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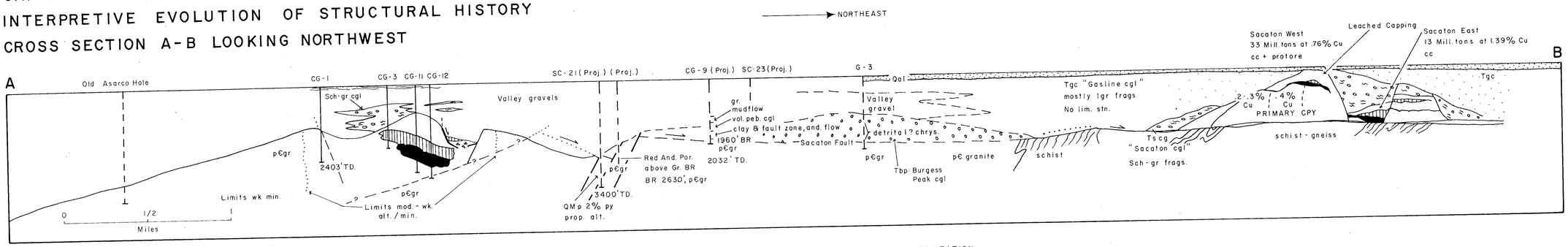
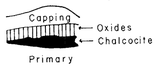
CAP 20-52

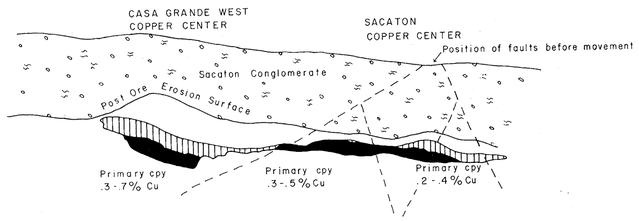
INTERPRETIVE EVOLUTION OF STRUCTURAL HISTORY

CROSS SECTION A-B LOOKING NORTHWEST

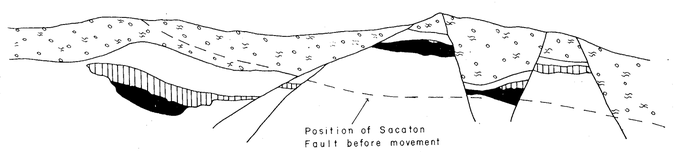


MINERALIZATION EXPLANATION

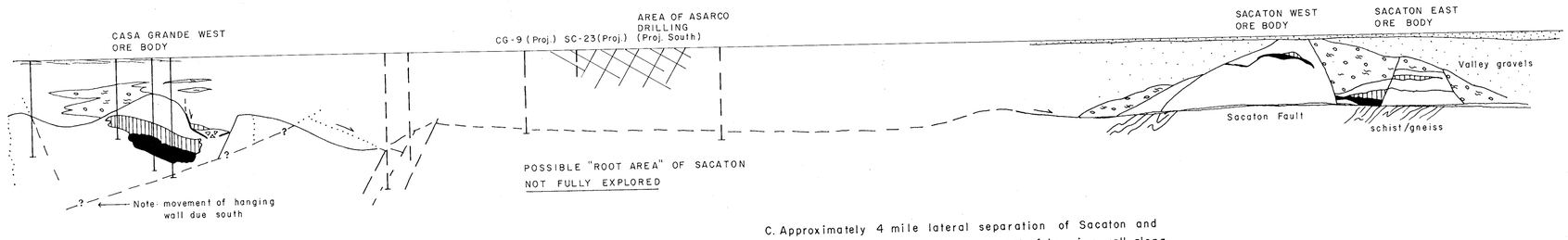




A. Formation of Chalcocite and Atacamite zones, followed by slight tilting (±20°) of Cc and Atacamite. Two principal copper centers in a long, narrow belt of mineralization and alteration. Covered by Sacaton granite-schist conglomerate.



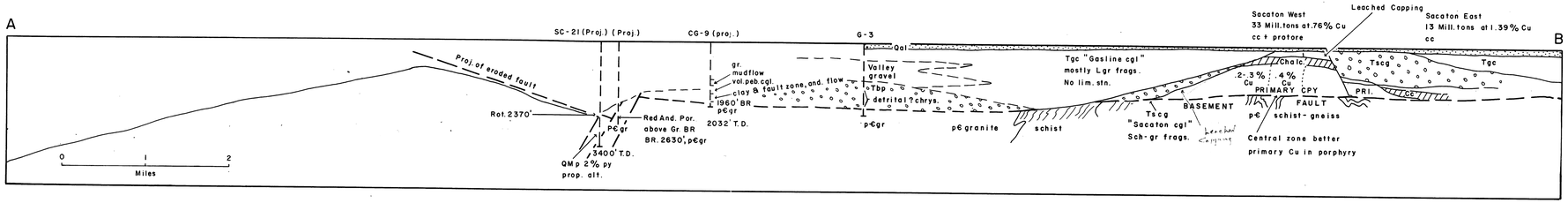
B. Vertical and lateral fault seperation of Casa Grande West copper center from Sacaton copper center, by medium-dipping normal faults; followed by erosional cycle.

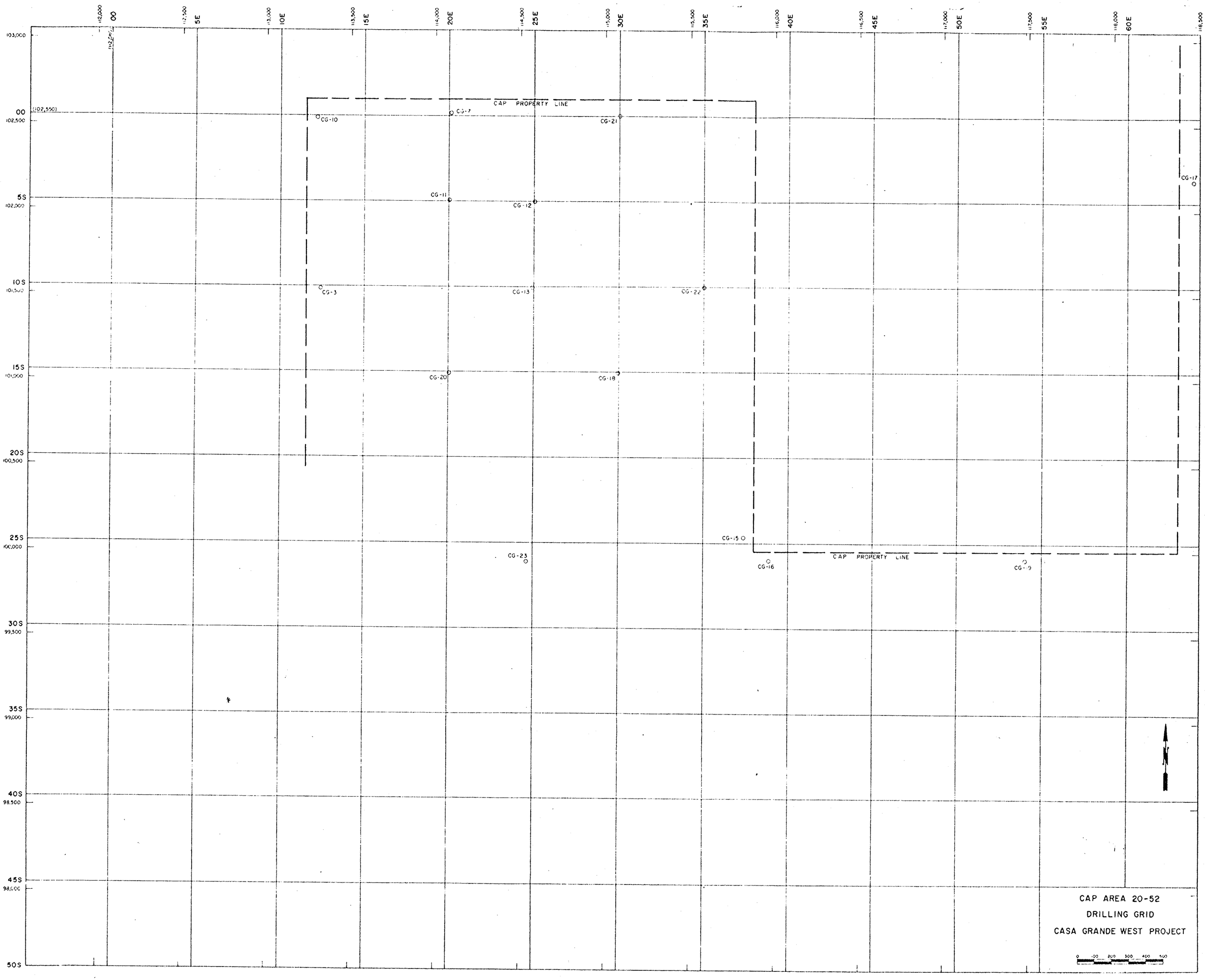


C. Approximately 4 mile lateral separation of Sacaton and and Casa Grande West by NE movement of hanging wall along the "flat" Sacaton Fault.

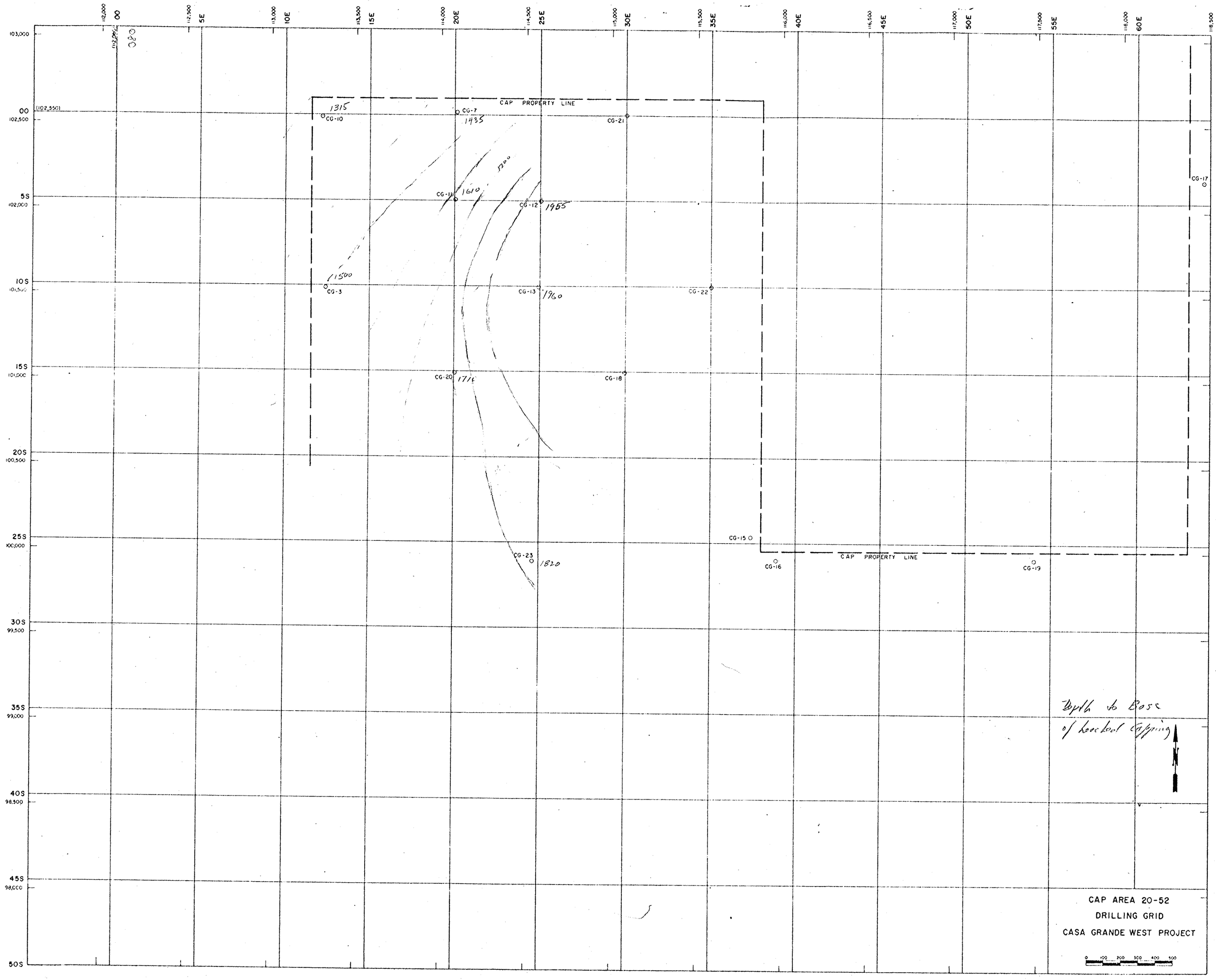
D. Postulated movement of Casa Grande West ore body, 1 mile south down-dip of 24° "Footwall Fault." (Kinnison memo 1/9/77)

E. High-angle faulting and deposition of basin fill gravels.

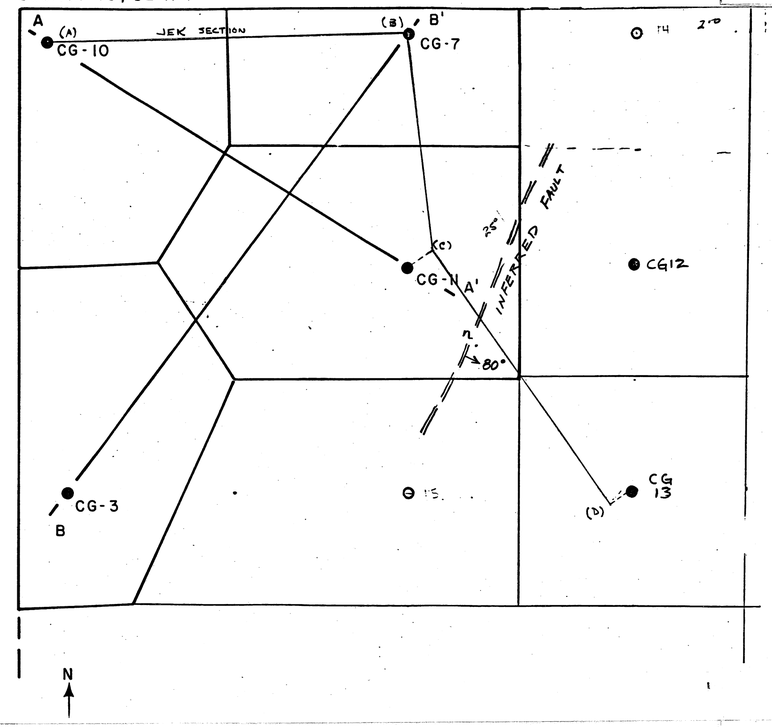

A
B
SC-21 (Proj.) (Proj.)
CG-9 (proj.)
G-3
Qal
Proj. of eroded fault
Rot. 2370'
P€gr
3400' T.D.
QMp 2% py
prop. alt.
Red And. Por.
above Gr. BR
BR. 2630', p€gr
gr.
mudflow
vol. peb. cgl.
clay & fault zone, and. flow
1960' BR
p€gr
2032' T.D.
Valley
gravel
Tbp
detrital ? chrys.
p€gr
p€ granite
schist
Tgc "Gasline cgl"
mostly Lgr frags.
No lim. stn.
Tscg
"Sacaton cgl"
Sch-gr frags.
BASEMENT
Sacaton West
33 Mill. tons at .76% Cu
cc + protore
Leached Capping
Sacaton East
13 Mill. tons at 1.39% Cu
cc
Chalc.
.2-.3% Cu
.4% Cu
PRIMARY CPY
FAULT
p€ schist-gneiss
Central zone better
primary Cu in porphyry
PRI.
Tscg
Tgc
cc
0
1
2
Miles

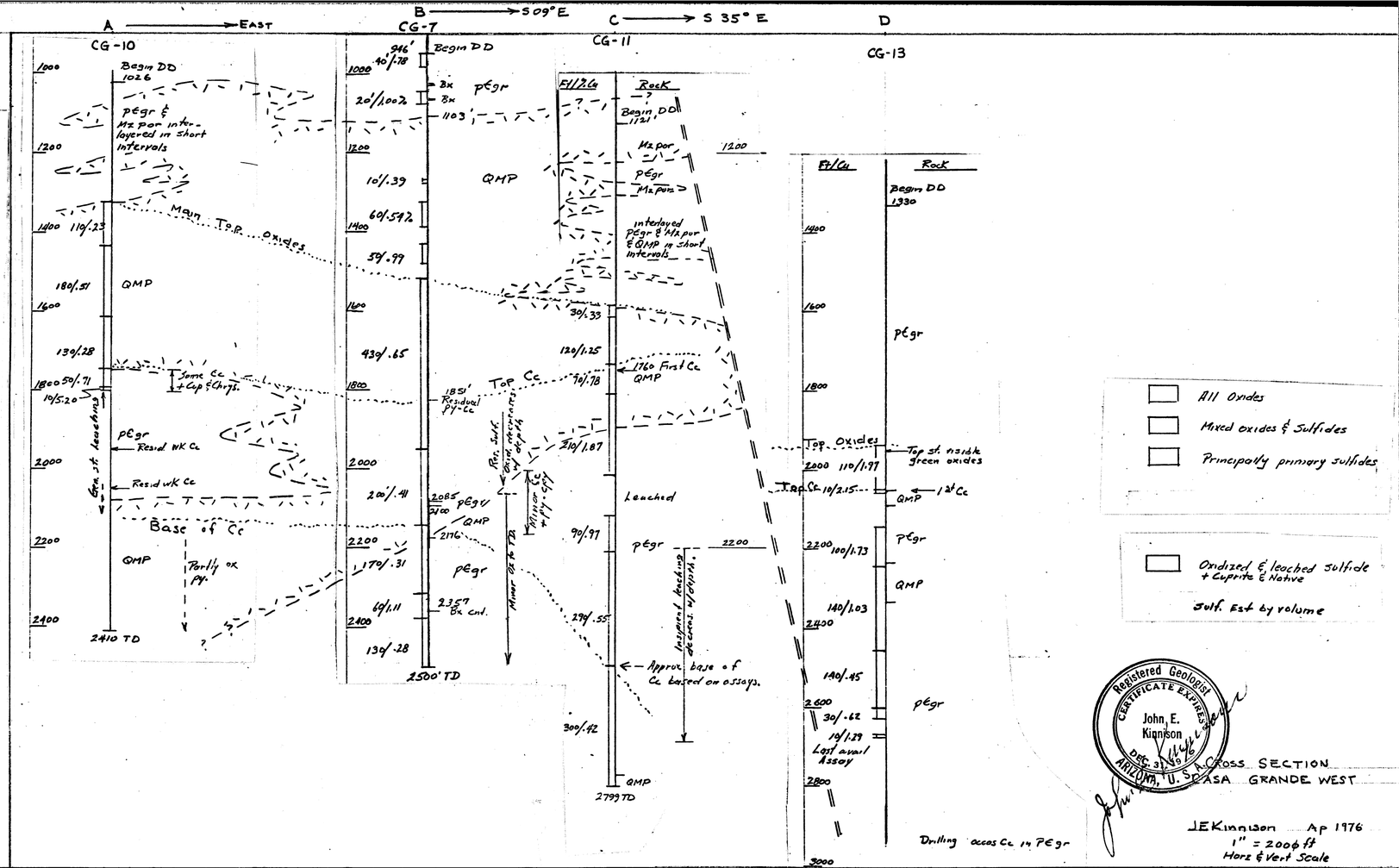


CAP AREA 20-52
DRILLING GRID
CASA GRANDE WEST PROJECT

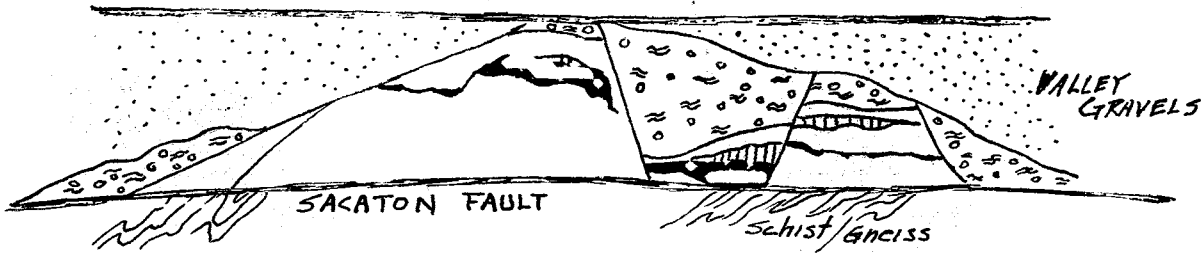

112,000
00
112,500
5E
113,000
10E
113,500
15E
114,000
20E
114,500
25E
115,000
30E
115,500
35E
116,000
40E
116,500
45E
117,000
50E
117,500
55E
118,000
60E
118,500
103,000
00
(102,550)
102,500
5S
102,000
10S
101,500
15S
101,000
20S
100,500
25S
100,000
30S
99,500
35S
99,000
40S
98,500
45S
98,000
50S
CAP PROPERTY LINE
CG-10
1315
CG-7
1435
CG-21
CG-11
1610
1200
CG-12
1955
CG-17
CG-3
1500
CG-13
1960
CG-22
CG-20
1710
CG-18
CG-15
CG-23
1820
CG-16
CG-19
CAP PROPERTY LINE
Depth to Base
of bedrock capping
N
CAP AREA 20-52
DRILLING GRID
CASA GRANDE WEST PROJECT
0 100 200 300 400 500

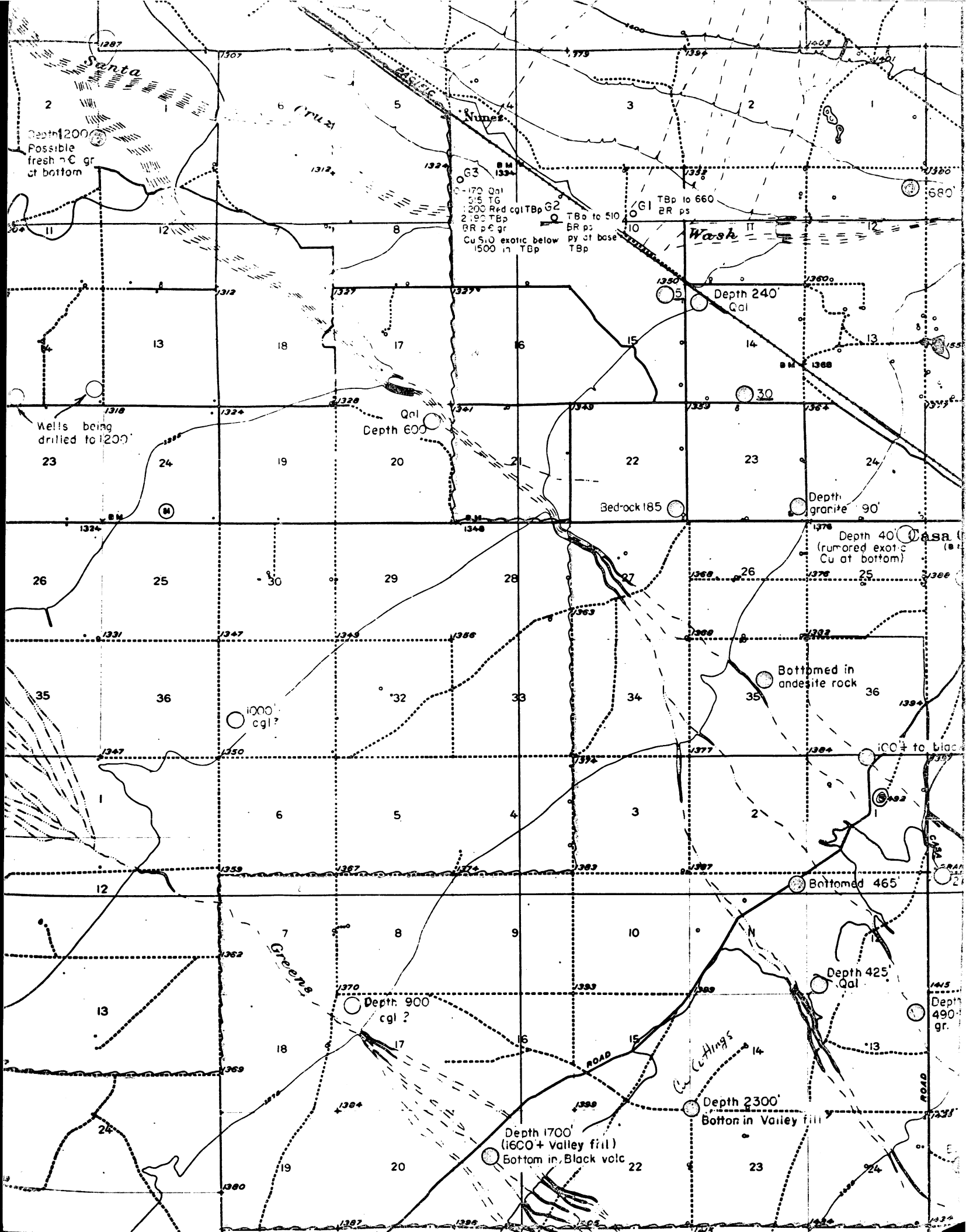
Section 13, SE 1/4



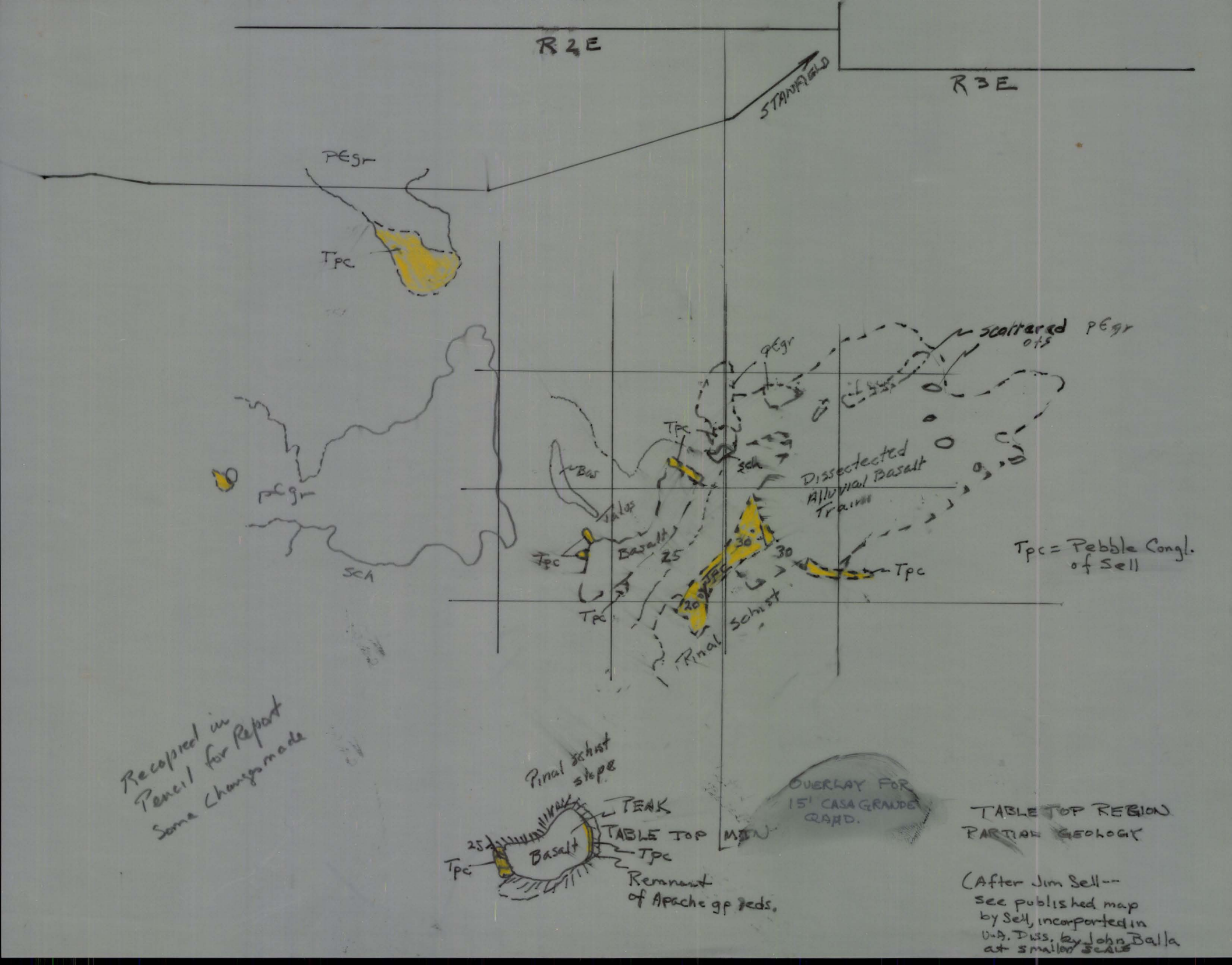


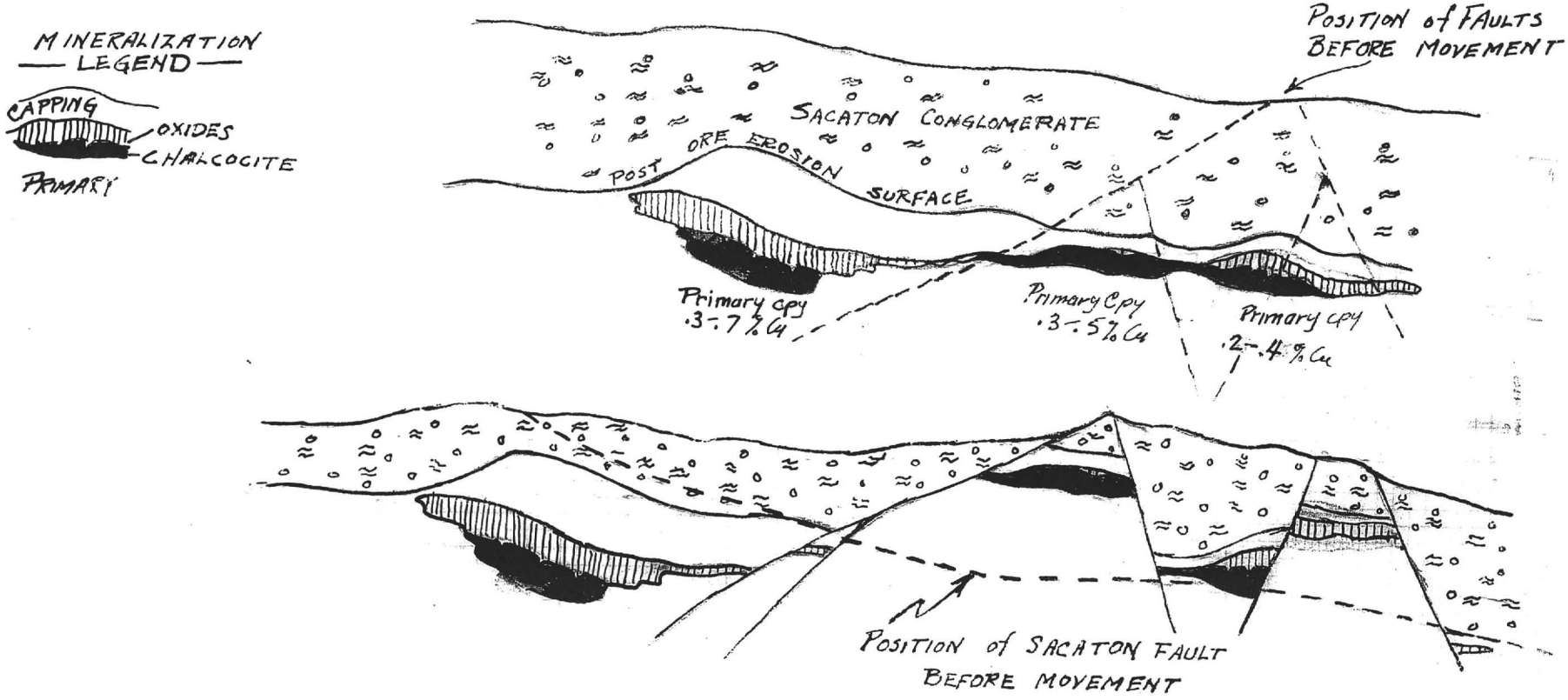
Scanned
7/21/11


VALLEY GRAVELS
SACATON FAULT
Schist/Gneiss



Santa
Cruz
Nunez
Depth 1200
Possible fresh p€ gr at bottom
G3
0-170 Qal
515 TG
1200 Red cgl TBp
2190 TBp
BR p€ gr
Cu SiO exotic below 1500 in TBp
G2
TBp to 510
BR ps
py at base TBp
G1
TBp to 660
BR ps
Wash
680'
Depth 240'
Qal
Wells being drilled to 1200'
Qal
Depth 600
Bedrock 185
Depth granite 90'
Depth 40'
(rumored exotic Cu at bottom)
Casa
Bottomed in andesite rock
1000' cgl?
100'+ to blac
Bottomed 465'
Greens
Depth 900
cgl ?
Depth 425'
Qal
Depth 490'
gr.
Cu Cuttings
ROAD
Depth 2300'
Bottom in Valley fill
Depth 1700'
(1600'+ Valley fill)
Bottom in Black volc


R2E
R3E
STANFIELD
PЄgr
Tpc
pЄgr
Sch
Bas
Talus
Basalt
25
30
30
20
Tpc
Tpc
Tpc
Tpc
Sch
Dissectected Alluvial Basalt Train
Scattered pЄgr ofs
Pinal Schist
Tpc = Pebble Congl. of Sell
Recopied in Pencil for Report Some Changes made
Pinal schist slope
PEAK
TABLE TOP MTN
25
Basalt
Tpc
Tpc
Remnant of Apache gp beds.
OVERLAY FOR 15' CASA GRANDE QUAD.
TABLE TOP REGION PARTIAL GEOLOGY
(After Jim Sell-- see published map by Sell, incorporated in U.A. Diss. by John Balla at smaller scale


MINERALIZATION
LEGEND
CAPPING
OXIDES
CHALCOCITE
PRIMARY
POSITION of FAULTS
BEFORE MOVEMENT
SACATON CONGLOMERATE
POST ORE EROSION SURFACE
Primary cpy
.3-.7% Cu
Primary Cpy
.3-.5% Cu
Primary cpy
.2-.4% Cu
POSITION of SACATON FAULT
BEFORE MOVEMENT

JEK copy

Mining Geologist
Registered: Arizona
California

JOHN E. KINNISON
5450 N. Bowes Rd.
Tucson Arizona
85715

(602)749-3453

January 9, 1977

Memo to: J. D. Lowell

From: John E. Kinnison

Subject: Casa Grande west, Deep Footwall Fault

A strong shear zone was penetrated in CG-12, from about 2970-2990 feet. A Mafic dike or sill about 2 ft thick bottomed this zone, and Precambrian granite--essentially unaltered and barren--was penetrated from this point to the total depth of the hole. This shear zone was recognized at the time as an obviously important post-ore structure, but its strike, dip, and displacement were unknown factors. It still has not been intersected by any other drill hole.

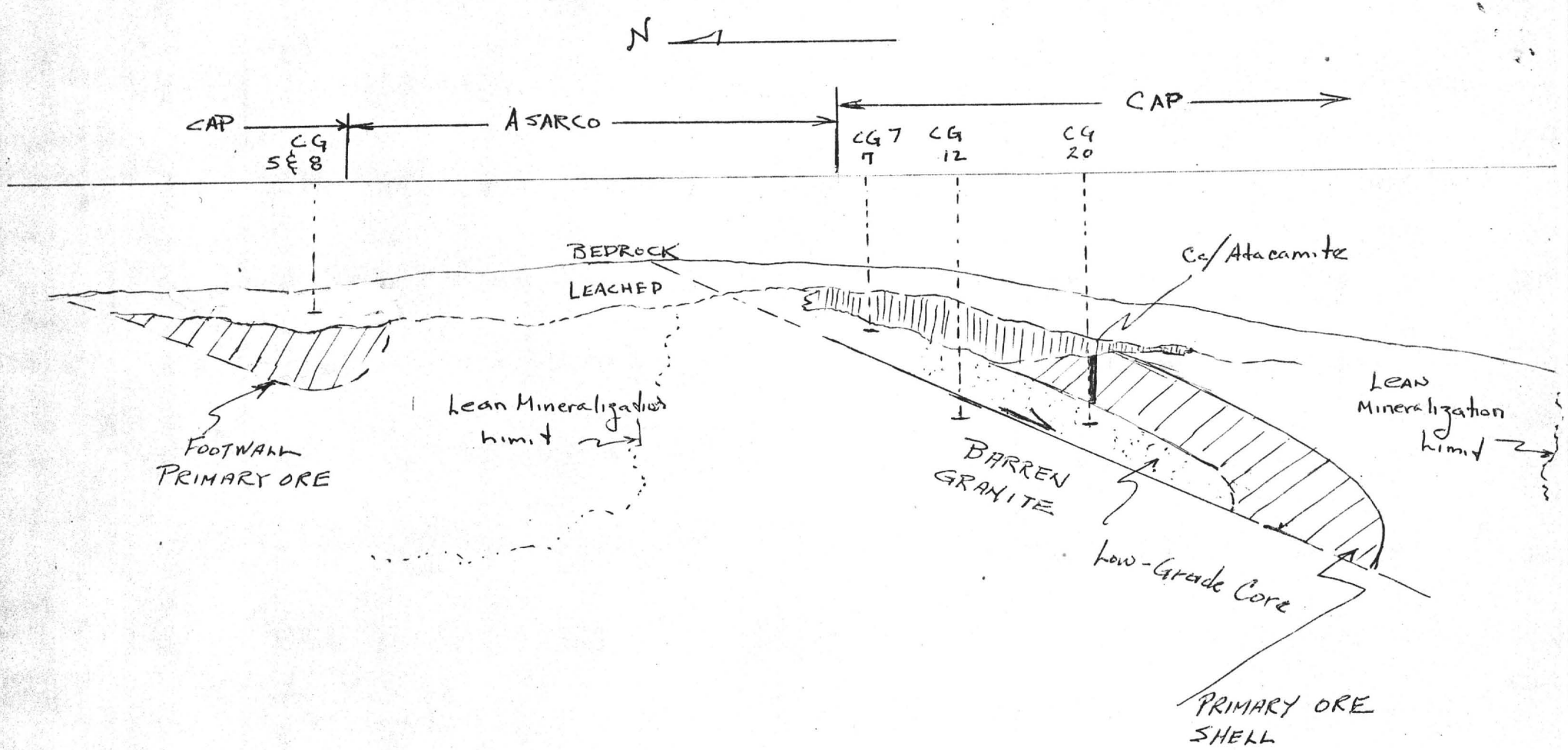
However, sufficient deep drill holes now exist to determine-- within close limits--the approximate strike and dip of this fault. It must strike about due east, or a few degrees north of east, and it must dip south or slightly southeast about 24° (give or take perhaps 2°). I have plotted it on several trial sections, and it seems to make a good "fit" (geometrically) to be missed by all holes except for the CG-12 penetration. This fault could limit potential primary ore in depth, south and southeast of holes CG 20 and 16, although the depth to the fault will be considerable (more than 4000 ft) in this area. It has a clearly important bearing on the depth to which we may be able to develop a primary sulfide orebody, because it appears to be a post-ore footwall to the entire zone of mineralization.

Moreover, there is an exploration consideration, beyond the continued development of the existing ore deposit. Should the primary ore zone represent part of a steeply tilted (say,70 to 80 degrees), southeasterly plunging, cylindrical or oval "ore shell" -- as Clark Arnold has suggested -- it may be truncated by the fault. If the movement of the hanging wall was south, down the dip, this does not necessarily imply that the footwall component will exist on Asarco land to the north; rather, their holes should at a relatively shallow depth penetrate the barren granite footwall, or marginal mineralization south of the footwall " ore shell".

The mineralization on CAP land found in holes 5 and 8 is poorly understood at this time, and has never been fully prospected; it could represent some portion of the footwall zone, and in this light deserves additional drilling in the hope that footwall primary ore might be found.

The attached sketch illustrates this concept in its simplest form. There are probably unknown structures on the intervening Asarco land which would make the actual geometry more complex.

cc: L. C. Arnold

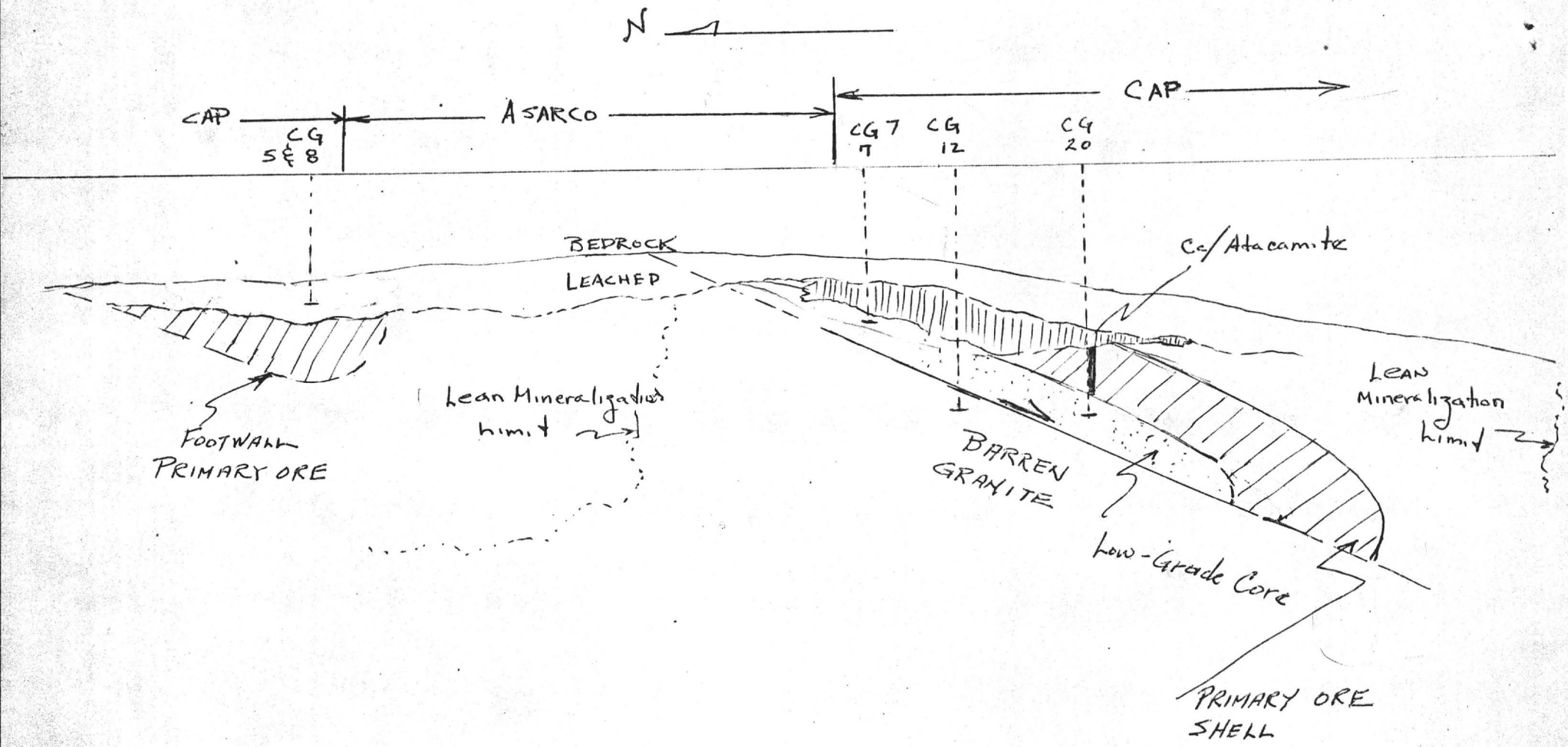


NOT TO SCALE

DIAGRAMMATIC SECTION
Looking East

Showing Possible Influence of "Footwall Fault"/CG-12

JEK / 1/9/77



NOT TO SCALE

DIAGRAMMATIC SECTION
Looking East

Showing Possible Influence of "Footwall Fault"/CG-12

JEK / 1/9/77

Well
CG-14 Barren
Pegr
CG 9
1000
1000
1500
24°
2000
2500
3000
Approximated sub outcrop
of "Footwall Fault".

Summary Sheet

0.5% Cu Cutoff. NO INTERVAL < 50' @ 0.5%

NO INTERVAL < 150'.

Hole	Tons Ox	Cu	Mo	Tons Su.	Cu	Mo
CG-3	6,778,444	0.61	—	—		
CG-7	8,633,920	0.65	0.007	7,554,680	0.61	0.012
CG-10	3,314,094	0.53	.004	—	—	—
CG-11	10,490,010	1.45	0.012	17,982,874	0.89	0.014
CG-12	4,204,918	1.60	.018	5,498,738	0.52	0.017
CG-13	7,160386	1.24	.023	26,380,368	.81	.023
CG-16	23,586,536	1.58	.012	33,021,158	1.15	.024
CG-18	17,087,804	0.96	.006	—	—	—
CG-20	14,458,628	1.25	.016	50,605,201	.64	.004
CG-23	9,535,656	2.73 ↗?		—	—	—
TOT	105,250,401	1.33	.012	141,043,019	.82	0.014
Tot. Ox + Su.	246,293,420 (246,293,000)	1.04%	.013%			
LBS Cu	5.12×10^9			45% sul	55% ox	(LBS Cu)

45-625 EYE-EASE
45-725 20/20 BUFF
Made in U.S.A.

0.5% Cu Cutoff
NO INTERVAL < 50' @ 0.5
NO INTERVAL < 150'

✓ checked by LCA.

Hole No.	Interval	Length Oxide	Length Sul	Copper %	Mo %	Polygon Area	Tonnage Factor	Tonnage
CG-3	1520-1690	170	—	.61 ✓	NIL ✓	498,415 ✓	12.5	6,778,4
Total		170	—	.613	.00126			
CG-7	1435-1835	400	—	.65 ✓	.007 ✓	269,810 ✓		8,633,9
	1835-2035	—	200	.55 ✓	.011 ✓			4,316,96
	2255-2405	—	150	.68 ✓	.014 ✓			3,237,72
Total		400	350					
CG-10	1455-1615	160	—	.53 ✓	.004 ✓	258,914 ✓		3,314,09
	2095-2245	—	BELOW C.O. 150	.308 X	NIL ✓			—
Total		160	—					
CG-11						468,304 ✓		
	1610-1760	150 ✓	—	1.04 ✓	.00955			5,619,64
	1760-1890	—	130 ✓	1.51 ✓	.019 ✓			4,870,36
	1890-2020	130	— ✓	1.92 ✓	.015 ✓			4,870,36
	2110-2460	—	350 ✓	.66 ✓	.012 ✓			13,112,51
	2560-2760	—	~~200~~ C.O.	.47 ✓	.005 ✓			—
Total		280	480					
CG-12	1955-2085	130	—	1.60 ✓	.018 ✓	404,319 ✓		4,204,918
	2085-2255	—	170	.52 ✓	.017 ✓			5498738
Total		130	170					
CG-13	1940-2140	190	—	1.24 ✓	.023 ✓	471,078 ✓	(4550/500 = .91 2140-2640)	7,160,380
	2140-2840	—	700	.81 ✓	.023 ✓			26,380,3
Total		190	700					
CG-16	2410-2560	150	—	1.87 ✓	.017 ✓	951,070 ✓		11,412,84
	2770-2930	160	—	1.30 ✓	.008 ✓			12,173,696
	2930-3364	—	434	1.15 ✓	.024 ✓			33,021,15
Total		310	434					
CG-18	1980-2210	230	—	0.96 ✓	.006 ✓	928,685 ✓		17,087,80
Total		230						
CG-20	1650-1870	220	—	1.25 ✓	.016 ✓	821,513 ✓		14,458,62
	1970-2740	—	770	.64 ✓	.0042 ✓			50,605,2
	2740-	—						
Total		220	770					

DATE		AMOUNT	
9-15	1976	732	87
Sept	Sept	164	00
		896	87

C. L. FAIR & ASSOCIATES
CONSULTING GEOLOGISTS
2120 NORTH DRACHICA, SUITE 9
TUCSON, ARIZONA 85745
PHONE (602) 882-5701

165
9-15
19 76
1123

PAY TO THE ORDER OF John E. Kimmison $732.87

Seven Hundred Thirty Two and 87/100 DOLLARS

STONE & SPEEDWAY OFFICE/TUCSON
FIRST NATIONAL BANK OF ARIZONA

Charles L. Fair
Jennie M. Fair

⑆122400018⑆ 185⑈167244⑈

DATE		FIRST NATIONAL BANK OF ARIZONA	SAVINGS DEPOSIT	DOLLARS	CENTS
9/16/76			CURRENCY	90	00
ACCOUNT NUMBER 2023-16400			COIN		
NAME John E. Kimmison	PLEASE LIST EACH CHECK PROPERLY ENDORSED SEPARATELY BY BANK NUMBER		CHECKS		
NAME Sept Acc. Savings (Tax Fund)					
ADDRESS 5450 N. Bowes Rd					
SAVINGS DEPOSITS AND WITHDRAWALS ARE SUBJECT TO THE CURRENT RULES AND REGULATIONS GOVERNING DEPOSIT ACCOUNTS AND SAFEKEEPING SERVICES. A COPY OF WHICH IS AVAILABLE UPON REQUEST. S-150 Rev. 2-75	PLEASE INITIAL		TOTAL		
			LESS CASH RECEIVED		
			NET DEPOSIT	90	00

⑈5555⑈1600⑈

$ for State Tax fund

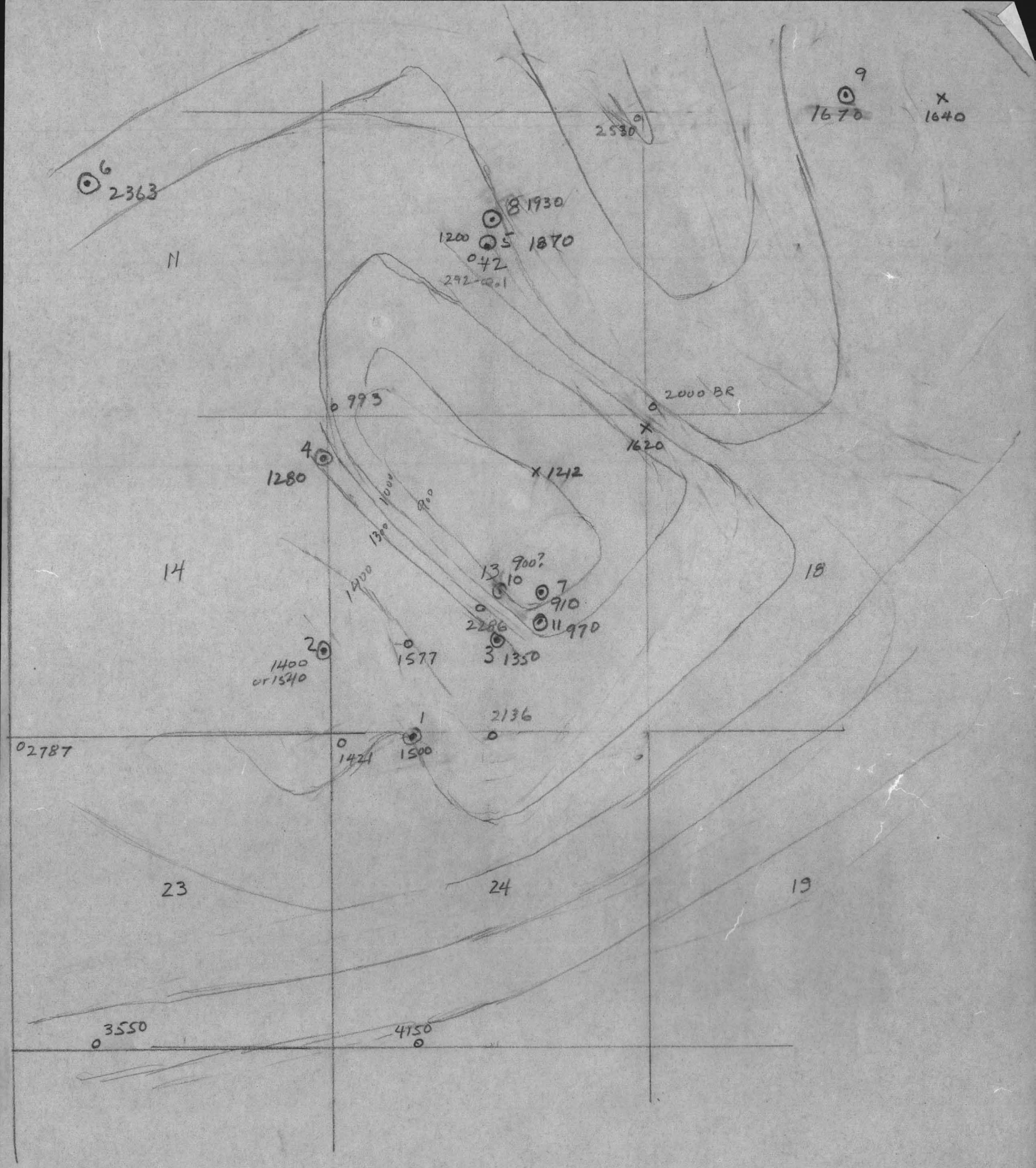
DATE		FIRST NATIONAL BANK OF ARIZONA	SAVINGS DEPOSIT	DOLLARS	CENTS
9/16/76			CURRENCY		
ACCOUNT NUMBER 2025-11553			COIN		
NAME John E. Kimmison	PLEASE LIST EACH CHECK PROPERLY ENDORSED SEPARATELY BY BANK NUMBER		CHECKS	732	87
NAME					
ADDRESS 5450 N. Bowes Rd					
SAVINGS DEPOSITS AND WITHDRAWALS ARE SUBJECT TO THE CURRENT RULES AND REGULATIONS GOVERNING DEPOSIT ACCOUNTS AND SAFEKEEPING SERVICES. A COPY OF WHICH IS AVAILABLE UPON REQUEST. S-150 Rev. 2-75	PLEASE INITIAL		TOTAL	732	87
			LESS CASH RECEIVED	154	00
			NET DEPOSIT	578	87

Regular Savings

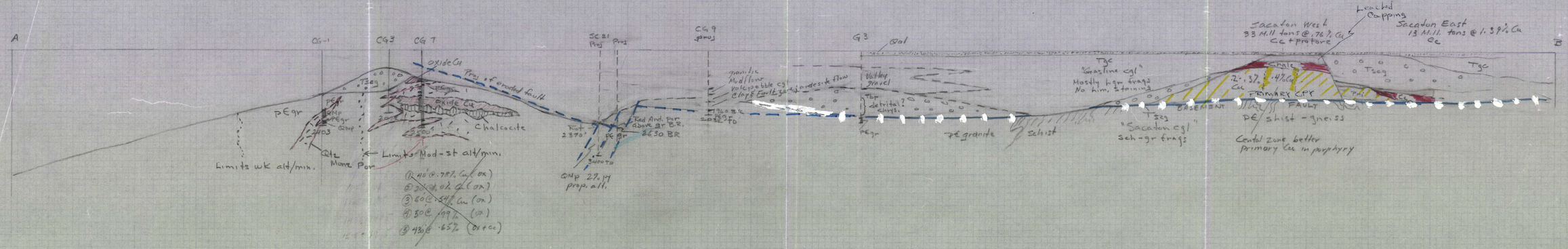
⑈5555⑈1600⑈

$ 64 to reimburse expense fund in JEK Spl Acc

732.87
90
64
164
164.00
578.87 to Reg Ck Acc



9
1670
1640
2530
6
2363
8 1930
1200
5 1870
42
292-Q.1
N
993
2000 BR
1620
4
1280
1212
1000
900
1300
14
1400
13 900?
10
7
910
2286
11 970
18
2
1400
or 1540
1577
3 1350
1
2136
2787
1421
1500
23
24
19
3550
4150


A
B
CG-1
CG3
CG 7
SC 21 Proj
Proj
CG 9 proj
G3
Qal
Leached Capping
Sacaton West
33 Mill tons @ .76% Cu
Cc + protore
Sacaton East
13 Mill. tons @ 1.39% Cu
Cc
Oxide Cu
Proj of eroded fault
Oxide Cu
Chalcocite
Limits wk alt/min.
Limits Mod-st alt/min.
Qtz
Mone Por
Rot 2370'
Red And. por above gr B.R. 2630 BR
QMp 2% py prop. alt.
granitic Mudflow
volcpebble cg
Clay Fault
Valley gravel
Tbp detrital? chrys.
Tgc
"Gasline cgl"
Mostly hgr frags
No him, staining
Tseg
"Sacaton cgl"
sch-gr frags
BASEMENT
FAULT
PRIMARY CPY
Cu
Chalc
Tseg
Tgc
PE shist - gneiss
Cental zone better primary Cu in porphyry
PE granite
schist
① 40' @ .78% Cu (ox)
② 20' @ 1.0% Cu (ox)
③ 60' @ .54% Cu (ox)
④ 30' @ .99% (ox)
⑤ 430' @ .65% (ox + cc)

CG 20 7/25

Clay cgl ~~BR to~~ 1100 ± (Rotary) —
1100-1240 Clean Cetz feld. Prob. arkosic cgl with little clay. possibly gr.
Began Core 1420

1533 - 1585 PE gr. Generally bleached white with supergene clay. Locally stained red with diffuse red hem (hem) and transp frac of orange hm. Consid. indig hhm as grain and med thick veinlets. - 1/16".
Total former sulf 3-4% - prob 1½% Cu as Cc.

7/26 1656 - 1770 PE gr - Transp hm - prob pyritic zone 1½% Sulf. Cu ox showing 1678. —

7/25 —

CG - 21 Cased and dia. D just moved on —

GG - 22 ~~Cased to 1575 waiting DD~~ Drilling 1400' in gravel

CG - 23 Site prepared.

3312 - 41 PEgr. Potassic alt, - some very good marrow replacement strgs of Pink Kspar. Cpy in little wavy strgs and some diss. 1½ total Sulf. 3:1 cpy-py CG-16

3350 to 3364 TD Poor Recovery. Lost hole. Similar rock - very broken Min looks poor - but recov so bad cannot be sure

2100-2107 PEgr. Almost porphyry texture. Pink groundmass. Atacamite CG-18

2146-2166 spot check st supergene clay, and atacamite. similar to D. 12 & 13, but clay not as well developed.

@ about 2176 begins 12' grad zone into leached Lhm capping.

2190-2200 PEgr. st alt, clay, with 4-5% orig sulfides lim is ½ after Py and ½ Lhm. Orig Cc zone ± 1% Cu.

-2215 Same

CG 14

1973 – Fresh (weathered) pt gr.

CG 18

Mon. lithologic? Breccia

1767 – 1829 – Bx of st alt frags gr, with smeared out LLm. Hair line fract do not cross matrix of Fe-soaked small frags.

Sedimentary

1829 – 1830 Sandstone. Dip about 30°. granitic origin – mostly arkose.

1830 – 1833 Coarse granitic sand grading down into granules and small cobble-size frag.

1833 – gr. Tr cu stain. Some Bx zones BR? or mor Bx.

1837 – 40 Granitic arkose – pebbly w/ veins exotic chrys

1840 – 42 granite cobbles & pebbles show LLm
Red arkose. some exotic ~~[illegible]~~ chrys veins

1842 – 1910 Pebblestone – rounded and frags – soft soapy matrix – chloritic alt – – plus exotic chrys
local frags of gr up to 3', w/ good LLm.

1910 – 1925 alt andesite porphyry. reddish to olive

1925 – 1930 Pebblestone

1930 – 1935 Andesite porph (over)

CG '16

- 2113 Sediments

- 2350 Talcy Gg & Frgs of gr., Bx

- 2380 Broken Bx PSgr - No sign sulfide - or < 1/2 %

- 2550 Pickup Atacamite in alt sh gr and biot qtz Mong. st alt. No diag eval of sulf.
intrusive cut w/ gr at 2541.

→ Granite Bx w/ increasing sign of sulphide
2680 - 1 1/2 hm/py. Ser.
2800 - 2 - 2 1/2 % hm/py - ~~poss and~~ poss semi and brown hm.
2860 - 2 1/2 % hm/sulf - Maroon frg and white clay.
- possibly after Cu sulf. st atacamite and poss. cuprite.
3002 - gr. remnants Cc in fine gr and steady ~~filaments~~ gr. on fractures. - frowing brown non-typical and hm.
Some good vents of ~~vel~~ velvet brown and hm.

3143 - 3185. Gr. st clay with good Cc
Cu + 1 %

7/9

CG 19

2033 - 2168 Pebby sandstone & gr. cgl.

—

@ 2705 ~~Gravel~~ cgl - pretty well consol. (higher in hole sand layers 7/25
are 25° dip.) Frags ±2" to 1 ft - mostly p Egr.
Occasional other ig lith - fine gr.

- 2796 ~~Gravel~~ cgl as above

Fringe CG-1

0 - 150	Gravel (gr + vol)	25 ppm Cu
150 - 1190	Clayey gravel. arkosic	30 $\xrightarrow{\text{grad inc}}$ 120 ppm Cu
1190 - 1490	" " - yellow clay	440 - 1350 ppm Cu
Prob. B.R. @ 1490 1490 - 1800	Arkose - gr derived. Pink to orange - BR(?) some alt chips. Sparse-Mod chrys.	± 1200 ppm Cu Max 4200 @ upper cnt
1800 - 1970	Granite - wk alt - some hm/py & ± 1% py to 1860, leached below,	± 950 ppm Cu to 1860 ± 1500 ppm to 1970
1970 - 2160	QM, gray. chl'tic	± 1000 ppm Cu
2160 - 2403 TD	Alternating gr + QM.	± 800 ppm Cu

Cuttings higher in Cu than spot cores, which run 40-820 ppm Cu ↑ upper section in Cc.
Cc (1800-1860) films on py + sparse chrys.

L.C.A. suggest cuttings "contaminated".
(by lag in mud system?)

Chip sample scan

1. Arkose interval - red Fe stains on chips. brown clay. Prob a cgl - many sand grains. ~~No - uphole contamination~~
2. QM is prob the biot. porphy.
3. I see some sand-gr contaminin even last sample.
4. Drilling rate increases sharply about 1770 - BR? cnt, although soft zone 1640 - 1770 may be weathered gr capping (just less weathering.)
   This zone - 1640-1770 - decided drop in clay and larger rounder sand grains -- chips all gr of one even texture

~~Questions - what rig & pump? - where drilling rate from?~~ oracle gr. core.

Check spot cores for alt min and rock type and Rotary Sample boxes

Fringe

CG-2

0 - 150 clayey gravel

150 - 320 clay

320 - 1240 clayey gravel

1240 - 1350 Arkose " - anomalous Cu - 540 ppm

1350 - 1400 Gravel (dark diorite) 1st chrys.

Prob B.R. weathered.

1400 - 1540 Pinkish gravel. - sp chrys 1470-1480 1300 ppm Cu as chrys increases.

— Drilling rate increases —

1540 - 2175 Granite. Below 1600 - 1% diss py.

1000 ppm Cu near BR contact, in gr.

general range 100 - 200 ppm in gr. BR..

Notes on cuttings —

1350 - 1400 — looks like dior. BR + cgl contamination

but! 1400 - 1720 " " " granite sand or arkose.

BR picked on Drilg rate @ 1540, OK — but LCA pick of 1400 OK in view of weathered gran. w/ chrys.

1720 - 1760 Diorite frags.

1760 - 2175 TD - Gr: slight "dribbling sand".

oracle gr core

[check spot cores for alt/min

pretty fair fringe hole

C.G. 3

0 - 120 clay.

120 - 270 Clayey gravel - minor vol.

270 - 610 Gravel w/ minor sch. Med hard.

610 - 1340 gr-sch cgl. Hard, well indurated. Sacatons cgl

Core @ 1264 - specimen - sch cgl. as pebbles.

B.R. 1340 - 2004. Granite. pЄ oracle. Narrow ~~at~~ andesite porph.

First py @ 1820

Spot cores & samples 1340 - 1686 - Cu stained feldspars. - plus ±2% py casts & some hhm. at 1685' core

Cc in core @ 1920 ±.2% Cu

oxide zone 1500-1700 ±.5% based on core assays which are higher than cuttings.

1330 - 40 440 ppm Cu
1340 - 50; 690 ppm Cu
50 - 60 2000
60 - 70 1750
70 - 80 750

Interpretation. Generally wk alt - but some py and minor cpy - low % total sulph. Some wk Cc enrichment in a narrow zone, and a larger amount of exotic chrys in oxid. zone, due to lateral migration of cu-bearing groundwaters.

✓ Rework this data - check cores - Reinterpret

Fresh hole ?

CG 4

0 - 220 Sandy clay & gravel.

220 - 1080 gravel with gr and some diorite

1080 - 1270 ~~BR~~ gravel or cgl of diorite (gray-green) + some gr sand,

Core @ 1390 - biotite qtz latite.

1490 - 1500 - Cse granite - PE or Sacaton gr. prob no
really large orth. ~~ptals~~.

Cuttings strongly contam. to 1500 feet

BR at 1270'
1270 - 1620 TD - Granite, Fresh looking but runs
1000 - 1300 ppm Cu
Vy thin films of Lim. may carry Copper Pitch. (LCA)

Cu ± 1200 feet in BR interval -
- exotic? - though no chrys. seen.

One - Interpretation - Essentially fresh hole -
some minor zone contained a little
alt and sulph - princ. the zone in
qtz latite (or dacite) - but only on
hairline fract.

Another Inter - Better miner. in Q. latite copping, separated by
fault from fresh gr below

Check spot cores for Rock & Mineral.
" Cuttings boxes for Rot. Sample - Rock & Miner.

Prob. leached Ore hole w/ Cc. CG-5

~~2090~~ 2150 to 2300± partly leached and partly the Cc was orig. spotty.

0-240 ft. gravel - poorly consol.

240-1870 Clayey gravel - mostly gr. frags w/ some acid vol.

BR 1870

1870-2060 Clay-sericit gouge

2060-2324 QMP - st alt. first py @ 2090'. Rot Cuttings. and granitic rock. are core of diabase.

py - w/ tr cpy, and Cc on py.

Sulf - 2-4%

Cores - Notes on H.S. in JDL office

1578-82 Missing (Sheared cgl?) - qtz Monz frags

1960-65 BX - St. clay or gouge soaked w/ orange hm. 305 Cu / 6 Mo

Granulated Bx/gg. white. clay/ser. pot(?) ~~305 ppm Cu~~ ~~of some soaked w/ orange clay~~

2160-67 QMP. st ser/clay leached Capping. Cu 590 / 130 Mo

diss small gr wd. hm (off Cc?) w/ hy Py → Cc Ratio

2229-39 2 Cores

sample - @ 2230 - pt gr. Mod clay Ser 2229-31 38 Mo 8500 ppm Cu

Py veinlet w Cc coating 2231-39 5250 Cu 10 Mo

Py also heavy veined w/ hard goethite or hem films. Some cpy.

± 3 or 4 % Sulf

@ 2235 diabase w/ py veinlet & diss.

2320-24. This piece of unlabled core ~~may be~~ is this footage. w/ fine py coated w/ Cc. 1% Sulf.

2650 ppm Cu / 66 Mo

Spot Core Assays in Co

2229-31 8500 ppm }
2231-39 5250 }

cores higher than corresp. Rotary Cuttings in this interval.

2320-24 2650 - Last sample.
TD

Not at Warehouse

— Fresh BR —
Deep cgl section

CG 6

0 - 3240 Gravel with st. clay.

3240 - 1240 arkosic gravel

1240 - 2363 Yellow cgl. dips 20°. local deformation w/ microfolds. (D.D. 2300 - 2363)
? Not? Burgess PK. (Not red). Some vol frags
much sub-pea gravel.

2363 - 2483 Fresh pЄ gr.
(2340-63 is bx zone)

1919-1929 } brown w/ faint yellowish undertone
2290 - 2298 } Frags pebbles to 5". PЄ gr.
w/ interbedded sandy layers. Small pebbles - minor - are a ~~dark~~ andesite porphy w/ dark matrix

0-140 Gravel w/ vol frags.

140-1290 Gravel - mudstone cgl. (spot core). yellow-gray. Some dark frags.

1290-1710 Cgl - Gasline type. Chips qts & feldspar.

1710-1810 cgl - Similar to above but w/ biot gr frags. or dior.

1810-1880 ? - Similar to above. cuttings very small

1880-1930 cgl - clayey. gr frags of diverse color plus some acid vol.

1930-1980 BR? - brownish clay w/ fine particles of qtz-feld. Some orange tinge. BR might be in this interval

BR@1980 LCA — OK JEK

1980-2120 BR? - Similar but no orange tinge. Fresh chips qtz feld showing. Much contam. from above.

2120-2295 BR? - gouge pieces plus 75% up hole contamination by sand.

TD Rotary.

JEK Cuttings LOG from sample cards.

Spot Core samples -

2050' - Lgr?? - Alt produces mottled texture. basically granitic.

Cu in BR <400ppm
Mo 4-8 above 2100
to ± 14 below to TD 2295.

Cu 440/26 Mo Some geoth. staining or flooding in feldsp., some feld green (alt K-spar?)

Mod ser. 1/2% hm after sulf.

2147- old dike rock? - long biot laths. fn. grnd mass prob alt, No sulf evident. FeOx staining.

Cu 1900/4 Mo

2290 gr? Bx. Oxidized. Seams of spec. Jarositic flooding.

Cu 205/10 Mo No evid. of sulf, though.

CG-8 Core

2295 began Core
N.S. core in IDL office

2295-2374 Bx - granitic texture. Frags in gouge.

2374 - 2475 Variable Bx. Granitic to sl. porph text.

2475 - 2546 do - Bx 2475 - 2545 (75') .46% Cu - erratic
Cc noted. one 4.4% reduced to 1.00% for ave calc.
H.S. (Qtz latite - st. Cc coating fine
~~25~~ py at base of run.

2546 - 2914 TD
Mostly gr. Some oxidized sections.
Some Cc, and bn/cc. Ave .07% Cu
Some cpy seen. ~~Some~~ Some latite por.
bottoms in pyrite w/o any Cc

1980 - 2535 .15% Cu Chrys and Pitch.
2535 - 87 primary sulfides about .07% Cu - slight oxid.
Continues to TD @ 2914, still running .07% Cu.

~~Not at Warhouse~~

CG - 9

0 - 160 - (Gravel) Qal w/ vol frags

- 300 - Gravel - all gr. frags light gray. Gas line type

Sample Cards

- 1350 Gravels - largely gr with some dio. frags. general light brown tone, with FeOx staining.

clay & gouge all washed out.

1350 - 1550 " - similar but stronger some dark vol sand. FeOx staing.

1550 - 1750 " " - brownish.

50% Gr sand up-h contam.

1750 - 1970 — ? — Brown clay

Spot Cores 1280 - 1390 Bx - Sed or tect?

1460 - 14~~45~~65 Cgl - Red. — Red cuttings log 1460-90

1666 - 16~~68~~73 And por above Bx,

~~1350 - 1550~~

Sample Cord 1970 - 2037.5 ~~100~~ 80% Contamination of granitic sand w/ some vol. sand, 20% prob pЄ br - shows very indist - not well chipped.

1960 - 2032.5 Granite

LCA Log of cuttings and correl. w/ spot cores.

basal gr mudflow

1280 - 1390 Arkosic gravel

1390 - 1460 Ark. cgl. gray or gray orange.

pebblestone

1460 - 1490 Red cgl

1490 - 1640 Arkosic cgl - Bright yellow to yellow brown. Fe stain. frags resemble brown frags of last core (1460-65)

[more clay alt - JEK]

1640 - 1760 Bx - Reddish yellow.

1760 - 1780 Clay - yellow brown

1780 - 1810 Bx or cgl Brownish yellow

1810 - 1890 Clay - bright pinkish orange

1890 - 1960 Bx or cgl Pinkish brown

1960 - 2037.5 Granite

Sandy or pebbly clay, granitic detritus, along with and. porph flow at top - coupled with shearing

Spot Cor

CG 9

basal Mudflow

1290 - 1300 Orange (lim sacked) "breccia". Sedimentary origin with sandy (arkose) matrix and pf gr frags 1/8 to 1", plus few other igneous types - fine gr. very clayey - soft.

55/0 ppm

Pebblestone

1460 - 1465 Cgl of various colored - light, dark brown, black, light brown, fn gr igneous (vol?) pebbles - - fair rounding. Seams of calcite and some clays, white and greenish, rim and alt. pebbles. Pebbles stand out on breaking, rock is firm but disintegrates slowly in water looks like "pebblestone" at Sacaton.

820/2 ppm

And and gouge

1666 - 1673 Purple andesite (flow?) with abundant fine laths of feldspar (chalky). ± 2' overlies orange to brown granite gouge - - fault zone. Poor Recov.

pf gr

2028 - 2037 pf gr - wk alt of feld. About 1% black ind lim (/cc?) - ~~Trace~~ Minor py with poss Cc films. - poss 1/2%

540/46

SC-21 TD 3400

Core Chips.

2600 QM Porph.? - stable biotite, sericitized. - Sludge Conc - only py.
Some bio → chl. 2% sulphi py w/ some cpy.

2830 Dacite - stable bio. some py. - sludge conc - py w/ some cpy

2500 QM Por - stable bio and st rextll bio.
Tr vy fine py.

Sludge was only @ 2500 150/2 2850 2300/36
2600 1500/34

SC-19 TD2350

2300' QM por - oxidized ~~capping~~ - alt. weakish
(or Dacite) Some sericit.. vy little
? sign of former sulphide

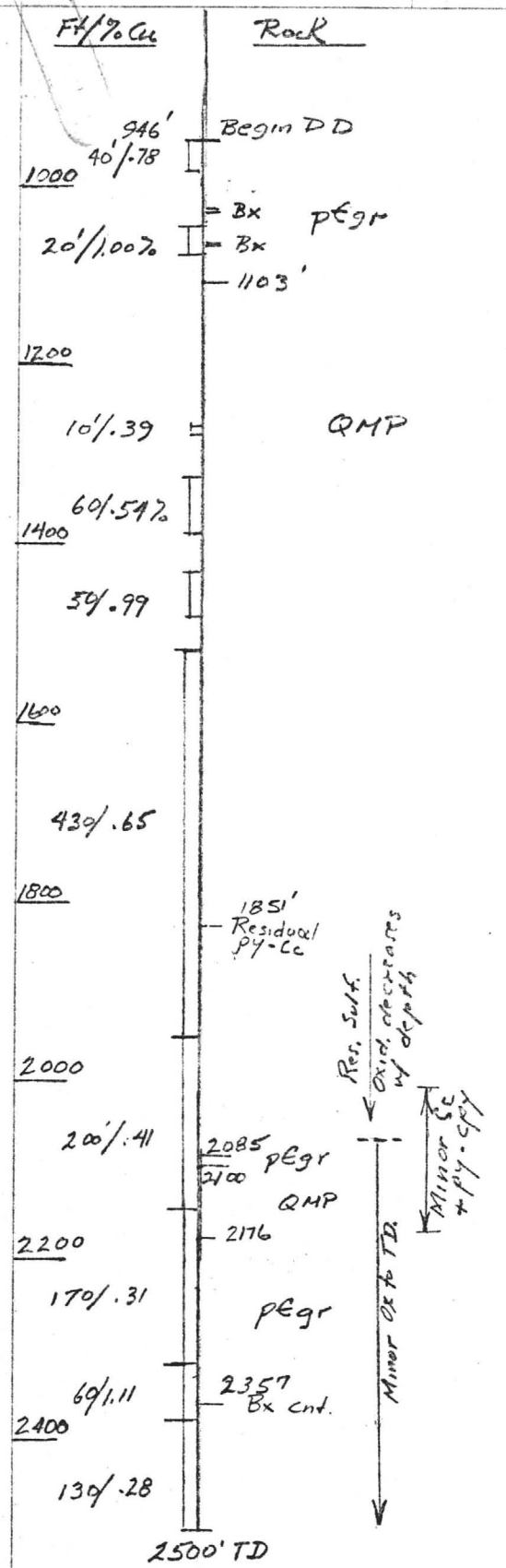
Slude
2200' 4400/44
2300 7400/48

SC-18 TD2685

2500' QM por. Dark matrix -
biotite stable. alt is poss
weak unless it is rextll.
Minor py.

SUMMARY LOG LCA+JEK

CG-7



JEK Notes

966-76 Mod Ser/clay. Strgs of exotic chrys (but may not have moved far). Orig Sulf est 2% Some Lhm, brown spots hem, and goethite seams. Orig Sulf vfg, diss, plus thin seams.

1001-11 St Ser-clay. Former Sul 2-3%. Lim mostly transp., but some ind. goeth. Some Lhm.

1110-20 QMP Biotite stable. St clay. Red hem "fog". Former sul as frac filling. Mostly trans hem, some Lhm

1167-76 do - Transp. hem flooding

1355-64 do - Bio. Stable. Less hem. flooding. Lm on frac both trans & Lhm. Some chrys. Py in one hem frac.

1443-52 QMP Biot. Stab. St. exotic Chrys on seams & Green-stn feld. Former sulf on seams 1-2% Lm brown, transp.

1647-55 QMP Biot. stable. Fairly fresh to Mod clay. Evidence of former sulf meager, but prob was on thin frac. Lim Transp - brown & red Hem/goeth. No chrys - Cu must be as oxides with the Lim.

1824-33 QMP - Somewhat crushed. St clay, hem. flooding varies st to wk. Biot → hem. WK pale chrys in clay. Py bxwk in red hem seam. Cu oxides not conspic -- assays higher than the rock looks.

1870-78 Do. Former sulf 4% as thicker seams. Bxwk/Py. Tr. Py. Cu leaching more complete. locally

2000-2007 QMP Biot stable. St clay -- prob supergene. Poss Cc mixed in clay. Py seams, some cpy. 2% sulf, partly ox to red stains.

2160-69 Do w/ st clay. Sulf 3%, mostly py on seams & diss. Poss. sooty Cc.

2335-45 P€gr St. Qtz-Ser, Mod clay. 2% Py mostly diss gr & fine strgs. Minor ox to sp. Lim.

All Oxides

Mixed oxides & Sulfides

Principally primary sulfides

JEK Ap 76

SUMMARY LOG LCA + JEK

CG-10

Ft/Cu	Rock	JEK Notes
1000	Begin DD 1026	
	pEgr & Mz por inter-layered in short intervals	1044-55 QMP Resid stable biot -- mostly oxid. st clay, Qtz-Ser. hm flooding, wk hhm. Former Sulf 2%
1200		1188-97 pEgr Mod clay, alt gen. wk. Former sulf 1%.
		1197-1207 pEgr Mod Qtz-Ser, St. Superg. clay. hm flooding plus hhm. Former sulf 3%
		1296-1302 Mz por. Biot. stable + text? Seams incl hm/cpy? Former sulf 1%
1400	110/.23	1302-1305 PEgr. St. Qtz-Ser. Transp hm + hhm. Former Sulf 3%
		1414-22 QMP Biot. stable. Former Sulf 1-2%. Tr chrys.
		1431-39 St clay. Obscure text. hm/py + hhm. Form Sulf 3%
	180/.51 QMP	1495-1501 Biot. stable. Mod clay, Mod chrys. Form. Sulf 2%
1600		1597-1604 Silic Bx & por. Qtz veins. Transp. hm & chrys
		1692-1701 Biot. stable. Spec in irreg seams + hm. hhm + chrys
	130/.28	
1800	50/.71	1788-97 pEgr. St. supergene clay + Cu diss & veinlets Total sulf 3% hm flooding in gg zones.
	Some Cu + Cup & Chrys.	
	10/5.20	
	Gen. st. leaching	
	pEgr ← Resid. wk Cu	1955-64 St Qtz-ser plus clay Trans hm: 2% Sulf Cu on py.
2000	← Resid wk Cu	2057-66 Sim. to above, more leaching. Some Cu on py, Superg. clay. Former total sulf 3%
		2110-19 pEgr Bx & silic. Mod Qtz-ser and hm flooding. Former sulf 1-2%
2200	QMP Partly ox py.	2146-54 Biot. stable. V st clay, Py veinlets partly ox to earthy hem.
		2259-66 Biot. stable. Py veinlets + fine grains, partly ox. Low total sulf, 1%.
2400	2410 TD	

☐ All Oxides

☐ Mixed Oxides & Sulf

JEK Ap 96

SUMMARY LOG LCA + JEK

CG-11

Ft/%Cu	Rock	JEK Notes
	Begin DD 1121'	
1200	Mz por	Biot. stable. Transp hm on frac. Former sulf ± ½%
	pEgr	Relict stable biot. in Mz. pEgr crushed & Bx/gg. General st clay and hm flooding. Former sulf up to 4%.
	Mz por	
1400	interlayed pEgr & Mz por & QMP in short intervals	1380-86 QMP st clay-ser. fine hm/cc. biot. partly bleached but still present.
		1439-47 QMP St. supergene clay + hm flooding. Form. sulf ± 2%.
		St hm flooding in Gr & Mz. St clay. Orig Sulf ± 2%
1600		1598-1608 QMP. Rextlig biot. Feld → st clay. All transp hm. Former sulf 1-2%
30/.33		
120/1.25		1644-53 QMP w/incl gr. Frac have red earthly hm + chrys. Tr hhm as fine grains.
	← 1760 First Cc QMP	
1800 70/.78		Biotite stable + Qtz-sericite veins. hhm, red earthy hm Possible Cuprite. Occassional low-assay intervals are leached. Total Sulf Orig ± 3% Partly ox, Cc → chrys, Cuprite.
		1912-21 pEgr. Silic. Qtz strgs w/chrys + brochantite? Orig Sulf low - 1%.
210/1.87		
2000		
		2022-31 Silic + ser. Resid fine gr Cc on py. Partly leach. former Sulf 1-2%
	Leached	
2200 90/.97	pEgr	2224-39 Mod-St ser. Irreg strgs and diss gr of Cc on py. Immature, insip leach. & ox Produces Transp brown hm/py. Total sulf 2-3%
2400 290/.55	Insipient leaching decreas. w/depth.	2348-57 Similar to above; Total sulf 4%. Insip. oxidation
	← Approx base of Cc based on assays.	2537-47 Sim. to above Mod Ser, silic. Py-cpy. Total Sulf 2-3%.
2600		
300/.42		2638-48 Similar to above but weaker silic. Total sulf 2% Tr. ox.
		2748-51 Similar to above. No ox. Total Sulf 2%.
2800	QMP	
2799 TD		

All Oxides

Mixed Oxides & sulf

Principally primary sulf.

JEK Ap 76

Ft/Cu	Rock	JEK Notes
	Begin DD 1268	
		1300' - St Qtz-ser, some relict stable biot. Some Lim - Mostly Maroon transp (almost Lim) Former sulf 3 %
1400	QMP	1400 - QMP bleached biot in st clay. Transp red lm. Former sulf 2 %.
		1500 & 1600 St silic gr. Lim gr + Transp lm/frac. Former sulf 2%. Qtz-Ser.
1600		
		1710 St supergene clay. Lim on frac & fine diss. Former sulf 2 %
1800		1811 - do - st clay. Minor Lim + reddish hem fog. former sulf 2 %
	1951 Begin st ox zone	1960 - St. supergene clay. Atocamite? on frac. Minor Lim.
2000		
140/1.50	pЄ gr	2070 - St clay. Frac w/ Atacamite ? + chrys. Former sulf hard to read - ± 2% ?
40/1.80	Cc begins 2091 interm. Leach & ox.	2130-40 St silic + qtz-ser. Cc on py as fine gr + Few 1/8" vnlet; overlies leached zone. Sulf 3%
2200 20/.84		
20/1.36	QMP	2250 St supergene clay. fn diss sooty Cc, w/ leach. areas with red Lm floating.
	pЄ gr	
2400 40/1.33	QMP	2400 QMP - Bi.t stable, Feld st. clay. Cc vemlets partly ox. Total former + pres sulf < 2 %, on frac.
	Leached Cc zone	2500 pЄ gr - Ser + silic. Tr resid sooty Cc. Transp. red Lm + some fine diss Lim. former sulf 1½ %
	pЄ gr	
2600		2595 silic + chrys. Some diffuse red hem.
		2700 Silic + diffuse chrys, locally st. Red hem as above. < 1½% former sulf.
2800	Vy wk Cu Min below 1750	
	End evid of Pri Miner.	2930 - Gr - Gen Silic, wk clay. Minor chrys. Lm/py former sulf ½ %
	Shear zone	
3000	pЄ gr	2938-89 Gouge & shears in gr. Transp Lim, some exot. chrys.
		2989 - 3009 Drilling Fresh pre Є gr.

All Oxides — Mixed Oxides & sulfides

Sulf. Estimates by volume

JEK Ap 76

Ft/Cu	Rock	JEK Notes
	Begin DD 1,330	
1400		1360 St ser, Mod clay. Transp hem & fog. Some specks Lhm 1-2% Former Sulf.
		1450 St supergene clay + ser. Some Lhm + Transp hem on frac. Former Sulf 2%
1600		1560 St supgene clay. All hm is Lhm, diss & frac. Former sulf 1-2% All K-spar → clay
	pEgr	1643 do. classic leached cap. /Cu. 2% Form. Sulf.
1800		1733 St clay but some K-spar stable. 50% Lhm + 50% Transp. hem /frac & as fog. Form sulf 2%
		1900 Similar to above. St clay/ser. Most hm is Transp or fog; some Lhm Former sulf 4%
2000 110/1.97	Top st. visible green oxides	1978 St clay. Atacamite?, chrys, earthy red hem. Tr Lhm diss.
10/2.15	← 1st Cu	2060 QMP. Biot. rextl/3d. Veinlets Cu on py/cpy. Some Cu → Pitch. Total Sulf 2%
	QMP	2100 Mod-st clay. Thin Qtz-ser veins. Atacamite? and transp red hem.
2200 100/1.73	pEgr	2200 St. ser-clay. K-spar stable. fine diss Cu. Total Sulf 2 1/2 %
	QMP	2245 QMP - Biot. rextl. chalky feld. Cu vnlets & diss, partly ox. to red transp hem + fog.
140/1.03 2400		2400 pEgr has odd text & color. WK clay-ser. Cu diss & strgs. Pink alt min -- anhydrite?? Cu partly ox to hem & cuprite. Sulf 2-3%
140/.45		2520 Gr as above, alt similar w/more abund pink mineral. Lhm thin strgs & grains. Minor Jar/Goeth. Possible tenorite. Former Sulf 4%
2600	pEgr	
30/.62		
10/1.29 Last avail Assay		END JEK NOTES
2800		
	Drilling accos Cu in PEgr	
3000		

All oxide

All Sulfide

Oxidized & leached sulfide + Cuprite & Native

JEK Ap 76

Sulf. Est by volume

FINAL DEPTH
COLLAR ELEVATION
COORDINATES
INCLINATION

Combination LCA Log
JEK Scan of Cuttings Composite Samples
& core runs.

JOHN E. KINNISON
MINING GEOLOGIST

GEOLOGIC-ASSAY LOG

PROPERTY

HOLE NO. CG-1
SHEET NO. ___ OF ___
DATE COMPLETED
LOGGED BY:

DEPTH	INTERVAL	CORE SIZE	SP GRAV	CORE REC %	ASSAY		AVERAGE	MINERALIZATION OXIDES	MINERALIZATION SUPHIDES	ALTERATION	ROCK TYPE	REMARKS
150		Rotary						POST ORE COVER			Grav.	gr + vol frags
1190		"									"	Arkosic and clayey
1490		"									"	yellow clay
								Pre-ore BR	Prob @ 1490'			
1490-1800		"						sp-Mod chrys			pEgr	Pink to orange cuttings. Drlg soft, prob weathered.
1857		"						sparse chrys	±1% py		pEgr	harder drilling
1857-	1862	Spot Core						hm/py on thin frac		biotites are bleached	pEgr	wk-Mod clay alt. Complete leaching. Former Sulf 1%
1970		Rotary									pEgr	
2160		Rotary									QM (LCA)	chl' alt. - cuttings st. contaminated by up-hole granite sand.
2170		Rotary									pEgr	
2170-	77	Spot Core						<1/4% specs hm/py			pEgr	Essentially Fresh
2310		Rotary									pEgr	
2328		"									Mz Por	(LCA Cuttings Log)
2328-	34	Spot Core						hm/py insip and on some veinlets.	hairline vnlts and fine diss py -- 1/2% total sulf.	vy wk clay fekl. Biotite vy wk → chl	Qtz Monz por.	Olive gray, dark groundmass Md-gr. xtals biotite in books, and plag. phenocrysts.
2370		Rotary									do	LCA Log
2398		"									pEgr	LCA Log - [illegible] JEK
2398-	2403	Spot Core									pEgr	" " (Could not find core - JEK)
	TD											

JEK Notes SpA Check on Core CG-3

1410-17 pEgr. Mod alt. sl weathering. hm/py. 1-2% Former Sulph.

1580-84 pEgr poor alt. Transp hm. exotic Chrys. <1% Former Sulph

1641-46 Mz por. biotite stable. wk alt – transp and Tr Chrys. <1/4 % former Sulph

1895-1901 Mz por Hem soaked in Feldspars. Some clays on frac. No evidence sulph.

1938-44 pEgr. Mod alt. Cc on py as grs and veinlets. > 50% oxidized to Py hm but some fract w/ good hm. Total avg Sulph 2%

JEK Notes

CG 7

966-76. Pt gr. Mod alt ser clay. stringers of exotic chrys but not moved for, necessarily. orig. sulph 2% some Lhm, brown spots of tenorite(?) and goet. to seams. Sulf. orig fine-gr, dissem - probably some thin seams

1001-11 pt gr. St ser-clay. former sulf 2-3% as diss gr & thin seams. mostly goethite, but occas. Lhm. Limonites largely transported but some are indig. Sub-ore grade former Cc zone No chrys.

1110-1120 Mz por. biot. stable. St clay ~~[illegible]~~ and red hem. "fog." former sulph as frac fillings - some Lhm seen. Mostly transp hem.

1167-1176 do. Transp hem saturates rock,

1355-1364 do Mz por - biot stable. less hem flooding but still present. Limonit on frac is transp. and also Lhm. Py seen on one hem filled (transp) seam. Some Chrys

1443-1452 Mz por Biot. St. Exotic Chrys on seams and Green stained feld. feld chalky, biot sl. shedded, but mostly as books. former sulf. on seams - 1 or 2%. hm. mostly brown, transp.

1647-1655 Mz por. Biot St. Varies from fairly fres looking to mod clay. evide of former sulf. meager, but prob occur on seams. Trans brown & Red hem/Goeth. No chrys

1824-33 Mz por. somewhat crushed. St. clay. Hematite looking varies from st - wk. Biot. in small shred, much of it alt. to hem. wk, pale, chrys on clay. One frac had well dev. py box in red brown hem.

1870-78 Mz por. Biot. stable. 4% form sulf as thicker seams. box wk of py. Transp. red hm. Some Bx and open seams were prob pre-mineral, now oxid w/ transp. hem. Traces of py.

2000-2007 Mz por. biot. stabb. sd. clay - prob supergene. The clay "looks" like Ce environment. Some py on seams, partly ox to trans hem seams and red stains. Traces cpy. Sulph 2%. Much of it as fine irreg strgs. Sootly Ce quest. on seams of clay.

2160-2169. Mz por. sd clay ser. (supergene?) Sulph, py, 3% as seams, diss. grains, and fine irreg veinlets. Poss Ce on clay seams. The irreg py seams partly ox. to transp. red partly glassy hem.

2335-2345 preC gr. sd ~~clay~~ qtz-ser, mod clay. 2% py, mostly as disseg and fine irreg strgs. Minor oxidation to sp. limonite.

JEK spot core checks - Notes CG-10

1044 - 1055 QMP Residual Biotite -- mostly oxidized. St Clay plus Qtz-Ser. St Orange & Red hem flooding. Some wk hm Former Sulph 2% as diss & thin strgs.

1188 - 1197 PE gr. Mod clay. - alt generally wk. 1% Former Sulph - py.

1141 - 1148 Mz por - dark groundmass - poss rextll. biot. ~~Pods~~ specks red ind. hm of uncertain origin -- prob sulf -- cpy? - Tr. ind hm w/ py box wk. former sulf - 1%

1148 - 1150 Gouge. St supergene clay. Bx frags gr? with ind brown hm.

1197 - 1207 PE gr. Mod qtz-ser. Local st supergene clay. General hm flooding + some good hm. Former Sulf 3%

1241 - 1250 PE gr - Similar to above, with less general hm flooding.

1296 - 1302 Mz por - like 1141-48: Books biot + rextll. biotin groundmass. Few thin seams with ind hm/cpy or cc. Former Sulph 1%

1302 - 1305 PE gr. St Qtz ser. Minor hm + trans hm/py. Former Sulf 3%

1342 - 1351 Mz por - Books biot + rextll biot. Few Qtz-Ser veinlets w/ hm/py. Former sulf ½% - 2% spotty.

1414 - 1422 QMP. Biot stable on ragged books. Chalky feld. Som transp hm on frac. Former Sulf 1-2%. Minor Blue Cu Stain on chalky feld & clay seams.

1431 - 1439 QMP. Text. obliterated/Fu 33%. St Qtz-Ser + V.St. Supergene Clay. Transp hm/py + Minor wk hm. Former Sulph 3% - Fract + diss.

1495 - 1501 QMP. Biot. stable. Mod clay. Mod chrys and red ind hem of uncertain origin. Transp hm/frac. Former Sulph 2%

1597 - 1604 Silic Bx & Por. Qtz repl veins. Spec + Trans hm. St chrys in irreg frac.

1604 - 1606 silic QMP? - Clay/ser. hm/py. in grains.

1660 - 1667 QMP. St. Qtz/Ser. + gen silic. Thin irreg seams hm (some hm) plus some diss limonite/sulf gr. Mod chrys. Few books biot. remain.

1692 - 1701 QMP Biot. stable. irreg seams spec plus lim. 3' Bx of silic por frags -- with good hhm plus chrys.

1752 - 1761 pЄgr Mod clay - ser. hm/py mostly, Tr hhm, chrys.

1788 - 1792 Bx & gg pЄgr Frags. Sacked with hem + pulverent red hem - und? ? hm or Cuprite Former Sulf 2%

1792 - 1797 pЄgr Vst supergene clay, irreg spec veinlets. Copper values ~~[illegible]~~ as tiny diss gr Cc + thicker veinlets Cc or py. Total Sulph 3%

1955 - 1964 pЄgr St. Qtz Ser./clay. Transp hm stains. 2% fine diss py w cc coatings.

2057 - 66 pЄgr Similar to above w/ Cc or py. Supergene clay. Some hhm on frac. Former total Sulf 3%.

2110 - 19 PЄgr w/ thin intercepts of QMP. Generally bx & Silic w/ Hem flooding. Mod Qtz - Ser. hm transp. Former Sulph 1-2%

2146 - 54 QMP. biotite stable. Strongly crushed but not Bx. Vy st clay. Py veinlets partly ox to earthy or crunty red hem. Sulphides hard to estimate - 2%?.

2259 - 66 QMP Biotite stable. Discrete fine grains plus some pyrite veinlets, partly oxidized. Total original Sulph - including the oxidized portion, was low, about 1%.

JEK Spot Core Check - Notes CG-11

1164-73
~~1246-60~~ Mz por. Biotite stable - some may be rextllz. Transp hm on Froc.
Former Sulph obscure -- poss ½ % as grains -- some on froc.

1246-60 pЄgr? generally crushed & Bx. st. clay on seams, and st ser.
hm transp - prob after 4% py as fine grains and ⅛" seams.

1328-31 QM or Mz por - biot. stable. St clay and Fe Flooding.
31-39 pЄgr Similiar st clay and hem as in por above. Some Bx. } Can't read Former Sulf?

1369-80 pЄgr St. Clay. and gg-Bx. Some thick veinlets of partly ind and
partly transp hm. General st hm flooding. Sulphides
may have been 4% - prob some orig Cc.

1380-86 QMP St clay-serc. hm specs - /cc. also Transp hm /veinlets.
biot partly alt or bleached but still present.

1439-47 QMP St. supergene clay, relict biot. Few qtz-serc veinlet w/ hm/py.
Former sulph - Min 1% - Max 4% - can't read. Most
prob about 2%.

1534-37 pЄgr Mod alt. St. Orange hm flooding.
orig Sulph ±2% - generally fine gr.

1537-42 Mz por Relict biot. st clay. Some Bx and hm flooding
as in gr. above.

1598-1608 QMP Rextllz Biot. Feld st clay. Mod hm on froc - all transp.
Former Sulph might have been ~2%. Assays suggest Cu OX
with hem

1644-53 QMP w/ incl pЄgr. Rextll biot and biot stable books. Froct
Redearthy hem, and chrys. (local Brocantite?)
Few Qtz-Ser veinlets. Tr hem in small gr.

1728-37 QMP Biot. to stable in books, St. clay repl feld. Qtz veins with
central line of red hem or aspirite, and chrys on irreg froct
and with qtz veins.

1746-55 QMP. Biot stable, except in silic zones. Numerous qtz-sericite veins to 1/4" plus silic patches obscure text. Good hem on frac & as tiny grains. Rock thoroughly leached.

1783-93 QMP Similar to above. Qtz-Ser veinlets w/hem plus some ~~red~~ earthy hem on frac. Few question relicts Cc on py - but not sure. Assay may ~~must~~ be partly from Cu Ox in hem. Total Sulph 3 %

check 1780-83, previous box. Contains unleached, good grade Cc replacement, accounting for most of assay value 1780-90.

1838-48 QMP. St ~~Qtz Ser~~ Ser throughout rock, plus qtz ser veins 1/8-1/4". Fair Cc repl of py in veinlets and diss. Rock bleached white, with minor frac ox to good hem. Total Sulph 3-4 %

1912-21 PEgr. St. Silic. Qtz strgs w/ chrys + brochantite? Former sulf low - 1%. Minor red ind lim - mostly sulph hard to read.

2022-31 pEgr. Silic + Ser. Mostly leached, leaving hem/py. Resid gr (diss) of Cc on py. Orig Sulf 1-2%.

2150-2158 pEgr. St-Mod Ser, irreg strgs + diss gr of Cc and py. Total Sulf 2-3 %. Partly leached leaving a pyritic limonite.

2224-39 pEgr. Similar to above. Cc on py. immature, insipient ox. to yellow and brown lim.

2348-57 pEgr. Similar to above, but in pri Sulf. 4% total. less Ser but still Mod alt. Insip. ox of py to ~~red~~ brown hem.

2425-34 pEgr Similar to above. Total Sulf 3%, py - cpy with local cov/Cc coatings. Diss gr & strgs ~~equal~~. Mod Ser & Silic Tr Orange hem - insip Ox.

2537-2547 pEgr. Similar to above. Mod Silic, Ser. Py-cpy Total Sulf 2-3%
wk unsip ox to brown hem.

2638-48 pEgr. General Silic but generally wk alt than above.
Py-cpy. Total Sulf 2% Tr ox.

2748-51 pEgr. Similar to above. Total Sulf 2% - Py - less cpy.
No ox. Assay seems too high in this interval.

JEK Notes Spot Core Checks CG-12

@1300 QMP - St. Qtz-Ser. Some relict stable biot. Deep Red to Maroon mostly transp hum - almost LLm. Some def LLm. Former sulf 3%.

@1400 QMP - Simil. to above. St. clay, biotite Mostly bleached. Transp Red hum. Fewer Min. Fract thus above. Former Sulf 2%

@1455 QMP - Similar to above. St clay-Ser in Plag & Matrix. Biot is shredded and prtly chl, crudy. Transp red hum. Former sulf 2%

@1500 pEgr - St. silic & qtz-ser. Good LLm on grains + Transp hum on Frac. Former sulf 2%.

@1600 pEgr - Almost ident. to above. Former Sulf slightly less - 1½%

@1710 pEgr - St. supergene clay. Fract & fine diss grains of former Sulf are filled w ind LLm. w/minor transp Red hum. Clearly a Cc capping. Former Sulf 2%

@1871 pEgr - St. Supergene clay. Lm tends to be hematite "fog" - reddish. Minor LLm Former Sulf 2%

@1960 pEgr - Some LLm. Mostly fract filled with xtllne green Cu mineral Anterite-brochantite?. Stone Supergene clay.

@2060-2070 pEgr - St. clay. Frac contain chrys + gree xtll Min as above. Former sulf hard to read. ±2%

@2135 pEgr - St silic Qtz-Ser. K spar stable. Cc on py as fine gr + occassional 1/8 veinlet. Sulf 3%

@2140 pEgr - Simila to above. Sooty Cc Sulf 2-3%. Goes into leached zone below 2141

@2250 pEgr - St. Supergene Clay w/fine diss gr of sooty Cc, plus leached portions with Red limonite flooding.

@2400 QMP - Biot. stable. Feld st. clay. Some Resid Cc in veinlets - mostly ox to brown to yellow brown semi-ind hum. Former total sulf, almost all on veinlets, ~~1½~~ 2% or less.

1555 - 1580 - Pt gr. leached, some FeOx soaking, but vy sparse former sulph. - mostly as pinpoints. - quartzose - former sulf 1%

1580 - 1597 Bx zone. Hematite soaked, foogs of pt gr as above.

1597 - 1631 Similar to 1555-80. Gr w/ relatively small former sulph. quartzose alt.

1631 - Granite, somewhat crushed and healed by qtz feld all clay. Maroon transp. hem develops and gets better on depth. much on fract, but some indig in pinpoint specs. Occas. hem in small blebs. former sulf ≤ %, some certainly Cu

@ 2500 pEgr. Mod Qtz-Ser. + Silic. Mostly transp Red hem on frac. Some fine specs hem ??. Former sulf 1½%. Tr resid sooty Cc

@ 2595 pEsr Silic + chrys. Some diffuse red hem. (1 foot mafic dike str goeth staining on shears @ 2599)

@ 2700 pEgr. Silic + chrys. diffuse, locally st, red hem as above. Orig sulf as fine gr & prob on frac, but I cant read to tot content. prob < 1½%

2926-2938 pЄgr. Gen. Silic - wk clay. 1/2% former Sulf as indic. by him. Some Chrys. Prob py.

FAULT ZONE

2938 -2952 pЄgr shears and gangy. Some chrys. clay. Transp him - may not be from orig Sulf in rock.

-2986 pЄgr strong shearing at diverse dips up to 45°. Some Bx. Transp him - Rock was prob not mineralized.

2986 -2989 Mafic dike?

-2990 Some chrys in pЄgr. - Minor Silic.

-3009 pЄgr - Fresh.

JEK SPOT CORE CHECKS NOTES CG-13

@ 1360 PEgr. St. ser, mod clay. Transp hem and Fog + some specks Lhm. 1-2% Former sulf.

@ 1450 PEgr St white clay + ser. Some Lhm + transp hem on frac. Former sulf 2% (Lhm largely leached away) No K-spar left stable.

@ 1560 PEgr St. white supergene clay. All Lhm is Lhm, ind in grains, minor on fract. Prob ½ sulf cavities leached out. Former sulf 1-2%

@ 1643 PEgr Similar to above. St white clay - ser. Nearly All hm is Lhm in grains and thin veinlets. 2% Former sulf. Classic leached capping/Cc.

@ 1733 PEgr St white supergene clay - but some K-spar left 50% Lhm or Lhm? plus 50% Transp Red hem on frac and minor fog. Former sulf 3%

@ 1900 PEgr Similar to above. St clay ser with minor residual Kspar Lhm partly ind as cavity lining plus most fog or frac transp. high Ratio ~~[illegible]~~ py:Cc suggested. Former sulf 4%

@ 1970-73 PEgr St. clay, some Lhm + Transp hem on frac, with Chrys on clay.
73-78 PEg St clay, Atacanite or brochantite (green xtilline Cu), chrys, plus earthy red hm on frac and Tr Lhm in specs.

2053-56 PEgr Silic. w/chrys and minor ind red hem (not typ Lhm) K spar stable.
56-61 QMP — Biotite stable and prob. rextll. Veinlets Cc on py or cpy. Total sulf 2%. Some of the Cc is ox. to pitch or goethite

@ 2100 PEgr Mod to locally st clay. Thin Qtz-ser veining distinguishable. Brochant? + Transp hem - mostly red and earthy. Minor grains prob Lhm.

@ 2200 PEgr St white ser/clay, but some Kspar stable. Good Cc in fine grains, and few thin irreg strgs. Few ~~[illegible]~~ 1" Bx zones with Transp Red hem. ~~[illegible]~~ Total sulf 2½%. Cc repl of py 70-100%

@ 2245 QMP. Biot. rextll. chalky feld. Cc veinlets & minor grains, partly ox to reddish transp hm & some red fog.

@ 2400 pEgr. Has odd text and color - might be not well develop
rexfll somewhat. Otherwise, ~~[illegible]~~ clay/ser alt. ^
Cc in discrete grains 50-80% repl py, with
occas Cc strgr. Cc is partly ox to hem & cuprite
Some pink alt of feld might be anhydrite. Sulf
2-3%

@ ~~2700~~ 2520 pEgr. Similar to above, but much more pink feld
alt -- anhydrite ?? Hm thin strgs & specs,
plus minor jarosite/goethite. Also, sm brown
ind limonitic material may be Tenorite. Former
Sulf 4%

Abs LCA Log CG 10

Begin Core 1026

1026-1056 Mz por leached good LLm Clay/ser

-1077 Gr. Top 6' gouge. LLm

-1154 Mixed intercepts gr & por. with biot. clay/ser
Some LLm - also Transported.

-1270 Gr Clay, Ser. Biot → chl. Transp lm + sp LLm

1270 - 1275 Gouge Clay + Trans lm.

-1325 Por. and gr - Biot. in books. Gr - clay Ser.
St. Vns LLm. ~~better Cu Assays~~.
~~sp chrys~~

-1429 QMP - Biot. - Feld → clay.
St Vns lm. better Cu Assays.
sp chrys.

1429-1435 Gg & Bx - Fault?

-1650 QMP - clay + biot → chl.
Vns lm + chrys. better Assays still to 1615,
Some lm/Cu sulph. then drop back

-1750 QMP - Similar to above - with chrys & cuprite, but
Hem veins assays to not kick up.

-1805 Granite. Str. Hem with mod to sp cup & chrys.
clay-ser. Wk to Mod Cc and cpy Good assays to 1805.

-1920 Gr. - Mod Ser lm/sulf and lm/Cu Sulph + Some Cc

-2080 Gr - Oxid. Sulph - Tr Cc. Earthly lim.

gr + por

2080 - 2265 OMP - Biot. - clay
Minor Cc on Py cpy locally leached.
Below 2140 thoroughly leached. hm/Cc.

2265 - 2403 TD OMP as above - sl oxid/leaching. sooty Cc minor.
Py/cpy. low assays.

Mining Geologist
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March 17, 1976

Subject: Casa Grande West
CAP. Pinal County, Arizona.
Job No. 0121

Memorandum for J. D. Lowell:

The following is a summary of my brief initial review of the subject project.

Data derived by you and Clark Arnold regarding the Sacaton deposit (Asarco) are in large measure correct. You are probably correct in your interpretation that the area now being drilled by CAP and Asarco-Freeport represents at least one strand (if not the "root zone") of a low-angle fault, and that the Sacaton deposit is a higher, faulted portion of the same deposit.

Although some features do not quite match between the two deposits, the weight of drill data which can be constructed in a manner which does match suggests they are the same deposit, separated by at least one major low-angle fault.

Features that suggest correlation are:

1. Mineralization in both deposits is in pre-Cambrian granite, and a quartz monzonite porphyry with a dark groundmass (where supergene clays have not bleached the rock) and hydrothermal-stable biotite books.

2. The Sacaton Conglomerate of schist and granite fragments is the oldest post-mineral formation overlying Sacaton, and has been questionably found in CG-3.

3. A distinctive post-ore, volcanic-pebble conglomerate is found only on the east end of the Sacaton altered zone. A correlative conglomerate was found in CG-9, northeast of C.G.W.

4. Inferred alteration limits (refer subsurface plan) of the two deposits are correlative in size and direction of elongation.

I have spent most of the initial review attempting to put together an overall regional interpretation. I have prepared drafts of two illustrations: a district subsurface plan map, at a scale of 1": 2000 ft, and a longitudinal section to the same scale. These are ready for initial drafting. As now interpreted, a single main fault is theorized to separate the Sacaton and Casa Grande West deposits. As shown by the section, it is inferred to dip 20-30° east near C.G.W., but is nearly flat further east near Sacaton.

The "Basement Fault" is clearly bounded on the north by a major E-NE fault zone, which is vertical. I do not believe that the Basement Fault is merely offset by this north "boundary" fault, however; the two probably formed--in some manner--jointly. The Basement Fault, however, appears to be offset by a parallel E-NE fault south of the Sacaton deposit. Sacaton itself, then, lies in a narrow, elongate structural block, which is nearly parallel to the zone of alteration and mineralization.

Drilling at C.G.W., interpreted largely from the CAP holes, with meager data from Asarco drilling (past and present) indicates a zone of propylitic alteration with some exotic copper, surrounding a zone of more intense sulfidation and silicate alteration (mainly sericite and supergene clays). The best area is clearly near hole 11, which is where you are currently drilling.

Holes 5 and 8, north of the Asarco ground, are also well mineralized, and it is possible that a thin zone of ±.6% Cu as chalcocite was penetrated with the rotary drill in CG-5. This area could be a subsidiary fault strand, or a second copper zone. In any event, some additional drilling is warranted there.

I have the following suggestions for obtaining additional information, to aid geologic interpretation.

1. The area being diamond drilled, near holes 7 and 11, shows sufficient promise to justify the expense of preparing core boards for holes in that area. Samples can be readily split out from the crushed assay rejects.

2. The drill core is currently being restacked in the new storage room. As soon as the boxes are sorted and stacked in order, I would like to make a better review of core from the holes around No. 7. It should take about 4 or 5 days to do this, synthesize my observations with Clark Arnold's logs, and plot the data. This would then provide a good base, coupled with work I have already done, for further interpretive study as drilling progresses.

3. If rotary drilling gets deeper--say, 1300 or more feet

to bedrock--in the area where bedrock definition is more important, I think you should see if Wendell Knight can provide one of his larger portable pumps. It is mandatory to maintain 150 gpm circulation in order to provide good samples in the size holes being drilled ($5\frac{1}{2}$-6"). This requires a pump which can maintain 500-600 psi (which range is quickly reached in depth at plus 100 gpm). The standard 5X6 pumps will not do this, and a 5X8 or 5X10 is recommended.

John E. Kinnison

Registered Geologist
CERTIFICATE EXPIRES
John E.
Kinnison
DEC. 31, 1976
ARIZONA, U.S.A.

Good —

Summary: Drill Hole CG-1

Drill hole CG-1 was collared in post mineral gravels and continued in that formation to a depth of 660 feet. At 660 feet copper values began to increase slightly above background level although no important changes in lithology were noted. Copper content increased steadily until 1490 feet at which point drilling intersected a strongly iron stained arkose or possibly a deeply weathered granitic bedrock. This unit was found to contain approximately 0.1% Cu in the form of oxide and chrysocolla. OK ~~BR 1490'~~

At 1800 feet the penetration rate dropped sharply as drilling intersected a well lithified granitic bedrock. Between 1800 feet and 2403 T.D. drilling intersected a number of intermediate granitic lithologies including Oracle granite, quartz latite porphyry, and quartz monzonite and finally bottomed in granite at a depth of 2403 feet. Pyrite appeared at a depth of about 1800 feet and continued to constitute approximately 1% of the rock volume between that depth and the bottom of the hole. Minor oxidation was noted at T.D but decreased sharply below 2200 feet. Alteration affects are of the propylitic argillic type and are found to be associated with very weak disseminated pyritic mineralization. K-feldspar is consistently fresh; plagioclase tends to be thoroughly clouded; and biotite is partially altered to chlorite. Rock textures are intact for the most part. Assay results for drill cuttings are notably higher than those for spot cores suggesting significant contamination of the cuttings by chrysocolla.

INTERPRETATION

Drill hole CG-1 intersected a zone of well developed exotic copper mineralization developed in a ~~an arkose or~~ deeply weathered granite. Drilling passed downward out of the exotic mineralization into weak propylitic porphyry fringe type alteration associated with approximately 1% total disseminated sulfide. Primary copper mineralization is very weak probably amounting to 50-100 ppm Cu.

Summary: Drill Hole CG-2

Drill hole CG-2 was collared in post mineral gravel and continued in that formation to a depth of 1400 feet. The first 1000 feet of drilling penetrated gravel units containing only background amounts of copper mineralization. At 1000 feet, however, the copper content jumped to approximately 145 ppm and continued at slightly anomalous levels to a depth of 1240 feet but no significant change in lithology was recognized in this section. At 1240, drilling intersected an arkosic gravel section containing some iron staining and as well as exotic copper mineralization in the form of chrysocolla.

At 1400 feet drilling passed into an arkosic gravel or deeply weathered granitic bedrock carrying sparse chrysocolla and limonite after pyrite. ← BR 1400' Prob.

The penetration rate dropped sharply at 1540 feet as drilling intersected the well lithified Oracle granite. With a few exceptions the drilling continued in the granite to T.D. of 2175 feet. Partially oxidized pyrite was first recognized at about 1600 feet and continued in small amounts to the bottom of the hole. Drilling failed to penetrate the zone of oxidation although only minor affects were noted at T.D. .

Alteration of the Oracle granite is of the propylitic argillic type characterized by the presence of weak disseminated pyrite. K-feldspar is typically fresh; plagioclase grains are clouded; and biotite shows some chloritization. Assay results for drill hole 2 from both core and cuttings show reasonable agreement and indicate the presence of 100-200 ppm Cu.

INTERPRETATION

Drill hole CG-2 intersected a zone of weakly developed exotic copper and iron mineralization fromed in an arkose or deeply weathered granite. Hypogene alteration at this location is of the weak fringe type and is associated with approximately 1% total disseminated sulfide as well as very weak primary copper mineralization.

Summary: Drill Hole CG-3

Drill hole CG-3 was collared in post mineral gravel and continued in that formation to a depth of 1340 feet. Strongly anomalous copper mineralization in the form of chrysocolla was observed in the interval 800-1000 but remained at or near background level both above and below this interval. At 1340 feet drilling passed directly into well lithified coarse grained granite and proceeded through a number of intermediate igneous lithologies between that point and T.D. at 2004 feet. Strong exotic mineralization in the form of chrysocolla was noted in the interval 1300-1500 and it is very possible that mineralization in this zone will average approximately 0.5 to 0.6% Cu. Chrysocolla was absent below 1820 feet but copper was present in the form of chalcocite coating on pyrite grains. Chalcopyrite was not observed at this location. Some oxidation effects were observed even at T.D. and may tend to deplete the true copper grade to a certain extent. It appears that copper content of the interval 1800-2000 will lie in the 0.2% range.

BR. Not much (or none) weathered soft zone.

Hypogene alteration affects are slightly stronger at this location than those encountered in the previous drilling. K-feldspar tends to be clean but plagioclase tends to be moderately to strongly sericiti-ed and argillized and total suflide appears to lie in the 2 to 3% range.

INTERPRETATION

Drill hole CG-3 intersected a zone of strong exotic copper mineralization developed over a thickness of approximately 200 feet and composed almost entirely of chrysocolla and copper pitch. This mineralization id developed in a granitic bedrock and is underlain by a zone of chalcocite mineralizaiton approximately 200 feet thick. Primary copper minerals were not observed in significant quantities at this location and it appears that the chalcocite in the interval 1800-2000 may have been developed from the same solution which formed the overlying zone of chrysocolla. Hydrothermal alteration is somewhat stronger than that previously observed, but is still of the weak fringe type and is associated with 2 to 3% disseminated pyritic mineralization.

Summary: Drill Hole CG-4

Drill hole CG-4 was collared in post mineral gravel containing background amounts of copper mineralization and continued in that formation to bedrock at 1270 feet. Anomalous copper values were first noted at approximately 800 feet although no change in gravel lithology was recognized. Copper increased sharply in the interval 1080-1270 B.R. and appeared to coincide with a concentration of gray-green granodiorite fragments in the Tertiary section. The bedrock interval 1270-1670 T.D. is characterized by a number of igneous lithologies including quartz latite and granodiorite in which both alteration and sulfide mineralization appears to vary considerably. The quartz latite appeared quite strongly altered and apparently contained several percent original sulfide. Underlying granodiorites, however, showed only minor alteration affects and no evidence of former sulfide although copper is present to the extent of approximately 1200 ppm throughout the entire bedrock intercept. Chrysocolla was not observed at this location and copper appeared to be present only as sooty copper pitch developed on minor fractures.

INTERPRETATION

Drill hole CG-4 appeared to have intersected a small but rather strong zone of alteration and sulfide mineralization and to have passed downward out of this zone into essentially unaltered granodiorite which carries significant copper in the form of copper pitch. The reason for this apparent discrepancy is poorly understood at this time.

Summary: Drill Hole CG-5

Drill hole CG-5 was collared in post mineral gravel and continued in that formation to a depth of 1800 feet. Although several minor lithologic and color changes occurred in this interval, copper and molybdenum content remained at or below background level. Volcanic fragments were noted between 1480 feet and 1650 feet in amounts up to approximately 5%.

Drilling between 1800 and 1870 feet also encountered gravel, but copper contact in this zone averaged approximately 130 ppm.

B.R.

At 1870 drilling intersected an orange clay-sericite gouge which continued to a depth of 2060 feet.

At 2060 drilling intersected altered and leached quartz monzonite in which sulfide appeared at 2090. Hole CG-5 continued to 2224 in mineralized granitic rocks carrying chalcocite, chalcopyrite and pyrite and intersected copper values as high as 0.85%.

CG-5 has been cased to 2324 and plans for coring are underway.

Summary: Drill Hole CG-6

Drill hole CG-6 was collared in post mineral gravel and continued in that formation to a depth of 340'. The gravel in this interval was found to be strongly clayey and to carry 10-15% unmineralized extrusive volcanic fragments. At 340' drilling intersected an arkosic gravel found to be slightly iron-stained but otherwise unaltered and unmineralized. Drilling continued in the arkosic gravel to a depth of 1240'. Between 1240 and 2298 drilling intersected a well indurated conglomerate sandstone thought to be correlative with the Mid-Tertiary Burgess Peak conglomerate.

Diamond drilling began at 2298' and continued in conglomeratic sandstone to a depth of 2310'. The interval 2310-2340 consisted of strongly deformed conglomeratic mudstone. Abundant microfolds were noted with axial planes inclined at 20-90°. The conglomerate remained very tight and compact despite intense folding and probable faulting. At 2340' drilling intersected a strongly brecciated biotite-quartz monzonite and continued in that unit to a depth of 2363'. The breccia in this unit was found to be very tight, not particularly friable; to be slightly to moderately iron-stained; and to have minor fractures dipping 45-70°. at 2363' drilling intersected the Oracle granite-quartz monzonite which was found to be fresh to weakly altered and to contain only background amounts of copper and molybdenum mineralization. Drilling terminated at 2483' in the unmineralized granite.

Nowhere in either the upper Tertiary gravel section, the strongly deformed gravel-granite contact, nor the basal Oracle granite did copper or molybdenum mineralization increase above background level.

Summary: Drill Hole CG-7

Drill hole CG-7 was collared in post mineral alluvial material containing extrusive fragments and continued in that formation to a depth of 140 feet. At that point drilling passed into a more arkosic member of the Tertiary section and continued in arkosic gravel to bedrock at 910 feet. No exotic mineralization was recognized in the gravel section.

Between bedrock at 910 feet and T.D. at 2500, drilling intersected a number of intermediate igneous lithologies including Precambrian Oracle granite and granodiorite and quartz-latite, but most of the footage was drilled in what appears to be a stock or stock-like body of biotite-monzonite, or biotite-quartz-monzonite porphyry. Alteration affects observed in hole CG-7 appeared to be low grade phyllic or high grade propyllitic. Biotite tends to be chloritic at grain margins and is locally associated with very fine grained disseminated magnetite. Plagioclase is extensively altered to clay and sericite expecially in the supergene portion of the hole and K-feldspar tends to fairly clouded although no alteration product is visible as such. Part of the alteration observed in CG-7 is certainly supergene, and may also be affected by the intense cataclasis which appears to post-date alteration and sulfide mineralization.

The interval 910-1325 consisted of granitic rock showing evidence of clay-sericite alteration. Evidence of former sulfide was sparse, but nearly all of the leached zone showed strong transported iron stains and spotty chrysocolla and copper oxide mineralization. Average copper content for the 910-1325 interval was 0.21% Cu.

At 1325 drilling intersected strong chrysocolla and copper oxide mineralization also in altered granitic rock and continued in this mineralization to a depth of 1825. The rocks in this interval were strongly broken and brecciated and chrysocolla, occurring as an open-space filling associated with moderate to strong silicification and iron staining, accounted for most of the copper value. Evidence of former sulfide mineralization was sparse to absent possibly due to strong brecciation of the granitic post rock. The average copper grade for this 500 foot zone was 0.6% Cu. Chalcocite was noted in the interval 1825-2010, coating grains of pyrite and chalcopyrite. This mineralization was accompanied by moderate to strong clay-sericite alteration and averaged 0.5% Cu for the interval described above. The interval 2010-2400 carried 1-2% disseminated pyrite and chalcopyrite with occassional spotty chalcocite. Part of this interval was found to be strongly brecciated and several instances sulfide mineralization appeared to pre-date brecciation. Alteration consists principally of moderate to strong argillization and sericitization. All plagioclase grains are effective and all K-feldspar grains showed dull, clouded surfaces. Sulfides frequently occur in quartz veinlets and most veinlets have narrow, but well-developed alteration selvages. Below 2400 feet effects of leaching and oxidation, although present, were very slight and this interval essentially represents primary sulfide mineralization. Copper grade in this interval was found to be 0.27% Cu as chalcopyrite. Total sulfide amounted to 1-2% by volume and the ratio of chalcopyrite to pyrite is estimated to be 1:2 or 1:3.

Summary: Drill Hole CG-8

Drill hole CG-8 was collared in post mineral alluvial material and continued in that formation to a depth of 1980 feet. No exotic mineralizaton was recognized in the gravel section.

At 1980 feet drilling intersected strongly brecciated intermediate igneous rocks of diverse lithologies. The rapid and diverse lithologic variation observed in this interval is thought to be the result of excessive intersection of relatively small blocks caught in the larger fault zone. Alteration products include clay and sericite and transported limonite is abundant. Chrysocolla and copper pitch (?) occur as open space filling and account for mineralization in the interval 1980-2535 which averages 0.15% Cu. The interval 2535-2785 continued in breccia with sparse, partly oxidized primary sulfide and moderate to strong iron stain. Alteration consists of clay and sericite and sulfide mineralization where presence appears to predate the brecciation. The overall copper grade for this interval was found to be 0.07%.

The interval 2785-2914 T.D. also showed some effects of brecciation, but oxidation effects had sharply diminished and mineralization in this interval approximates primary sulfide mineralization. The copper grade for this interval was also found to be 0.07%.

SUMMARY: Drill Hole CG-9

Drill hole CG-9 was collared in post mineral alluvial material and continued in that formation to a depth of 1220'.

At 1220' drilling intersected a yellow strongly iron-stained arkosic unit which spot cores showed to be at least moderately fractured and slickensided. Fragments were argillized and some found to carry limonite suggestive of former pyrite.

At 1390' drilling intersected a dark reddish-brown conglomerate carrying occassional altered fragments and having a distinctly talcy matrix. This unit appears definitely sedimentary and may be a mid-Tertiary or older conglomeration, perhaps similar to the Burgess Peak Conglomerate.

At 1460' copper values which had been at background levels or slightly above jumped to about 0.03% Cu as drilling entered a bright yellow to yellow brown conglomerate or arkosic breccia. No copper minerals were identified in any of the upper section of CG-9 and Cu is assumed to be present in the yellow and red limonites which occur in this part of the hole.

At about 1650' a basic change from predominantly yellow iron staining to predominantly red iron staining occured along with a slight drop in copper assay values (see assay summaries below).

Drilling from 1650-1960' continued in deformed iron-stained (red) arkosic material. This section was found to contain long intervals of nearly pure clay which tended to swell and created moderately severe hole problems. At 1670' drilling passed abruptly into granite-quartz monzonite which was moderately altered and found to carry 1-2% disseminated and veinlet pyrite, chalcopyrite and chalcocite. Oxidation and leaching have removed some of the copper values (estimate 1/3 - 1/2) but those still present amounted to 0.02-0.05% Cu.

1960

Drilling terminated at 2037.5' on October 5, 1975.

ASSAY SUMMARY

Interval	Cu (ppm)	Mo (ppm)
0-1200	23	2
1200-1300	83	4
1300-1460	51	5
1460-1550	318	8
1550-1620	541	14
1620-2037.5 T.D.	210	17

M E M O R A N D U M

TO: J. David Lowell

FROM: John E. Kinnison JEK

SUBJECT: Casa Grande West - Asarco Negotiations

DATE: Jan. 18, 1977

The position of the Casa Grande West orebody, as now defined, indicates the obvious need to negotiate a sideline agreement with Asarco - probably well in advance of mine design. Small projections of ore from the Hanna/Getty orebody are indicated to extend onto Asarco ground, and the block cave "crack line" will extend into their ground on three sides.

Since the drilling is now into the development stage, I would suggest that negotiations would properly be initiated with Asarco mining management. Based on my experience as an Asarco employee, it seems likely that the actual negotiations will be with the regional office, but that initial contact would need to be on an executive level in New York.

The management of Asarco, in the past, has always been cooperative and realistic in such matters (for example Mission/Pima agreements). However, the people I know have largely retired, and the organization is headed by new faces (moved, however, from within Asarco by promotion and retirement).

The current chain of authority is:

(1) Vice President, Mining - Norman Visness, New York.

(2) Assistant Vice President, Mining - J.E.A. McDonald, New York.

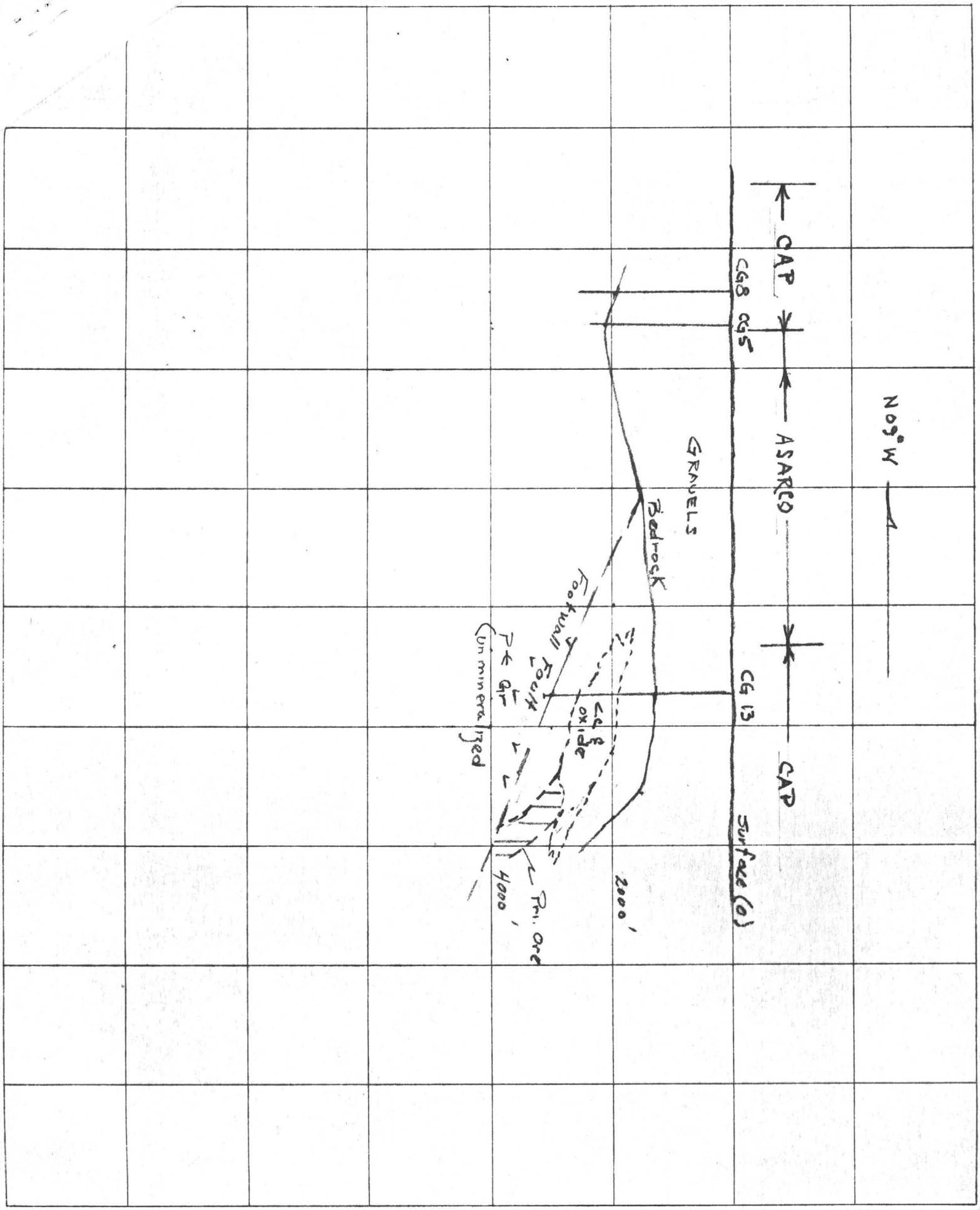
(3) Manager of Western Operations - Charles Campbell, Tucson (Campbell is also a Vice President and assistant to Visness)

(4) Manager of the Southwest Mining Department - Tom Scartaccini, Tucson.

Mr. Visness was formerly manager of the Asarco Couer d'Alene Mining Department. Mr. Campbell has had a long tenure with the Mexican operations.

These men would in part turn to the Manager of Western Exploration, W.G. Kurtz, and to J.H. Courtright, Chief Geologist, Exploration, both of whom are in the Tucson office. The Mining Department has, however, recently created the position of Chief Geologist, Mining Department, which is filled by Mr. Sal Anzalone - who reports directly to Visness in New York. He would certainly be called for consultation.

JEK/jeb



MINE _____ LOCATION C.G.W. Proj. LEVEL Cross-Sec.

GEOLOGY BY JEK SURVEY _____ DATE 1/19/77 SCALE 1"=2000'

N _____ E _____ EL. _____

45-625 EYE-EASE
45-725 20/20 BUFF
Made in U.S.A.

0.5% Cutoff
includes leached zones a la John Kinnian & LCA

Hole No	Interval	Length Ox	Length Sul	Cu %	Mo %	Polygon Area	Ton Factor	Tonnage
CG-3	1520-1690	170	—	0.61	—	498415	12.5	6,778,44
G-7	1435-1835	400	—	0.65	.007	269,810	12.5	8,633,92
	1835-2145	—	310	0.50	.010	269,810	12.5	6,691,28
CG-10	1455-1805	350	—	0.59	0.004	258,914	12.5	7,249,59
G-11	1610-1760	150	—	1.04	.010	468,304	12.5	5,619,648
	1760-1890	—	130	1.51	.019	468,304	12.5	4,870,36
	1890-2020	130	—	1.92	.015	468,304	12.5	4870,36
	2020-2460	—	440	0.53	.014	468,304	12.5	16,484,30
G-12	1955-2085	130	—	1.60	.018	404,319	12.5	4,204,918
	2085-2245	—	160	0.54	.017	404,319	12.5	5,175,283
G-16	2410-2930	520	—	1.05	0.010	951070	12.5	39,564,51
	2930-3364	—	434	1.15	.024	951,070	12.5	33,021,15
G-18	1980-2210	230	—	.96	.006	928,685	12.5	17,087,804
G-20	1710-1970	260	—	1.01	0.018	821,513	12.5	17,087,470
	1970-2780	—	810	0.~~66~~65	.004	821,513	12.5	53,234,04
G-13	1940-2140	190	—	1.24	.023	471,078	12.5	7160386
	2140-2840	—	700	0.81	.023	471,078	12.5	26,389,36
G-23	1840-~~1940~~ 1990	~~100~~ 150	—	~~2.73~~ 2.05	N.A.	1,191,957	12.5	9,535,65

0.5% Cutoff
includes leached zone a la John Kinnan & LCG

Hole No	Interval Top of ore	Length Ox	Length Sul	Cu %	Mo %	Polygon Area	Ton Factor	Tonnage
G-3	1520-1690	170	—	0.61	—	498415	12.5	6,778,44
G-7	1435-1835	400	—	0.65	.007	269,810	12.5	8,633,9
	1835-2145	—	310	0.50	.010	269,810	12.5	6,691,28
G-10	1455-1805	350	—	0.59	0.004	258,914	12.5	7,249,59
G-11	1610-1760	150	—	1.04	.010	468,304	12.5	5,619,648
	1760-1890	—	130	1.51	.019	468,304	12.5	4,870,36
	1890-2020	130	—	1.92	.015	468,304	12.5	4,870,36
	2020-2460	—	440	0.53	.014	468,304	12.5	16,484,30
G-12	1955-2085	130	—	1.60	.018	404,319	12.5	4,204,918
	2085-2245	—	160	0.54	.017	404,319	12.5	5,175,283
G-16	2410-2930	520	—	1.05	0.010	951070	12.5	39,564,51
	2930-3364	—	434	1.15	.024	951,070	12.5	33,021,15
G-18	1980-2210	230	—	.96	.006	928,685	12.5	17,087,804
G-20	1710-1970	260	—	1.01	0.018	821,513	12.5	17,087,470
	1970-2780	—	810	0.65	.004	821,513	12.5	53,234,04
G-13	1940-2140	190	—	1.24	.023	471,078	12.5	7160 38
	2140-2840	—	700	0.81	.023	471,078	12.5	26,389,36
G-23	1840-~~1940~~ 1990	~~100~~ 150	—	~~2.73~~ 2.05	N.A.	1,191,957	12.5	9,525,656

1692-1701 QMP Biot. stable. irreg seams spec plus lim. 3' Bx of silic por frags -- with good hhm plus chrys.

1752-1761 pЄgr Mod clay-ser. hm/py mostly, Tr hhm, chrys.

1788-1792 Bx & gg pЄgr frags. Sacked with hem + pulverent red hem - und?? hm or Cuprit Former Sulf 2%

1792-1797 pЄgr Vst supergene clay, irreg spec veinlets. Copper values [redacted] as tiny diss gr Cc + thicker veinlets Cc or py. Total Sulph 3%

1955-1964 pЄgr St. Qtz Ser./clay. Transp hm stains. 2% fine diss py w cc coatings.

2057-66 pЄgr Similar to above w/ Cc on py. Supergene clay. Some hhm on frac. Former total Sulf 3%.

2110-19 PЄgr w/ thin intercepts of QMP. Generally bx & Silic w/ Hem flooding. Mod Qtz-ser. hm transp. Former Sulph 1-2%

2146-54 QMP. biotite stable. Strongly crushed but not Bx. Vy st clay. Py veinlets partly ox to earthy or crunty red hem. Sulphides hard to estimate - 2%?.

2259-66 QMP Biotite stable. Discrete fine grains plus some pyrite veinlets, partly oxidized. Total original Sulph - including the oxidized portion, was low, about 1%.

JEK spot core checks - Notes CG-10

1044 - 1055 QMP Residual Biotite -- mostly oxidized. St Clay plus Qtz-Ser. St Orange & Red hem flooding. Some wk hm Former Sulph 2% as diss & thin strgs.

1188 - 1197 PCgr. Mod clay. - alt generally wk. 1% Former Sulph - py.

1141 - 1148 Mz por - dark groundmass - poss rextll. biot. ~~Pods~~ specks red ind. hm of uncertain origin -- prob sulf -- cpy? - Tr. ind hhm w/ py box wk. former sulf - 1%

1148 - 1150 Gouge. St supergene clay. Bx frags gr? with ind brown hm.

1197 - 1207 PEgr. Mod qtz-ser. Local st supergene clay. General hm flooding + some good hhm. Former Sulf 3%

1241 - 1250 PEgr - Similar to above, with less general hm flooding.

1296 - 1302 Mz por - like 1141-48: Books biot + rextll. biotin groundmass. Few thin seams with ind hm/cpy or cc. Former Sulph 1%

1302 - 1305 PEgr. St Qtz ser. Minor hhm + trans hm/py. Former Sulf 3%

1342 - 1351 Mz por - Books biot + rextll biot. Few Qtz-Ser veinlets w/ hm/py. Former sulf 1/2% - 2% spotty.

1414 - 1422 QMP. Biot stable on ragged books. Chalky feld. Som transp hm on frac. Former Sulf 1-2%. Minor Blue Cu Stain on chalky feld & clay seams.

1431 - 1439 QMP. Text. obliterated/Fu 33%. St Qtz-Ser + V.St. Supergene Clay. Transp hm/py + Minor wk hhm. Former Sulph 3% - Fract + diss.

1495 - 1501 QMP. Biot. stable. Mod clay. Mod chrys and red ind hem of uncertain origin. Transp hm/frac. Former Sulph 2%

1597 - 1604 silic Bx & Por. Qtz repl veins. Spec + Trans hm. St chrys in irreg frac.

1604 - 1606 silic QMP? - clay/ser. hm/py. in grains.

1660 - 1667 QMP. St. Qtz/Ser. + gen silic. Thin irreg seams hm (some hhm) plus some diss limonite/sulf gr. Mod chrys. Few books biot. remain.

Mining Geologist
Registered: Arizona
California

JOHN E. KINNISON
5450 N. Bowes Rd.
Tucson Arizona
85715

(602)749-3453

April 22, 1976

Mr. J. D. Lowell
5115 N. Oracle Road
Tucson, Arizona

Subject: Casa Grande
West CAP, Progress Report.
Job No. 0120.

Dear Sir:

I have made an independent review of drill core in the strongly mineralized part of the subject property. By combining these observations with Clark Arnold's detailed logs, I have reached some tentative conclusions, presented herewith. The brief text is supplemental to the data given by the attached interpretive graphic logs and cross-section.

Attachments

A. Graphic summary logs of drill holes 7, 10, 11, 12, and 13.

B. Notes from logging of holes 1, 3, 7, 10, 12, and 13.

C. Map showing drill holes, and a cross-section through ore zone.

Supplemental Maps

A revised District plan map showing drill holes and bedrock topography, and a revised District cross-section, have been given to Caroline Shakel for drafting.

Alteration

Quartz monzonite porphyry in holes 10, 7, and 11 is difficult to fit with standard "zones" of porphyry type alteration and mineralization. It is a generally low-total sulfide (2% by volume, my estimate) system, in which biotite was stable, or perhaps partly recrystallized. Typical sericite is present, but not in the abundance of the usual phyllic zone. Secondary K-spar is absent, or else very minor. Mineralization in Precambrian granite is not strongly sericitic, nor does it exhibit evidence of potassic alteration.

The best protore grades are in CG-7 (.30% Cu) and CG-11 (.42% Cu). I suggest that the transition from phyllic to potassic may be the position in established porphyry "models" which most closely corresponds to this deposit.

Oxidation and Chalcocite Enrichment

The history of leaching and enrichment in holes 10, 7, and 11 is complex, and clearly atypical compared to the mid-Tertiary enrichment history commonly seen at deposits in the southwest. Holes 12 and 13, however, appear to represent a single cycle enrichment history, later subjected to an oxidizing and unstable environment which has modified the chalcocite blanket. Because of this apparent difference in their enrichment history, I have inferred that a fault separates these two areas (Att. C).

The structural block penetrated by 7, 10, and 11 does not exhibit typical capping in any sense. Most limonite is transported, and relatively little supergene clay has been formed; yet there exists beneath this capping the remnants of a thick chalcocite zone, now largely converted in situ to oxide copper, with some leached zones. I believe the leaching and enrichment cycles in this block were never established by a stable water table. Possibly this area was one of great relief during the late Tertiary, and leaching and enrichment were almost coincidental.

Although the area is now a topographic basin, compared to the surrounding mountain ranges, there is more relief evident within the gravel-filled basin than there is in the adjacent low ranges. Prior to basin filling, Casa Grande West must have been on a high ridge. Some "root" portions of the Sacaton chalcocite zone may have been preserved on this ridge, after movement of Sacaton on the low-angle Basement Fault (refer to supplementary cross-section). The oxide copper zone above 1100 feet in CG-7 may be the basal

portion of such a chalcocite remnant.

The block penetrated by holes 12 and 13 is characterized by a thoroughly leached capping, with limonite derived from chalcocite together with very strong supergene clay (and possibly sericite). This zone overlies a high-grade copper oxide zone, which passes downward into an oxidized chalcocite zone. Supergene clays are strongly developed in the upper part of the oxide and chalcocite zone, and diminish gradually with depth.

This chalcocite zone is comparable to the ones at Sacaton and Silver Bell (the two nearest deposits), and at other deposits where a single-cycle of enrichment has been controlled by a gradually descending water table. The same late Tertiary cycle which both leached and enriched the adjacent area (hole 11, et.al.) also oxidized and leached the 12-13 area chalcocite blanket, and is responsible for deep leaching to the bottom depths penetrated by holes 12 and 13.

Interpretation

The block penetrated by holes 12 and 13 may be a segment of the Sacaton chalcocite zone, which had been displaced at least 2500 feet along a northerly trending fault. The throw was down on the east side. There is precedent for such a supposition in the fact that at Sacaton similar faults displace the chalcocite zone; the greatest measured throw being about 1200 feet, while one or more other faults have displacements in excess of 1800 feet. These faults pre-date the Basement Fault, and should have footwall counterparts.

Under this interpretation the western (hole 11) block derived its enrichment wholly during the late Tertiary uplift episode, while the eastern (hole 13) block was originally the Sacaton mid-Tertiary chalcocite blanket, modified and leached during the more recent uplift.

An alternate interpretation would have a displacement of about 300 feet along the inferred fault, as indicated by the position of narrow fingers of porphyry in CG-13 between 2100 and 2400 feet. Conceivably, the fractured granite on the east, separated by a gougy fault from the western block with thick monzonite bodies, could have established a normally descending water table at the same time that the west block maintained an irregular and open ground water drainage system.

Registered Geologist
CERTIFICATE EXPIRES
John E. Kinnison
DEC. 31, 1976
ARIZONA, U. S. A.

Mining Geologist
Registered: Arizona
California

JOHN E. KINNISON
5450 N. Bowes Rd.
Tucson Arizona
85715

(602)749-3453

March 17, 1976

Subject: Casa Grande West
CAP. Pinal County, Arizona.
Job No. 0121

Memorandum for J. D. Lowell:

The following is a summary of my brief initial review of the subject project.

Data derived by you and Clark Arnold regarding the Sacaton deposit (Asarco) are in large measure correct. You are probably correct in your interpretation that the area now being drilled by CAP and Asarco-Freeport represents at least one strand (if not the "root zone") of a low-angle fault, and that the Sacaton deposit is a higher, faulted portion of the same deposit.

Although some features do not quite match between the two deposits, the weight of drill data which can be constructed in a manner which does match suggests they are the same deposit, separated by at least one major low-angle fault.

Features that suggest correlation are:

1. Mineralization in both deposits is in pre-Cambrian granite, and a quartz monzonite porphyry with a dark groundmass (where supergene clays have not bleached the rock) and hydrothermal-stable biotite books.

2. The Sacaton Conglomerate of schist and granite fragments is the oldest post-mineral formation overlying Sacaton, and has been questionably found in CG-3.

3. A distinctive post-ore, volcanic-pebble conglomerate is found only on the east end of the Sacaton altered zone. A correlative conglomerate was found in CG-9, northeast of C.G.W.

4. Inferred alteration limits (refer subsurface plan) of the two deposits are correlative in size and direction of elongation.

I have spent most of the initial review attempting to put together an overall regional interpretation. I have prepared drafts of two illustrations: a district subsurface plan map, at a scale of 1": 2000 ft, and a longitudinal section to the same scale. These are ready for initial drafting. As now interpreted, a single main fault is theorized to separate the Sacaton and Casa Grande West deposits. As shown by the section, it is inferred to dip 20-30° east near C.G.W., but is nearly flat further east near Sacaton.

The "Basement Fault" is clearly bounded on the north by a major E-NE fault zone, which is vertical. I do not believe that the Basement Fault is merely offset by this north "boundary" fault, however; the two probably formed--in some manner--jointly. The Basement Fault, however, appears to be offset by a parallel E-NE fault south of the Sacaton deposit. Sacaton itself, then, lies in a narrow, elongate structural block, which is nearly parallel to the zone of alteration and mineralization.

Drilling at C.G.W., interpreted largely from the CAP holes, with meager data from Asarco drilling (past and present) indicates a zone of propylitic alteration with some exotic copper, surrounding a zone of more intense sulfidation and silicate alteration (mainly sericite and supergene clays). The best area is clearly near hole 11, which is where you are currently drilling.

Holes 5 and 8, north of the Asarco ground, are also well mineralized, and it is possible that a thin zone of ±.6% Cu as chalcocite was penetrated with the rotary drill in CG-5. This area could be a subsidiary fault strand, or a second copper zone. In any event, some additional drilling is warranted there.

I have the following suggestions for obtaining additional information, to aid geologic interpretation.

1. The area being diamond drilled, near holes 7 and 11, shows sufficient promise to justify the expense of preparing core boards for holes in that area. Samples can be readily split out from the crushed assay rejects.

2. The drill core is currently being restacked in the new storage room. As soon as the boxes are sorted and stacked in order, I would like to make a better review of core from the holes around No. 7. It should take about 4 or 5 days to do this, synthesize my observations with Clark Arnold's logs, and plot the data. This would then provide a good base, coupled with work I have already done, for further interpretive study as drilling progresses.

3. If rotary drilling gets deeper--say, 1300 or more feet

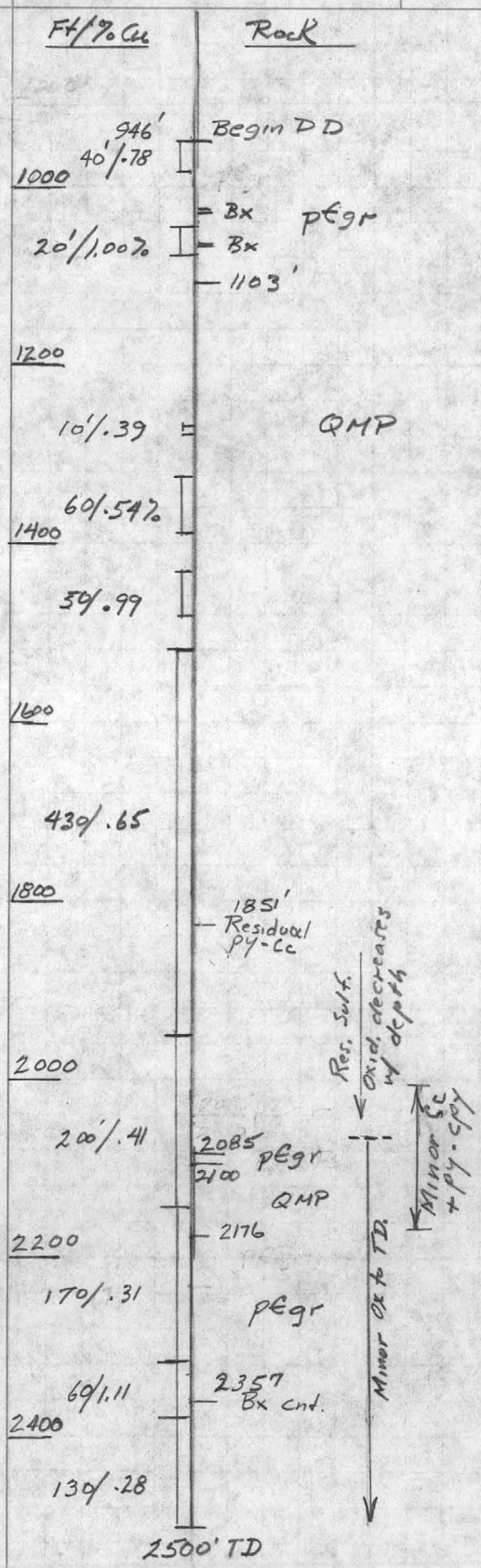
to bedrock--in the area where bedrock definition is more important, I think you should see if Wendell Knight can provide one of his larger portable pumps. It is mandatory to maintain 150 gpm circulation in order to provide good samples in the size holes being drilled ($5\frac{1}{2}$-6"). This requires a pump which can maintain 500-600 psi (which range is quickly reached in depth at plus 100 gpm). The standard 5X6 pumps will not do this, and a 5X8 or 5X10 is recommended.

John E. Kinnison

Registered Geologist
CERTIFICATE EXPIRES
John E.
Kinnison
DEC. 31, 1976
ARIZONA, U.S.A.

SUMMARY LOG LCA + JEK

CG-7



JEK Notes

966-76 Mod Ser/clay. Strgs of exotic chrys (but maynot have moved far). Orig Sulf est 2% Some hhm, brown spots hem, and goethite seams. Orig sulf ufg, diss, plus thin seams.

1001-11 St Ser-clay. Former Sul 2-3%. Lim mostly transp, but some ind. goeth. Some hhm.

1110-20 QMP Biotite stable, st clay. Red hem "fog". Former sul as frac filling. Mostly trans hem, some hhm

1167-76 do - Transp. hem flooding

1355-64 do - Bio. Stable. Less hem. flooding. hm on frac both trans & hhm. Some chrys. Py in one hem frac.

1443-52 QMP Biot. Stab. St. exotic Chrys on seams & Green-stn feld. Former sulf on seams 1-2% hm brown, transp.

1647-55 QMP Biot. stable. Fairly fresh to Mod clay. Evidence of former sulf meager, best prob was on thin frac. Lim Transp - brown & red Hem/goeth. No chrys - Cu must be as oxides with the lim.

1824-33 QMP - Somewhat crushed. St clay, hem. flooding varies st to wk. Biot → hem. wk pale chrys in clay. Py bx wk in red hem seam. Cu oxides not conspic -- assays higher than the rock looks.

1870-78 Do. Former sulf 4% as thicker seams. Bx wk/Py. Tr. py. Cu leaching more complete locally

2000-2007 QMP Biot stable. St clay -- prob supergene. Poss Cc mixed in clay. Py seams, some cpy. 2% sulf, partly ox to red stains.

2160-69 Do w/ st clay. Sulf 3%, mostly py on seams & diss. Poss. sooty Cc.

2335-45 PEgr St. Qtz-Ser, Mod clay. 2% Py mostly diss gr & fine strgs. Minor ox to sp. lim.

All Oxides

Mixed oxides & Sulfides

Principally primary sulfides

JEK Ap 76

Ft/Cu	Rock	JEK Notes
1000	Begin DD 1026	
	pEgr & Mz por interlayered in short intervals	1044-55 QMP Resid stable biot. -- mostly oxid. st clay, Qtz-Ser. hm flooding, wk hhm. Former Sulf 2%.
		1188-97 pEgr Mod clay, alt gen. wk. Former Sulf 1%.
1200		1197-1207 pEgr Mod Qtz-Ser, St. Superg. clay. hm flooding plus hhm. Former sulf 3%.
		1296-1302 Mz por. Biot. stable + rextil? Seams incl hm/cpy? Former sulf 1%.
		1302-1305 PEgr. St. Qtz-Ser. Transp hm + hhm. Former Sulf 3%.
1400	110/.23	1414-22 QMP Biot. stable. Former Sulf 1-2%. Tr chrys.
		1431-39 St clay. Obscure text. hm/py + hhm. Form Sulf 3%
		1495-1501 Biot. stable. Mod clay, Mod chrys. Form. Sulf 2%
	180/.51 QMP	
1600		1597-1604 Silic Bx & por. Qtz veins. Transp. hm & chrys
		1692-1701 Biot. stable. Spec in irreg seams + hm. hhm + chrys
	130/.28	
1800	50/.71 Some Cc + Cup & Chrys.	1788-97 pEgr. St. supergene clay + Cc diss & veinlets. Total sulf 3% hm flooding in gg zones.
	10/5.20 Gen. st. leaching	
	pEgr ← Resid WK Cc	1955-64 St Qtz-ser plus clay Trans hm: 2% Sulf Cc on py.
2000	← Resid wk Cc	2057-66 Sim. to above, more leaching. Some Cc on py, superg. clay. Former total sulf 3%
		2110-19 pEgr ^ Bx & silic. Mod Qtz-ser and hm flooding. Former sulf 1-2%.
2200	QMP Partly ox py.	2146-54 Biot. stable. V st clay. Py veinlets partly ox to earthy hem.
		2259-66 Biot. stable. Py veinlets + fine grains, partly ox. Low total sulf, 1%.
2400		
	2410 TD	

All Oxides

Mixed Oxides & Sulf

JEK Ap 76

Ft/%Cu	Rock	JEK Notes
	Begin DD 1121'	
1200	Mz por	Biot. stable. Transp hm on frac. Former sulf ± 1/2 %
	pEgr	Relict stable biot. in Mz. pEgr crushed & Bx/gg.
	Mz por	General st clay and hm flooding. Former sulf up to 4%.
1400	interlayed pEgr & Mz por & QMP in short intervals	1380-86 QMP st clay-ser. fine hm/cc. biot. partly bleached but still present.
		1439-47 QMP st. supergene clay + hm flooding. Form. sulf ± 2 %
		st hm flooding in Gr & Mz. st clay. Orig Sulf ± 2%
1600	30/.33	1598-1608 QMP. Rextl/3 biot. Feld → st clay. All transp hm. Former sulf 1-2%
	120/1.25	1644-53 QMP w/incl gr. Frac have red earthly hm + chrys. Tr hhm as fine grains.
1800	70/.78 ← 1760 First Cc QMP	Biotite stable + Qtz-sericite veins. hhm, red earthy hm Possible Cuprite. Occassional low-assay intervals are leached. Total Sulf Orig ± 3% Partly ox, Cc → chrys, Cuprite.
	210/1.87	1912-21 pEgr. Silic. Qtz strgs w/chryst brochantite? Orig Sulf low - 1%
2000		
	Leached	2022-31 Silic + ser. Resid fine gr Cc on py. Partly leach. former Sulf 1-2%
2200	90/.97 pEgr	2224-39 Mod-St Ser. Irreg strgs and diss gr of Cc on py. Immature, insip leach. & ox. Produces Transp brown hm/py. Total sulf 2-3%
2400	290/.55	2348-57 Similar to above; Total sulf 4%. Insip. oxidation
	← Approx base of Cc based on assays.	2537-47 Sim. to above Mod Ser, silic. Py-cpy. Total Sulf 2-3%.
2600	300/.42	2638-48 Similar to above but weaker silic. Total sulf 2% Tr. ox.
		2748-51 Similar to above. No ox. Total Sulf 2 %
2800	QMP	
	2799 TD	

Insipient leaching decreas. w/depth.

☐ All Oxides

☐ Mixed Oxides & sulf

☐ Principally primary sulf.

JEK Ap 76

SUMMARY LOG LCA + JEK

CG-12

Ft/Cu	Rock	JEK Notes
	Begin DD 1268	
		1300' - St Qtz-ser, some relict stable biot. Some LLm - Mostly Maroon transp (almost LLm) Former sulf 3%
1400	QMP	
		1400 - QMP bleached biot in st clay. Transp red Lm. Former sulf 2%
		1500 & 1600 St silic gr. LLm gr + Transp Lm/frac. Former sulf 2%. Qtz-Ser.
1600		
		1710 St. supergene clay. LLm on frac & fine diss. Former sulf 2%
1800		
		1871 - do - st clay. Minor LLm + reddish hem fog. former sulf 2%
	1951 Begin st ox zone	1960 - St. supergene clay. Atacamite? on frac. Minor LLm.
2000		
140/1.50		
	p€gr	2070 - st clay. Frac w/ Atacamite? + chrys. Former sulf hard to read - ± 2%?
40/.80	Cc begins 2091 interm. Leach & ox.	
		2130-40 St silic + qtz-ser. Cc on py as fine gr + Few 1/8" vnlet; overlies leached zone. Sulf 3%
2200 20/.84		
20/1.36	QMP	
		2250 st supergene clay. fn diss sooty Cc, w/ leach. areas with red Lm flooding.
	p€gr	
2400 40/1.33	QMP	2400 QMP - Biot stable, Feld st. clay. Cc veinlets partly ox. Total former + pres sulf < 2%, on frac.
		2500 P€gr - Ser + silic. Tr resid sooty Cc. Transp. red Lm + some fine diss LLm. former sulf 1½%
	p€gr	
2600		2595 silic + chrys. Some diffuse red hem.
		2700 Silic + diffuse chrys, locally st. Red hem as above. < 1½% former sulf.
2800	Vy wk Cu Min below 2750	
		2930 - Gr - Gen Silic, wk clay. Minor chrys. Lm/py former sulf ½%
	End evid of Pri Miner.	
	Shear zone	
3000	p€gr	2938-89 Gouge & shears in gr. Transp Lm, some exot. chrys.
		2989 - 3009 Drilling Fresh pre€ gr.

Leached Cc Zone

All Oxides

Mixed Oxides & sulfides

Sulf. Estimates by volume

JEK Ap 76

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
Made in U.S.A.
NATIONAL

Ft/Cu	Rock	JEK Notes
	Begin DD 1330	
1400		1360 st ser, Mod clay. Transp hem & fog. Some specks Lhm 1-2% Former sulf.
		1450 St supergene clay + ser. Some Lhm + Transp hem on frac. Former Sulf 2%
1600		1560 St supgene clay. All hm is Lhm, diss & frac. Former sulf 1-2% All K-spar → clay
	pEgr	1643 do. classic leached cap. /Cu. 2% Form. Sulf.
1800		1733 St clay but some K-spar stable. 50% Lhm + 50% Transp. hem /frac & as fog. Form sulf 2%
		1900 Similar to above. St clay/ser. Most hm is Transp or fog; some Lhm Former sulf 4%
2000 110/1.97	Top st. visible green oxides	1978 St clay. Atacamite?, chrys, earthy red hem. Tr Lhm diss.
10/2.15	1st Cu QMP	2060 QMP. Biot. rextl/3d. Veinlets Cu on py/cpy. Some Cu → Pitch. Total sulf 2%
		2100 Mod-st clay. Thin Qtz-ser veins. Atacamite? and transp red hem.
2200 100/1.73	pEgr	2200 St ser-clay. K-spar stable. fine diss Cu. Total Sulf 2 1/2 %
140/1.03	QMP	2245 QMP - Biot. rextl/l. chalky feld. Cu vnlets & diss, partly ox. to red transp hem + fog.
2400		2400 pEgr has odd text & color. Wk clay-ser. Cu diss & strgs. Pink alt min -- anhydrite?? Cu partly ox to hem & cuprite. Sulf 2-3%
140/.45		2520 Gr as above, alt similar w/more abund pink mineral. Lhm thin strgs & grains. Minor Jar/Goeth. Possible tenorite. Former Sulf 4%
2600 30/.62	pEgr	
10/1.29 Last avail Assay		END JEK NOTES
2800		
	Drilling occas Cu in PEgr	
3000		

All oxide

All Sulfide

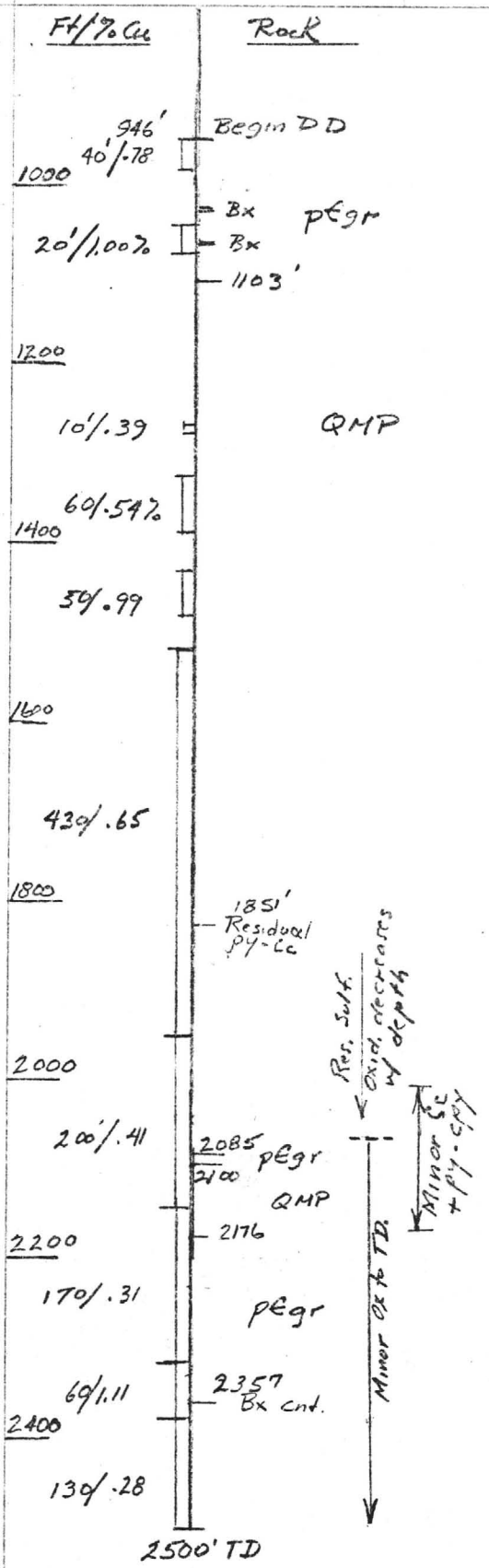
Oxidized & leached sulfide + Cuprite & Native

JEK Ap 76

Sulf. Est by volume

SUMMARY LOG LCA + JEK

CG-7



JEK Notes

966-76 Mod Ser/clay. Strgs of exotic chrys (but may not have moved far). Orig Sulf est 2% some hhm, brown spots hem, and goethite seams. Orig Sulf vfg, diss, plus thin seams.

1001-11 St Ser-clay. Former Sul 2-3%. Lim mostly transp., but some ind. goeth. Some hhm.

1110-20 QMP Biotite stable, st clay. Red hem "fog". Former sul as free filling. Mostly trans hem, some hhm

1167-76 do - Transp. hem flooding

1355-64 do - Bio. Stable. Less hem. flooding. hm on frac both trans & hhm. Some chrys. Py in one hem frac.

1443-52 QMP Bio. Stab. St. exotic Chrys on seams & Green-stn fld. Former sulf on seams 1-2% hm brown, transp.

1647-55 QMP Biot. stable. Fairly fresh to Mod clay. Evidence of former sulf meager, but prob was on thin frac. Lim Transp - brown & red Hem/goeth. No chrys - Cu must be as oxides with the lim.

1824-33 QMP - Somewhat crushed. St clay, hem. Flooding varies st to wk. Biot → hem. WK pale chrys in clay. Py bx wk in red hem seam. Cu oxides not conspic -- assays higher than the rock looks.

1870-78 Do. Former sulf 4% as thicker seams. Bx wk/Py. Tr. py. Cu leaching more complete, locally

2000-2007 QMP Biot stable. St clay -- prob supergene. Poss Cc mixed in clay. Py seams, some cpy. 2% Sulf, partly ox to red stains.

2160-69 Do w/ st clay. Sulf 3%, mostly py on seams & diss. Poss. sooty Cc.

2335-45 PE gr St. Qtz-Ser, Mod clay. 2% Py mostly diss gr & fine strgs. Minor ox to sp. lim.

All Oxides

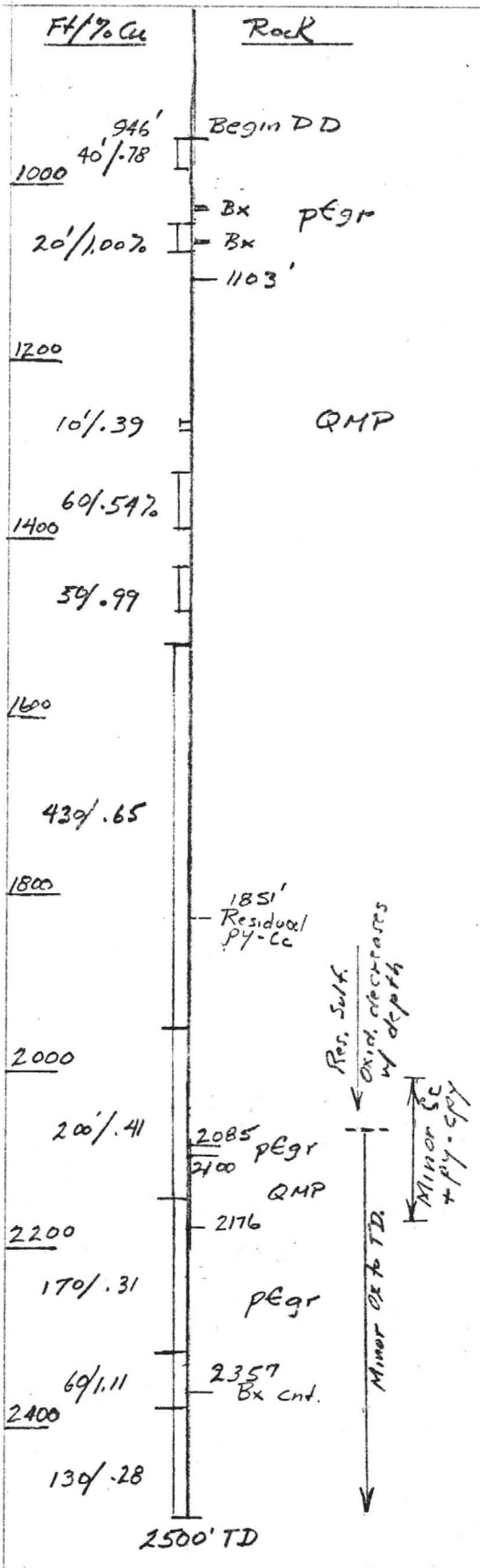
Mixed oxides & Sulfides

Principally primary sulfides

JEK Ap 76

SUMMARY LOG LCA+JEK

CG-7



JEK Notes

966-76 Mod Ser/clay. Strgs of exotic chrys (but maynot have moved far). Orig Sulf est 2% some hhm, brown spots hem, and goethite seams. Orig Sulf vfg, diss, plus thin seams.

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1110-20 QMP Biotite stable. St clay. Red hem "fog". Former sul as frac filling. Mostly trans hem, some hhm

1167-76 do - Transp. hem flooding

1355-64 do - Bio. Stable. less hem. flooding. hm on frac both trans & hhm. Some chrys. Py in one hem frac.

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1870-78 Do. Former sulf 4% as thicker seams. Bx wk/Py. Tr. Py. Cu leaching more complete locally

2000-2007 QMP Biot stable. St clay -- prob supergene. Poss Cc mixed in clay. Py seams, some cpy. 2% sulf, partly ox to red stains.

2160-69 Do w/ st clay. Sulf 3%, mostly py on seams & diss. Poss. sooty Cc.

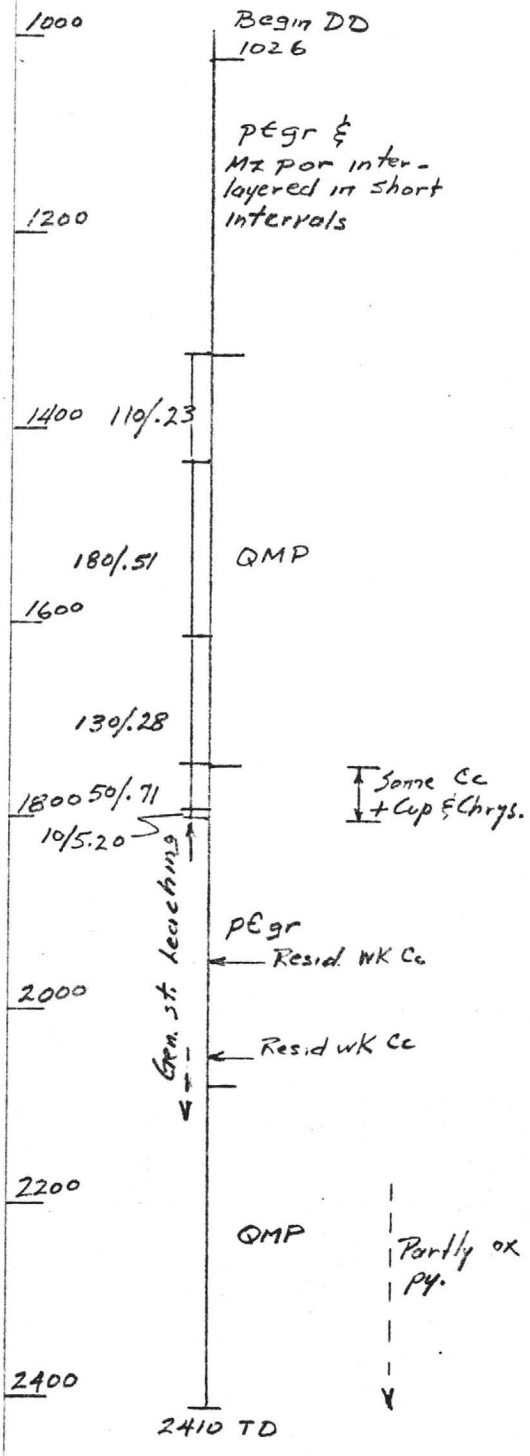
2335-45 PEgr St. Qtz-Ser, Mod clay. 2% Py mostly diss gr & fine strgs. Minor ox to sp. lim.

All Oxides

Mixed oxides & Sulfides

Principally primary sulfides

JEK Ap 76



JEK Notes

1044-55 QMP Resid stable biot - - mostly oxid. st clay, Qtz-Ser. hm flooding, wk hhm. Former Sulf 2%

1188-97 pEgr Mod clay, alt gen. wk. Former sulf 1%

1197-1207 pEgr Mod Qtz-Ser, St. Superg. clay. hm flooding plus hhm. Former sulf 3%

1296-1302 Mz por. Biot. stable + text!! ? Seams incl hm/cpy? Former sulf 1%

1302-1305 PEgr. St. Qtz-Ser. Transp hm + hhm. Former sulf 3%

1414-22 QMP Biot. stable. Former Sulf 1-2%. Tr chrys.

1431-39 St clay. Obscure text. hm/py + hhm. Form Sulf 3%

1495-1501 Biot. stable. Mod clay, Mod Chrys. Form. Sulf 2%

1597-1604 Silic Bx & per. Qtz veins. Transp. hm & chrys

1692-1701 Biot. stable. Spec in irreg seams + hm. hhm + chrys

1788-97 pEgr. St. supergene clay + Cc diss & veinlets. Total sulf 3% hm flooding in gg zones.

1955-64 St Qtz-ser plus clay Trans hm. 2% Sulf Cc on py.

2057-66 Sim. to above, more leaching. Some Cc on py, superg. clay. Former total sulf 3%

2110-19 pEgr Bx & silic. Mod Qtz-ser and hm flooding. Former sulf 1-2%.

2146-54 Biot. stable. V st clay, Py veinlets partly ox to earthy hem.

2259-66 Biot. stable. Py veinlets + fine grains, partly ox. Low total sulf, 1%.

All Oxides

Mixed Oxides & Sulf

JEK Ap 76

Ft/%Cu	Rock	JEK Notes
	Begin DD 1121'	
1200	Mz por	Biot. stable. Transp hm on frac. Former sulf ± ½%
	pEgr	Relict stable biot. in Mz. pEgr crushed & By/gg. General st clay and hm flooding. Former sulf up to 4%.
	Mz por	
1400	interlayed pEgr & Mz por & QMP in short intervals	1380-86 QMP st clay-ser. fine hm/cc. biot. partly bleached but still present.
		1439-47 QMP st. supergene clay + hm flooding. Form. sulf ±2%.
		st hm flooding in Gr & Mz, st clay. Orig Sulf ±2%.
1600		1598-1608 QMP. Rextllz biot. Feld → st clay. All transp hm. Former sulf 1-2%
30/.33		
120/1.25		1644-53 QMP w/incl gr. Frac have red earthly hm + chrys. Tr hhm as fine grains.
1800 70/.78	← 1760 First Cu QMP	Biotite stable + Qtz-sericite veins. hhm, red earthy hm Possible Cuprite. Occassional low-assay intervals are leached. Total Sulf Orig ±3%. Partly ox, Cu → chrys, Cuprite.
210/1.87		1912-21 pEgr. Silic. Qtz strgs w/chrys + brochantite? Orig Sulf low - 1%.
2000		
	Leached	2022-31 Silic + ser. Resid fine gr Cu on py. Partly leach. former Sulf 1-2%
2200 90/.97	pEgr	2224-39 Mod-st ser. Irreg strgs and diss gr of Cu on py. Immature, insip leach. & ox. Produces Transp brown hm/py. Total sulf 2-3%
2400 290/.55	Insipient leaching decreas. w/depth.	2348-57 Similar to above; Total sulf 4%. Insip. oxidation
	← Approx. base of Cu based on assays.	2537-47 Sim. to above Mod Ser, silic. Py-cpy. Total Sulf 2-3%.
2600		
300/.42		2638-48 Similar to above but weaker silic. Total sulf 2%. Tr. ox.
		2748-51 Similar to above. No ox. Total Sulf 2%.
2800	QMP	
2799 TD		

All Oxides

Mixed Oxides & sulf

Principally primary sulf.

JEK Ap 76

SUMMARY LOG LCA + JEK

CG-12

Ft/Cu	Rock	JEK Notes
	Begin DD 1268	
		1300' - St Qtz-ser, some relict stable biot. Some Lim - Mostly Maroon transp (almost Lim) Former sulf 3 %
1400	QMP	1400 - QMP bleached biot in st clay. Transp red Lm. Former sulf 2 %.
		1500 & 1600 St silic gr. Lim gr + Transp Lm/frac. Former sulf 2%. Qtz - Ser.
1600		
		1710 St supergene clay. Lim on frac & fine diss. Former sulf 2 %
1800		1871 - do - st clay. Minor Lim + reddish hem fog. former sulf 2 %
	1951 Begin st ox zone	1960 - St supergene clay. Atacamite? on frac. Minor Lim.
2000		
140/1.50	pЄgr	2070 - St clay. Frac w/ Atacamite ? + chrys. Former sulf hard to read - ± 2% ?
40/1.80	Cu begins 2091 interm. Leach & ox.	2130-40 St silic + qtz-ser. Cu on py as fine gr + Few 1/8" vnlet; overlies leached zone. Sulf 3%
2200 20/.84		
20/1.36	QMP	2250 St supergene clay. fn diss sooty Cu, w/ leach. areas with red Lm flooding.
	pЄgr	
2400 40/1.33	QMP	2400 QMP - Bi.t stable, Feld st. clay. Cu vemlets partly ox. Total former + pres sulf < 2 %, on frac.
	pЄgr	2500 pЄgr - Ser + silic. Tr resid sooty Cu. Transp. red Lm + some fine diss Lim. former sulf 1½ %
2600	Leached Cu zone	2595 silic + chrys. Some diffuse red hem.
		2700 Silic + diffuse chrys, locally st. Red hem as above. < 1½% former sulf.
2800	Vy wk Cu Min below 1750	
	End evid of Pri Miner.	2930 - Gr - Gen Silic, wk clay. Minor chrys. Lm/py former sulf ½ %
	Shear zone	
3000	pЄgr	2938-89 Gouge & shears in gr. Transp Lim, some exot. chrys.
		2989 - 3009 Drilling Fresh pre Є gr.

All Oxides

Mixed Oxides & sulfides

Sulf. Estimates by volume

JEK Ap 76

SUMMARY LOG LCA + JEK

CG-12

Ft/Cu	Rock	JEK Notes
	Begin DD 1268	
		1300' - St Qtz-ser, some relict stable biot. Some Lim - Mostly Maroon transp (almost Lim) Former sulf 3 %
1400	QMP	1400 - QMP bleached biot in st clay. Transp red Lm. Former sulf 2 %.
		1500 & 1600 st silic gr. Lim gr + Transp Lm/frac. Former sulf 2%. Qtz-Ser.
1600		
		1710 St. supergene clay. Lim on frac & fine diss. Former sulf 2 %
1800		1871 - do - st clay. Minor Lim + reddish hem fog. former sulf 2 %
	1951 Begin st ox zone	1960 - St. supergene clay. Atacamite ? on frac. Minor Lim.
2000		
140/1.50	pЄ gr	2070 - st clay. Frac w/ Atacamite ? + chrys. Former sulf hard to read - ± 2% ?
40/1.80	Cu begins 2091 interm. Leach & ox.	2130-40 St silic + qtz-ser. Cu on py as fine gr + Few 1/8" vnlet; overlies leached zone. Sulf 3%
2200 20/.84		
20/1.36	QMP	
	pЄ gr	2250 st supergene clay. fn diss sooty Cu, w/ leach. areas with red Lm floating.
2400 40/1.33	QMP	2400 QMP - Bi.t stable, Feld st. clay. Cu veinlets partly ox. Total former + pres sulf < 2 %, on frac.
	pЄ gr	2500 pЄ gr - Ser + silic. Tr resid sooty Cu. Transp. red Lm + some fine diss Lim. former sulf 1½ %
2600	Leached Cu zone	2595 silic + chrys. Some diffuse red hem.
		2700 Silic + diffuse chrys, locally st. Red hem as above. < 1½% former sulf.
2800	Vy wk Cu Min below 1750	
	End evid of Pri Miner.	2930 - Gr - Gen Silic, wk clay. Minor chrys. Lm/py former sulf ½ %
	Shear zone	
3000	pЄ gr	2938-89 Gouge & shears in gr. Transp Lm, some exot. chrys.
		2989 - 3009 Drilling Fresh pre Є gr.

All Oxides

Mixed Oxides & sulfides

Sulf. Estimates by volume

JEK Ap 76

SUMMARY LOG LCA + JEK

CG-13

Ft/Cu	Rock	JEK Notes
	Begin DD 1330	
		1360 St ser, Mod clay. Transp hem & fog. Some specks Lhm 1-2% Former sulf.
1400		1450 St supergene clay + ser. Some Lhm + Transp hem on frac. Former Sulf 2%
		1560 St supgene clay. All Lm is Lhm, diss & frac. Former sulf 1-2% All K-spar → clay
1600		
	pЄgr	1643 do. classic leached cap. /Cc. 2% Form. Sulf.
		1733 St clay but some K-spar stable. 50% Lhm + 50% Transp. hem/frac & as fog. Form sulf 2%
1800		
		1900 Similar to above. St clay/ser. Most Lm is Transp or fog; some Lhm Former sulf 4%
	← Top st. visible green oxides	1978 St clay. Atacamite?, chrys, earthy red hem. Tr Lhm diss.
2000 110/1.77		
10/2.15	← 1st Cc	2060 QMP. Biot. rextllzd. Veinlets Cc on py/cpy. Some Cc → Pitch. Total Sulf 2%
	QMP	2100 Mod-st clay. Thin Qtz-ser veins. Atacamite? and transp red hem
2200 100/1.73	pЄgr	2200 St ser-clay. K-spar stable. fine diss Cc. Total Sulf 2½%
	QMP	2245 QMP - Biot. rextll. chalky feld. Cc vnlets & diss, partly ox. to red transp hem + fog.
140/1.03		
2400		2400 pЄgr has odd text & color. WK clay-ser. Cc diss & strgs. Pink alt min -- anhydrite?? Cc partly ox to hem & cuprite. Sulf 2-3%
140/.45		2520 Gr as above, alt similar w/more abund pink mineral. Lhm thin strgs & grains. Minor Jar/Goeth. Possible tenorite. Former Sulf 4%
2600	pЄgr	
30/.62		
10/1.29		END JEK NOTES
Last avail Assay		
2800		
	Drilling occas Cc in PЄgr	
3000		

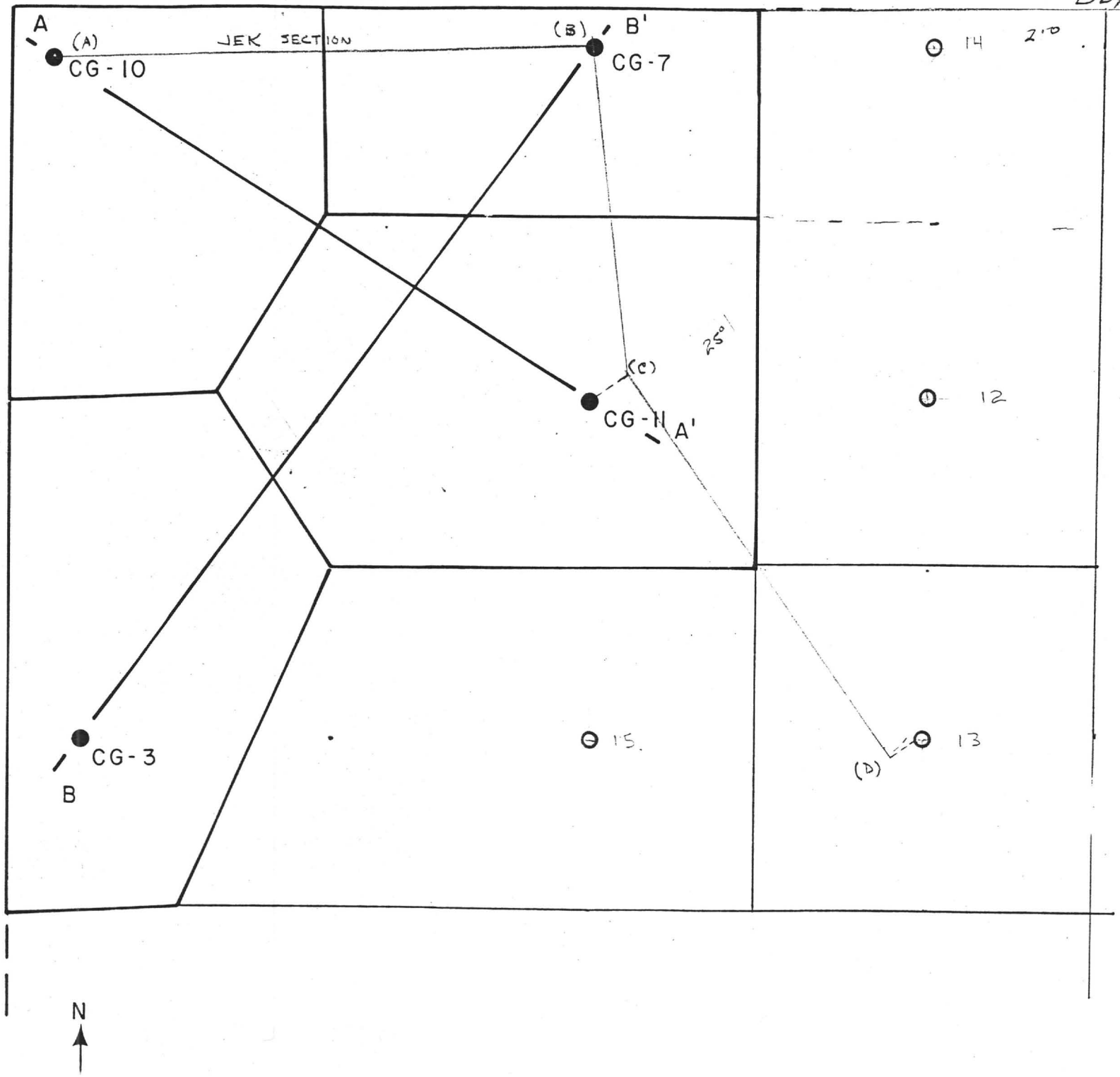
All oxide

All Sulfide

Oxidized & leached sulfide + Cuprite & Native

JEK Ap 76

Sulf. Est by volume

Section 13, SE 1/4

BOY. COLLINS PR