerate and arkose. Bedding at 45°, more or less, to core center line. Cu content: Nil to sparse.

[illegible]

John E. Kimbison

12-13-58

ASARCO

D. D. Hole No. U-2

PRELIMINARY GEOLOGIC LOG

Location 1500W, S.D.75' S of ShaftMISSION UNDERGROUNDDepth of Hole 70.9 (Bottom)Collar Elev. 12.9' above track
Angle (+) 90°

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

See previous log

From	To	Assay Data % Cu (Core)	From	To	Assay Data % Cu (Core)
1.3	6.6	0.85			
6.6	10.8	0.70			
10.8	13.8	0.30			
13.8	19.0	0.52			
19.0	23.7	0.71			
23.7	29.0	0.24			
29.0	32.0	0.34			
32.0	36.0	2.16			
36.0	39.3	0.20			
39.3	42.6	2.91			
42.6	45.9	0.89			
45.9	48.0	2.33			
48.0	51.0	0.32			
51.0	53.5	0.57			
53.5	55.8	0.31			
55.8	61.0	0.19			
61.0	65.6	0.47			
65.6	70.9	0.64			

cc: KERichard
JKinnison
LabJohn E. KinnisonDec. 13, 1958

ASARCO

PRELIMINARY GEOLOGIC LOG

MISSION UNDERGROUND

D. D. Hole No. U-1

Location 1500W, S.D.

75' S of Shaft

Depth of Hole 86.3 (Bottom)

Collar Elev. Tracklevel
Angle (-) 90°

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

See previous log

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

67.3	71.9	0.10
71.9	77.1	0.30
77.1	82.2	0.34
82.2	86.3	0.67

cc: KERichard
JMKinnison
Lab

John E. Kinnison
December 13, 1958

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

December 10, 1958

MEMORANDUM FOR K. E. RICHARDMISSION GEOLOGIC REPORT
Underground Exploration
Week Nov. 30-Dec. 6, 1958

During the subject week the 370-4350 West drift was advanced 18 feet and stopped, and the 370-4350 East drift was advanced 26 feet. The attached preliminary sketch, subject to revision, shows the salient features.

Both advances were in tactite. The West drift was driven beyond the surface coordinate position of DEH 148 but failed to connect with it. A zone of northeast, thin fissures with chalcopryite, sphalerite, and calcite was penetrated in the East drift (4350). Beyond these fissures the Cu content is low.

Available drift assays are shown on the sketch plan.

DEH U-2 was completed, and a preliminary geologic log is attached.

JOHN E. KINNISON

JEK/ds
Attachments

0.8% Cu (est) 1.0% Cu (est)

3.99 1.10 Nov. 22 267 1.70 73

766 300 E

Section 1400 W

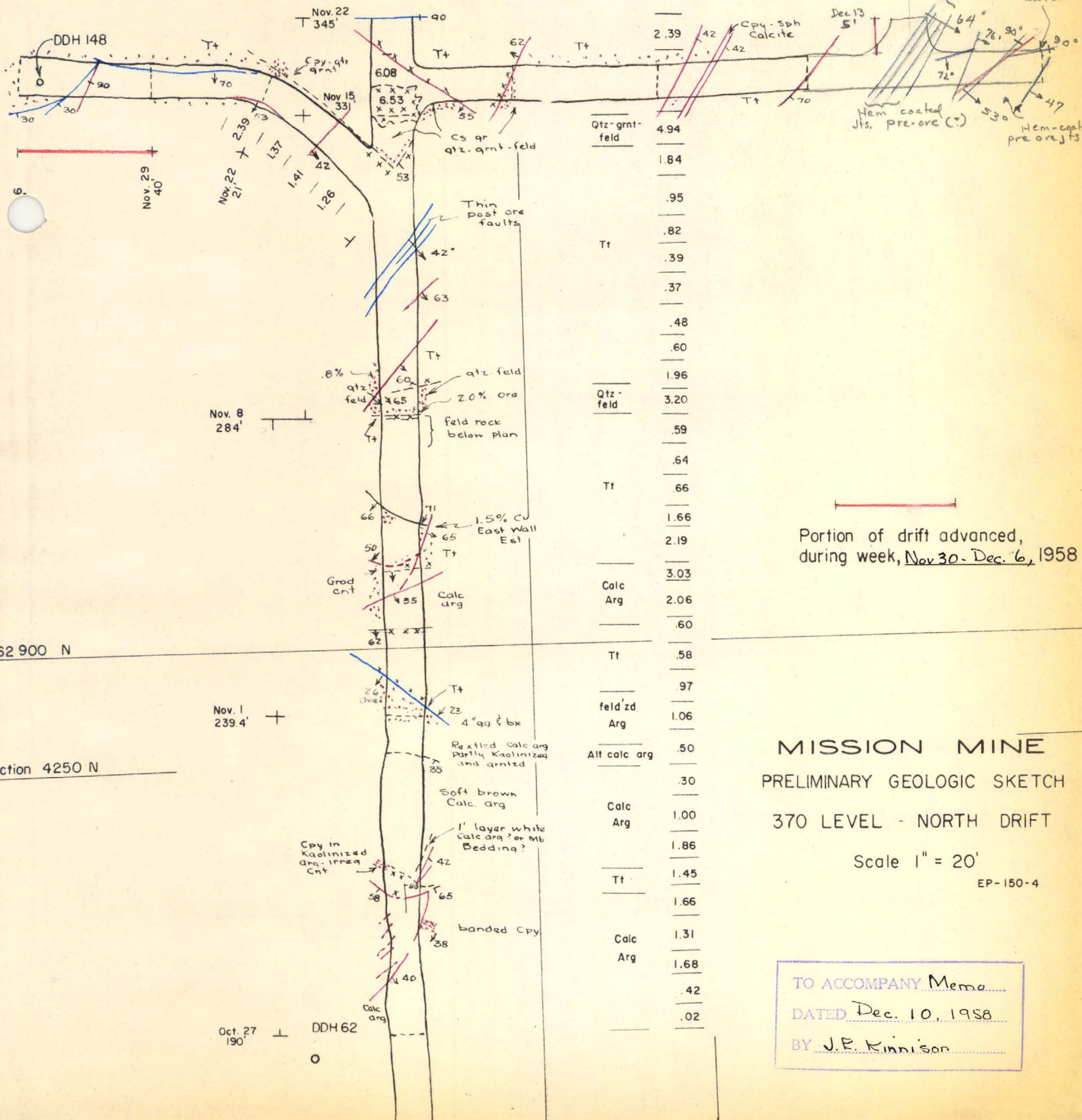
0.4% Cu (est)

.5% Cu (est)

Nov. 29 38

Dec. 5 60

Dec. 13 96



ASARCO

PRELIMINARY GEOLOGIC LOG

D. D. Hole No. U-2Location South drift75' So. of shaftDepth of Hole 70.9' (bottom)Collar Elev. 12.9' above trackAngle (+) 90°

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

29.060Tactite. Similar to previous intercept. Garnet with heavy drop. Cpx and py diss. elongate blebs. Cu content: moderate.32.065Tactite, similar to above, with local patches of hard drop. Ht intergrown locally. Py and cpx dissam. Pre-mineral Bx 46.6 - 48.0 ft. -- Bx garnet filled with sulfide - gypsum - calcite aggregate. Cu content: strong.55.860Tactite, similar to above, locally replacing ~~matrix~~ preccreted fragments of drop. hornfels. Cu content: moderate.70.9Bottom

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)John E. Linneman
Dec 6 1958

JEK

P-10.10.1

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

December 4, 1958

Mr. L. H. Hart
Chief Geologist
New York Office

MISSION GEOLOGIC REPORT
Underground Exploration
Week Nov. 23-Nov. 29, 1958

Dear Sir:

Attached is copy of Mr. Kimmison's weekly geological progress report.

Yours very truly,

Original Signed By
K. Richard

KENYON RICHARD

Attachment
KR/ds
cc: DJPope - w/att.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

December 3, 1958

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week Nov. 23-Nov.29, 1958

During the subject week the 370-4350 West drift was advanced 19 feet and the 370-4350 East drift was advanced 19 feet. The attached preliminary sketch, subject to revision, shows the salient features.

Both advances were in tactite with moderate and locally high-grade Cu ore. Pyrite and chalcopyrite are disseminated.

Available assays are shown on the sketch plan.

Underground drill log summaries are attached. Hole U-1 was completed, and U-2 started and is currently drilling.

JOHN E. KINNISON ✓

Attachments
JEK/ds

PRELIMINARY GEOLOGIC LOG

Location South India

Depth of Hole 20.0' (drilling)

Collar Elev. 12.9' above track
Angle (+) 90°

RESEARCH DESIGN

DESCRIPTION

1

Rockbit - no core.

50

Tactite. Pale yellow garnet with admixed soft diopside. Core badly broken. Possible fault zone from 19.5 to 23.7 feet. Sulphides are py and cov in small disseminated grains.

Cu content: 1.3 - 13.8 weak to moderate;
13.8 - 23.7 moderate to strong; 23.7 - 29.0
weak to moderate.

29.9

Assay Data
% Cu (Core)

FREE AVAILABLE

cc: Richard
J. Kimison
Lab

John E. Simonsen

11-23-58

ASARCO

D. D. Hole No. U-1

PRELIMINARY GEOLOGIC LOG

Location South Drift75' So. of ShaftMISSION UNDERGROUNDDepth of Hole 86.3 bottomCollar Elev. Track levelAngle (-) 90°

FOOT

APPROX. CORE
RECOVERY %

DESCRIPTION

67.3

Hornfels. Hard and dense, probably diopside, to 76 feet, and becomes more typical soft, white diopside hornfels below. Laminated color bands, at 80 feet, dip 40°. Py and cpy as fine disseminated grains. Cu content: weak to moderate.

86.3 Bottom

From

To

Assay Data
% Cu (Core)

From

To

Assay Data
% Cu (Core)

0.0

4.0

0.35 (Assay

obtained from a few fragments
from reaming bit)

4.0

8.9

2.61

8.9

11.3

1.87

11.3

17.8

1.73

17.8

22.1

1.18

22.1

27.1

1.66

27.1

32.2

0.51

32.2

38.1

0.04

38.1

45.0

0.15

45.0

50.0

0.48

50.0

55.0

0.48

50.0

55.0

0.87

55.0

60.9

0.75

60.9

62.9

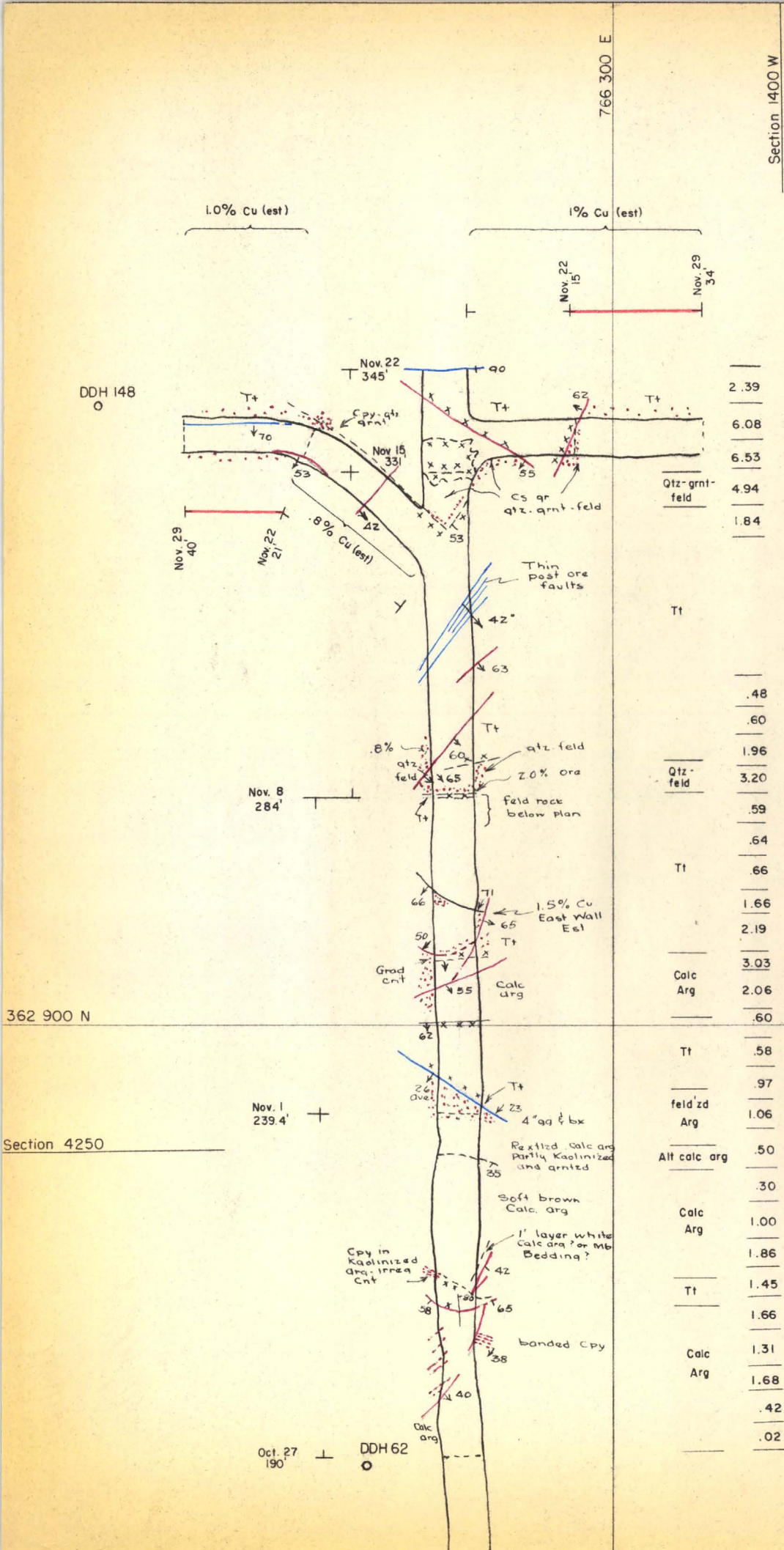
0.19

62.9

67.3

0.04

John E. Kinnison11-29-58



Section 1400 W

2.39	
6.08	
6.53	
4.94	Qtz-grnt-feld
1.84	
	Tt
.48	
.60	
1.96	
3.20	Qtz-feld
.59	
.64	
.66	Tt
1.66	
2.19	
3.03	
2.06	Calc Arg
.60	
.58	Tt
.97	
1.06	feld zd Arg
.50	Alt calc arg
.30	
1.00	Calc Arg
1.86	
1.45	Tt
1.66	
1.31	Calc Arg
1.68	
.42	
.02	

Portion of drift advanced, during week, Nov. 23.-29, 1958

MISSION MINE PRELIMINARY GEOLOGIC SKETCH 370 LEVEL - NORTH DRIFT

Scale 1" = 20'
EP-150-4

TO ACCOMPANY Memo
DATED Dec. 3, 1958
BY J.E. Kinnison

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

November 25, 1958

P-10.10.1

V. C. K.

Mr. L. H. Hart
Chief Geologist
New York Office

MISSION GEOLOGIC REPORT
Underground Exploration
Week Nov. 16-Nov. 22, 1958

Dear Sir:

Attached is copy of Mr. Kinnison's weekly
geological progress report.

Yours very truly,
Original Signed By
K. Richard

KENYON RICHARD

KR:S
Attachment
cc: DJPope-w/att.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

November 25, 1958

MEMORANDUM FOR MR. K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week Nov.16-Nov.22,1958

During the subject week the North drift was advanced 14 feet and stopped at 345'. The East drift, 4350 N. was advanced 15 feet, and a turn-out to the west drift, 4350 N. was advanced 21 feet. The attached preliminary geologic sketch, subject to revision, shows the salient features.

The quartz-garnet-feldspar zone near the face at last week's report, was penetrated. The footwall is a tight, slightly irregular pre-mineral contact which strikes northwest and dips 55° southwest. The face of the North drift is on a fault. The south wall and face of the E. D. 4350 N. shows local quartz feldspar, and high-grade Cu.

Available assays are shown on the sketch plan.

Underground drilling was initiated, with hole U-1. A summary drill log is attached.

JOHN E. KINNISON

JEK:S
Attachment

PRELIMINARY GEOLOGIC LOG

Location So. drift

Depth of Hole **67.3-drilling**

Collar Elev. Track level

Angle (-) 90°

APPROX. CORE
RECOVERY %

DESCRIPTION

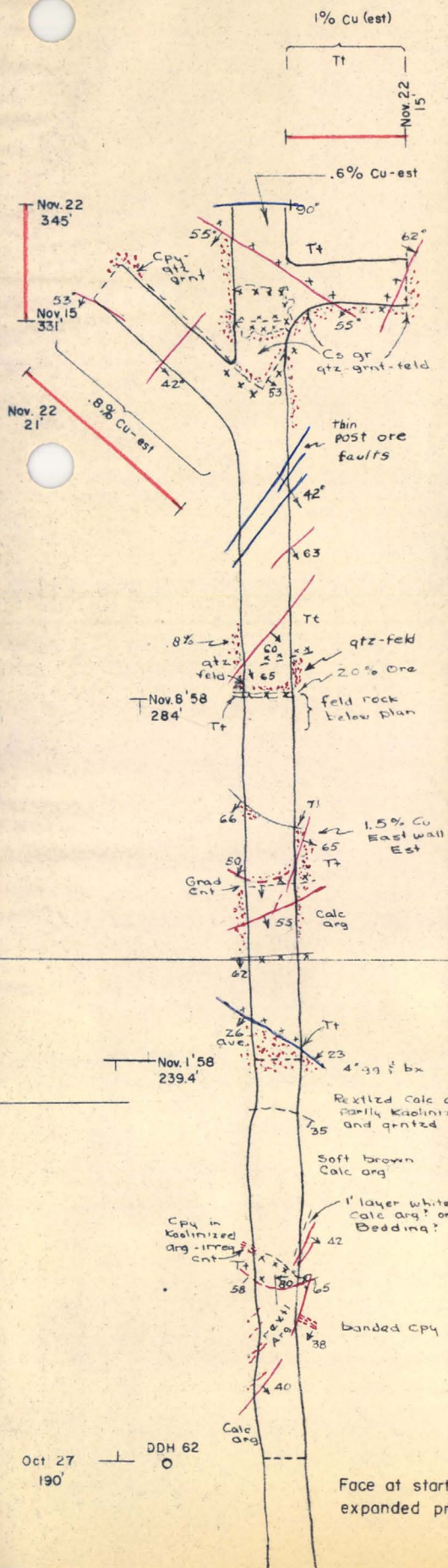
0.40	10	Tactite. Weak Cu in core recovered.
	80	Hornfels. Hard, fine-grained diop. hornfels. Cpy and py. Cu strong to 11.3, weak to moderate to 27.6. Fault 8.9 - 9.1'.
27.6		
	55	Tactite, with admixed diop. Some qtz. blebs. Sulphides py. - cpy., dissem. fine grains. Cu contact weak. Fault at 36.0'.
40.7		
	70	Hornfels, soft, white granular diop. Cpy. in generally small blebs. Cu contact weak, but local short intercepts heavy cpy.
67.3		

From	To	Assay Data % Cu (Core)
1	2	10.5
2	3	12.8
3	4	15.2
4	5	18.7
5	6	22.1
6	7	25.6
7	8	28.9
8	9	32.4
9	10	35.8
10	11	39.2
11	12	42.7
12	13	46.1
13	14	49.6
14	15	53.0
15	16	56.5
16	17	59.9
17	18	63.4
18	19	66.8
19	20	70.3
20	21	73.7
21	22	77.2
22	23	80.6
23	24	84.1
24	25	87.5
25	26	91.0
26	27	94.4
27	28	97.9
28	29	101.3
29	30	104.8
30	31	108.2
31	32	111.7
32	33	115.1
33	34	118.6
34	35	122.0
35	36	125.5
36	37	128.9
37	38	132.4
38	39	135.8
39	40	139.3
40	41	142.7
41	42	146.2
42	43	149.6
43	44	153.1
44	45	156.5
45	46	160.0
46	47	163.4
47	48	166.9
48	49	170.3
49	50	173.8
50	51	177.2
51	52	180.7
52	53	184.1
53	54	187.6
54	55	191.0
55	56	194.5
56	57	197.9
57	58	201.4
58	59	204.8
59	60	208.3
60	61	211.7
61	62	215.2
62	63	218.6
63	64	222.1
64	65	225.5
65	66	229.0
66	67	232.4
67	68	235.9
68	69	239.3
69	70	242.8
70	71	246.2
71	72	249.7
72	73	253.1
73	74	256.6
74	75	260.0
75	76	263.5
76	77	266.9
77	78	270.4
78	79	273.8
79	80	277.3
80	81	280.7
81	82	284.2
82	83	287.6
83	84	291.1
84	85	294.5
85	86	298.0
86	87	301.4
87	88	304.9
88	89	308.3
89	90	311.8
90	91	315.2
91	92	318.7
92	93	322.1
93	94	325.6
94	95	329.0
95	96	332.5
96	97	335.9
97	98	339.4
98	99	342.8
99	100	346.3

From	To	Assay Data % Cu (Core)
------	----	---------------------------

NONE AVAILABLE

John E. Kinnison
Nov. 22, 1958



766 300 E

Section 1400 W

Tt	3.0 % Cu Est
Qtz-grnt-feld	0.5 % Cu Est
Tt	0.4 % Cu Est

	.48
	.60
	1.96
Qtz-feld	3.20
	.59
	.64
Tt	.66
	1.66
	2.19
	3.03
Calc Arg	2.06
	.60

Tt	.58
	.97
feld'zd Arg	1.06
Alt calc arg	.50
	.30
Calc Arg	1.00
	1.86
Tt	1.45
	1.66
Calc Arg	1.31
	1.68
	.42
	.02

Section 4250 N

Portion of drift advanced, during week, Nov. 16-22, 1958

MISSION MINE
PRELIMINARY GEOLOGIC SKETCH
370 LEVEL - NORTH DRIFT
Scale 1" = 20'

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona
November 18, 1958

Mr. L. H. Hart
Chief Geologist
New York Office

MISSION GEOLOGIC REPORT
Underground Exploration
Week Nov. 9 - Nov. 15, 1958

Dear Sir:

Attached is copy of Mr. Kinnison's weekly geological progress report.

Yours very truly,

Original Signed By
K. Richard

KENYON RICHARD

Attachment
KR/ds
cc: DJPope - w/att.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona
November 18, 1958

MEMORANDUM FOR K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week Nov. 9-Nov. 15, 1958

During the subject week the North drift was advanced 47 feet. The attached preliminary geologic sketch, subject to revision, shows the salient features.

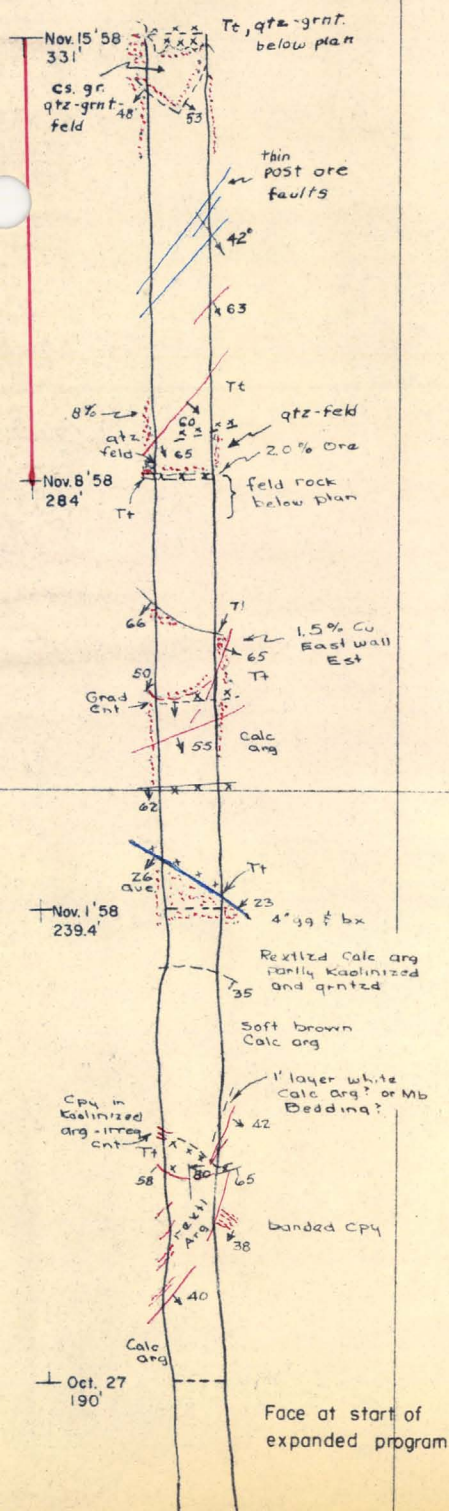
The quartz-feldspar rock with heavy chalcopyrite, which appeared in the face at the end of the previous week's advance, proved to be a pod, 5 feet thick, with irregular contacts. A coarse-grained quartz-garnet-feldspar rock with locally very heavy chalcopyrite has been penetrated for about 10 feet behind the present face (331'). The intervening rock was weakly mineralized (.2% Cu) tectite.

A zone of northeast post-ore faults dips 42 degrees southeast. This roughly parallels the other post ore faults penetrated in the South and East drifts.

Available assays are shown on the sketch plan.

JOHN E. KINNISON

JEK/ds
Attachment



Tt		
Qtz-grnt-feld	3.0 % Cu Est	
	0.5 % Cu Est	
Tt		
	0.4 % Cu Est	
Qtz-feld	0.4 % Cu Est	
	2.0 % Cu Est	
	0.2-0.3 % Cu Est	
Tt		
Calc Arg	0.8 % Cu Est	
Tt	<0.4 % Cu Est	
	.97	
feld'zd Arg	1.06	
Alt calc arg	.50	
	.30	
Calc Arg	1.00	
	1.86	
Tt	1.45	
	1.68	
Calc Arg	1.31	
	1.68	
	.42	
	.02	

TO ACCOMPANY Memo
DATED 11-18-58
BY J.E. Kinnison

362 900 N

Portion of drift advanced,
during week, Nov. 9 - Nov. 15 1958

MISSION MINE PRELIMINARY GEOLOGIC SKETCH

370 LEVEL - NORTH DRIFT

Scale 1" = 20'

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

November 13, 1958

Mr. L. H. Hart
Chief Geologist
New York Office

MISSION GEOLOGIC REPORT
Underground Exploration
Week Nov. 2 - Nov. 8, 1958

Dear Sir:

Attached is copy of Mr. Kimmison's weekly geological progress report.

Yours very truly,

Original Signed By
K. Richard

KENYON RICHARD

KR/ds
Attachment
cc: DJPope - w/att.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

November 12, 1958

MEMORANDUM FOR MR. K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week Nov. 2 - Nov. 8, 1958

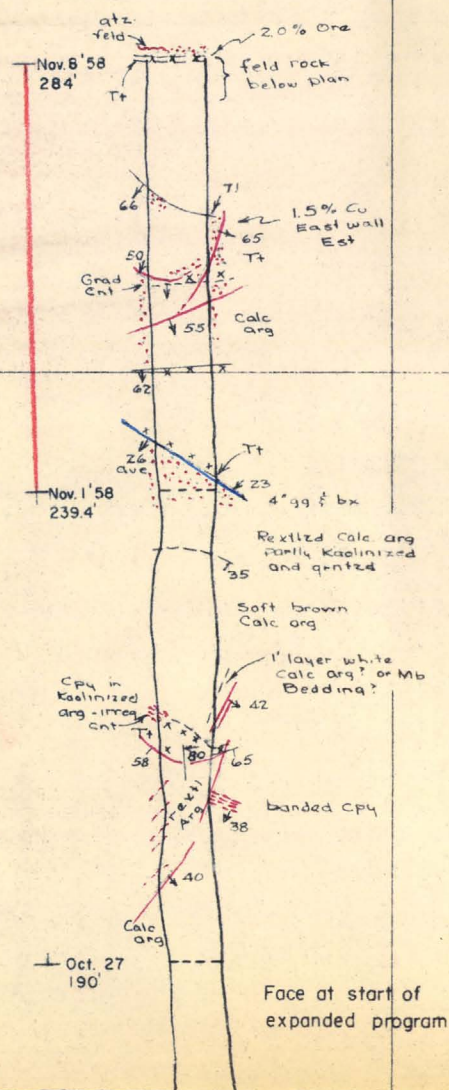
During the subject week the ^{North}~~East~~ drift was advanced 44.6 feet. The attached preliminary geologic sketch, subject to revision, shows the salient features. A recent transit survey showed that the bearings previously used need to be corrected by rotating $1\frac{3}{4}$ degrees counterclockwise. The sketch map now incorporates this correction.

The low angle thrust(?) fault (see last week's report) was penetrated and the rocks in the drift below this fault are tactite and calcareous argillite. About 15 feet of tactite and argillite carry disseminated ore, locally exceeding 1% Cu.

Available assays are shown on the sketch plan.

JOHN E. KINNISON

JEK/ds
Attachment



Tt	0.2-0.3 % Cu Est
Calc Arg	0.8 % Cu Est
Tt	<0.4 % Cu Est
feld'zd Arg	0.8 % Cu Est
Alt calc arg	<0.4 % Cu Est
Calc Arg	1.86
Tt	1.45
	1.66
Calc Arg	1.31
	1.68
	.42
	.02

362 900 N

Portion of drift advanced,
during week, Nov. 3 to 8, 1958

MISSION MINE
PRELIMINARY GEOLOGIC SKETCH
370 LEVEL - NORTH DRIFT

Scale 1" = 20'

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

November 3, 1958

MEMORANDUM FOR MR. K. E. RICHARD

MISSION GEOLOGIC REPORT
Underground Exploration
Week, Oct. 27-Nov. 1, 1958

During the subject week the expanded underground program was begun, and the north drift was advanced 50 feet. The attached preliminary geologic sketch, subject to revision, shows the salient features.

Ore-grade rock was penetrated in a recrystallized phase of the calcareous argillite, and concentrations of plus 0.4% Cu occur locally in tactite and calcareous argillite.

A 1-foot layer of white, very calcareous material (calcareous argillite or Mo), within typical calcareous argillite, strikes N 25° E, and may be a sedimentary bed.

In the present face is a 4" fault zone, striking N 57° W and dipping 15-23° SW, which may be the No. 2 thrust, but a more definite conclusion awaits further developments. As you know, I had speculatively designated a fault near the mouth of the north drift as the No. 2 thrust.

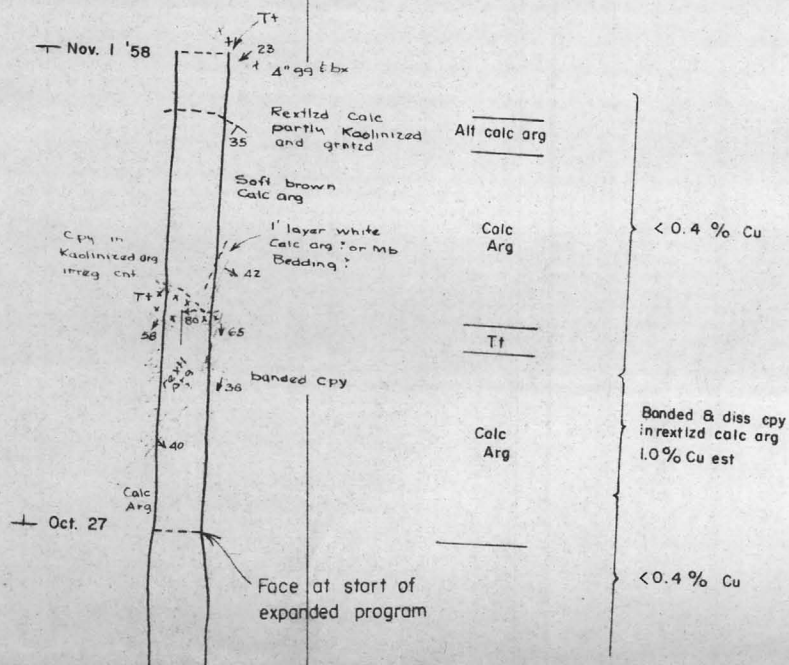
No assays are available.

JOHN E. KINNISON

JEK/as

766 300 E

362 900 N



Portion of drift advanced, during week, _____

MISSION MINE
PRELIMINARY GEOLOGIC SKETCH
370 LEVEL - NORTH DRIFT

Scale 1" = 20'

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

October 9, 1958

Mr. L. H. Hart
Chief Geologist
New York Office

EXPLORATION REPORT
Third Quarter 1958
Southwestern Department

Dear Sir:

San Xavier

Drilling was terminated on August 23 upon completion of Hole X-263. The last few shallow, close-spaced holes intersected mixed oxide-sulphide ore, demonstrating that this body has appreciable extent. It was not delimited to the northwest.

Mission

Detailed mapping was carried on in the underground Mission workings, and has pointed up the following principal geological conditions as having a bearing on mining and metallurgy:

- (1) Chalcopyrite occurs as disseminated grains and small blebs. Veinlets are particularly scarce -- even less in evidence than drill core studies had indicated.
- (2) The principal structures as interpreted from cores and plotted on 100-scale sections and plans are found in the workings (excepting the "A" fault), but the positions are somewhat at variance, particularly the No. "2" thrust.
- (3) Minor post-mineral slips and irregular, post-mineral breccia zones are prevalent in some areas. Overall, the rocks exposed are more friable than expected -- that is, they are easier to blast and to grind -- but they appear to be sufficiently competent to stand in pit banks without slumping.
- (4) Bedding is not recognized and, in this eastern area, it probably will not have the control of Cu

distribution that is expected in the western part of the ore body.

(5) In a number of cases ore-waste contacts are not clearly visible. This suggests that, in this eastern area, sorting during mining will be more difficult than was visualized in our ore reserve report of May 7, 1958. However, the modification of our dilution calculation method, which Mr. Schubel is using in his present calculation, should adequately take care of the matter. It is still expected that most of the ore-waste contacts in the western part of the ore body will be more clearly visible than those seen in present workings.

Other

Underground mapping and part of the surface mapping have been done at the Atlas Mine, northwest Silver Bell district. This Zn-Cu ore zone may extend into Company property.

Reconnaissance mapping in the southern ^{large} Santa Rita Mts. was completed and reported on. Despite the extent of disseminated sulphide mineralization, no exploration possibilities were recognized.

Reconnaissance mapping in the Globe-Superior region was continued. One zone of disseminated mineralization recently was found. This may have exploration possibilities and is being studied further.

Some reconnaissance work was done in the Sierrita Mts. Small Alteration zones were found here, but nothing of consequence has yet been noted.

A tellurium-bearing quartz-sulphide deposit in altered volcanics, Mogollon Mts., New Mexico, was sampled without encouraging results.

Personnel and Forecast

Blucher will continue his mapping in the Miami-Superior-Ray-San Manuel region. The field work in the Miami-Superior area is approaching completion and will be reported on before the field work is continued southerly. In order to gain experience, Fall will assist Blucher in the field.

Von Fay will make spot prospect and mine examinations as things come up requiring prompt attention. Otherwise, he

will continue the gossan and tactite mapping in the northwest Silver Bell District.

Kinnison will complete maps, sections and a report on the Mission shaft and workings. Thereafter, he may need to revise some of the 100-scale regular geological sections. As time permits he will continue his detailed mapping of the Pima District.

In addition to field work in connection with the foregoing activities, Courtright and I will continue the tellurium exploration program.

Yours very truly,

KENTON RICHARD

KR/ds

1500 W

DDH 62



Shaft

DDH 151

4050 N

35
Sta 370

1D
2D
3D
4D
5D
7D
8D
10D
12D
13D
15D
17D
19D
21D
23D
25D
27D

1500W East Drift

1500 W. South Crosscut

EAST PIMA PROJECT
SAMPLE MAP - 370 LEVEL

Scale 1" = 40'

July, 1958

P-
AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

July 22, 1958

Mr. L. H. Hart, Chief Geologist
American Smelting and Refining Company
120 Broadway
New York 5, New York

EAST PIMA
Underground Work

Dear Sir:

Mr. Richard is away from the office on a short vacation. In his absence, we have attempted to give you promptly, in a preliminary manner, the data which you requested in your letter to him dated July 18th.

You will recall that a minimum amount of work was estimated with the possibility that this might be expanded by additional lateral development. The former, with slight variation, should be completed during the first part of September. The expanded program may or may not be done.

The shaft was completed on June 19th, and after cutting a small station, the development of the laterals was begun. Work in the raises will be started as soon as the sites are reached via the headings.

Attached please find the following maps:

(1) The work planned, and work done through July 18th, shown on the original geological plan map of 2810 bench;

(2) A preliminary overlay sketch showing the main geological features encountered in the lateral work, (this can be readily compared with (1));

(3) An assay plot plan showing the locations of the bulk samples produced from the horizontal development.

Channel sampling is planned parallel with the geological mapping, although such has not yet been started purely for operational reasons.

Also attached is a memorandum prepared by Mr. Kinnison which is self-explanatory. As you know, Mr. Kinnison has done all the geological work in connection with the underground exploration.

Mr. L. H. Hart
East Pima Underground Work

-2-

July 22, 1958

Yesterday we wrote Mr. Pope relative to progress of the underground exploration sending you a copy of that letter. Assay results of bulk samples were included. If you will use the corresponding assay sheets you will have no difficulty in locating the various samples as numbered on the assay plot plan attached to this letter.

As further background, the pilot plant test work done so far (tactite) has shown the ore to be generally amenable to routine procedure.

Yours very truly,

ORIGINAL SIGNED BY

T. A. SNEDDEN

T. A. SNEDDEN

Encls.

ACH:S

cc: DJPope
KERichard

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

July 22, 1958

FILE MEMORANDUM

The attached overlay sketch map shows certain gross geologic features on the 370-foot shaft level (2830-foot elevation), and the geologic bench plan shows the completed and proposed level work.

To date no geologic mapping as such has been done, because it is not feasible until enough lateral work is completed to give "elbow room". Mapping will probably start next week and then be kept reasonably up to date, being worked into suitable times during the operations. Numerous fresh faces, however, have been examined, and the geologic features shown on the accompanying sketch result from such observations.

With careful mapping, obscure and presently unknown structural features may be found, but it now appears that, at least in this area, ore is not related to any specific type of structure. This suggests that remote feeder(s) effected pervasive sulphide dissemination. A few thin, mineralized stringers were noted in the shaft and on the level, but their persistence is unknown.

The tactite and diopside hornfels (a soft, fine-grained type) are of the same character seen in the drill cores, previously described in file memoranda (accompanying letters: Richard to Hart, 5/24/57; Richard to Weiss, 3/13/58). In the workings the best ore occurs in the hornfels, but from the drill cores we know that the reverse is also true.

In regard to Mr. Hart's coming visit, I should think that he would see the most geology near the completion of underground work. Certainly the trip should be delayed until the east drift has crossed the "A" and "East" faults. No timbering or lagging has yet been required on the level, and I expect that very little will be, so that the walls will remain clear.

JOHN E. KINNISON

JEK/ds

cc: DJPope

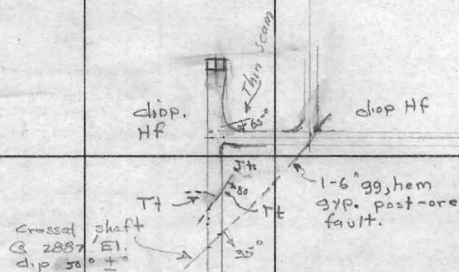
LHart

KRichard

Tt.
No struct.
evident.
Py spy spotty

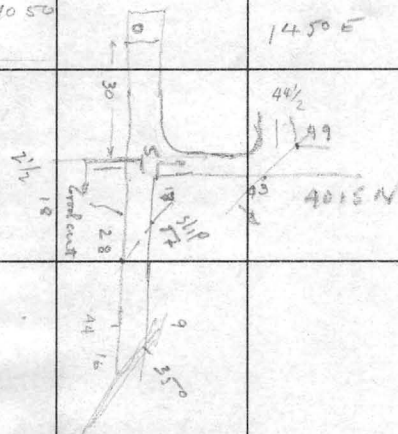


2887
2830
57



40 50

1450 E



DATE

SCALE

SURVEY

GEOLOGY BY

LEVEL

LOCATION

MINE