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CAP
BLACK HILLS RECONNAISSANCE
GRANITE BELOW LOW ANGLE FAULT
&
INTERNAL STRUCTURE UPPER PLATE

JEK

CONCLUSIONS

The Tar Min Mineralization was in both volcanics of Tcf in upper plate, ~~with sim.~~ and in PEgr in Lower Plate: Very low sulfide shear zone, Chalcocite w/ minor cpy and very minor pyrite - oxidized to copper Pitch w/o transportation, and minor leaching of pyrite. Silver in dump samples in sub-ore grade. Reports are of silver-gold production, suggesting similar origin as ~~the~~ Tar Min at Mammoth. Copper value in granite dump samples is related to visible prop. alteration or quartz, with geochemically low and visibly unaltered dump probably from workings away from vein. No evidence of pervasive porphyry Cu type mineralization can be reconstructed from this data.

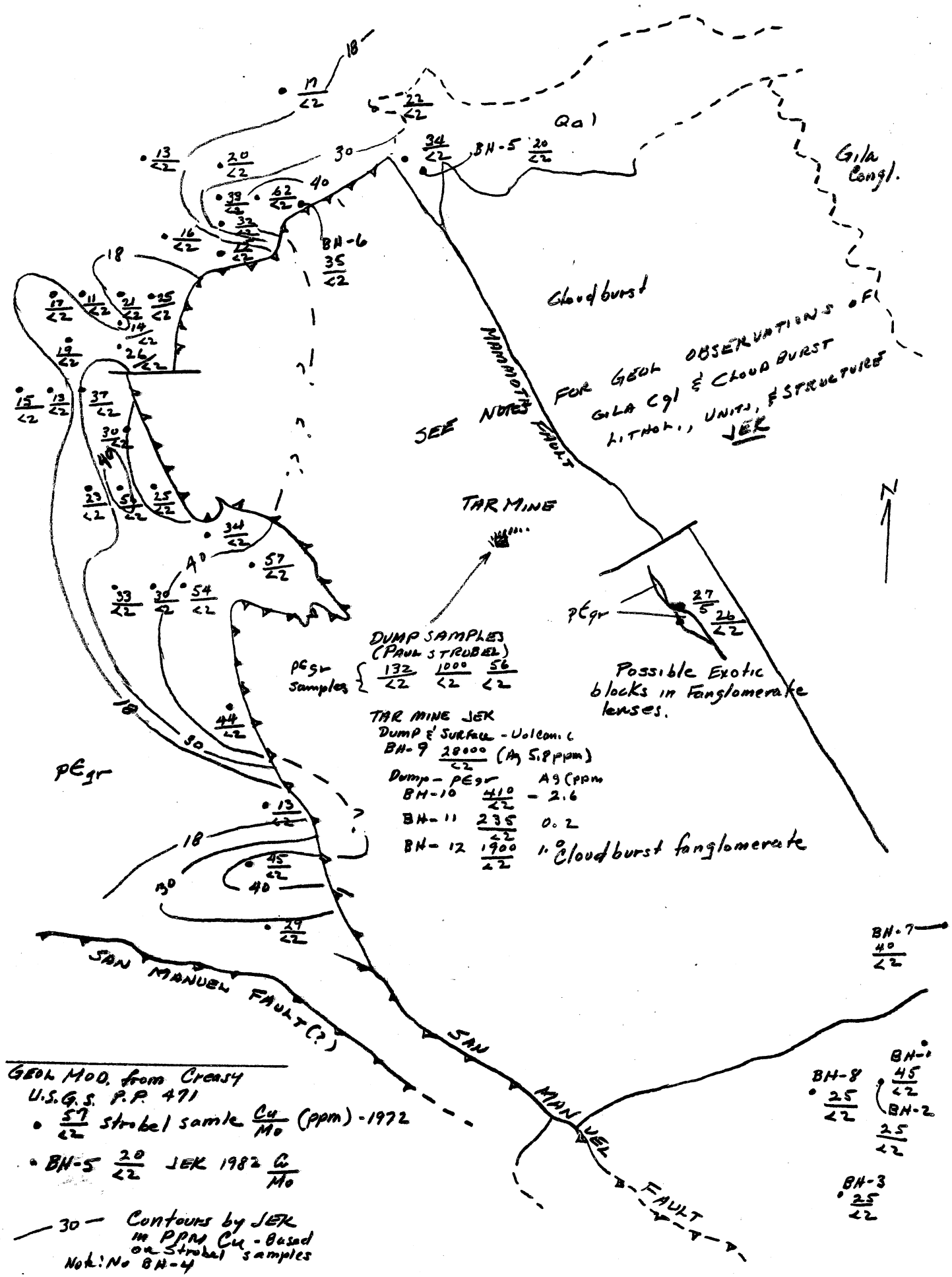
Creasy maps other areas of pE granite as ~~[illegible]~~ windows or fault slices, but these are best attributable to being part of the Cloudburst Conglomerate units.

The original (Strobel) samples which indicate a slight increase toward the low-angle fault surface may be attributable to some correlation to the fault itself, extending downward into the granite for 20-30 feet. Thus, samples farther from fault outcrop trace are also eroded more from original vertical distance below fault, and are thus falling to a low-background.

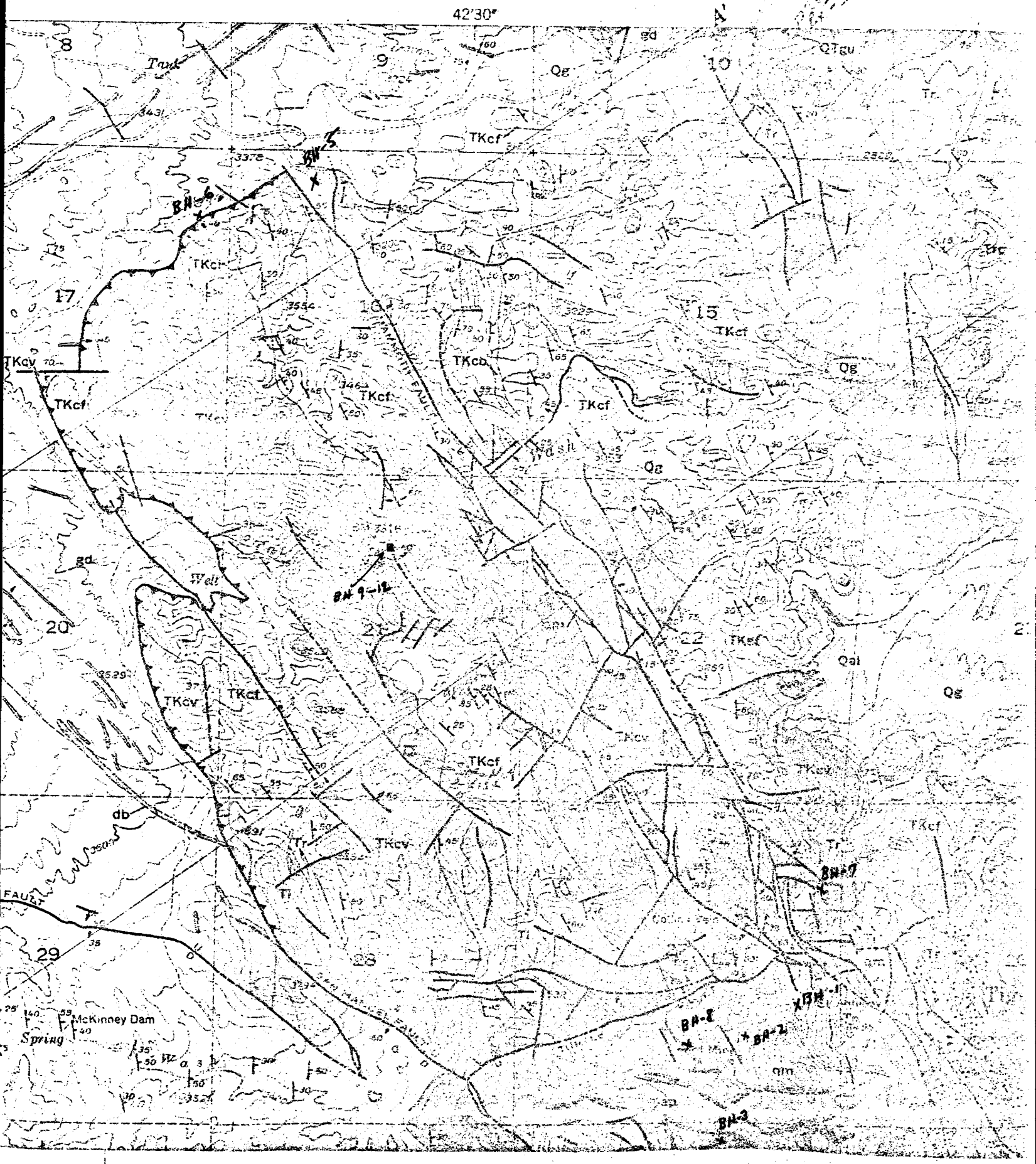
No further work is recommended.

JEK
August 1982.

Data & Notes Attach


Qal
Gila Congl.
Cloudburst
MAMMOTH FAULT
SEE NOTES FOR GEOL OBSERVATIONS GILA Cgl & CLOUD BURST LITHOL., UNITS, & STRUCTURES JEK
TAR MINE
pEgr
DUMP SAMPLES (PAUL STROBEL)
pEgr samples 132/<2 1000/<2 56/<2
TAR MINE JEK
Dump & Surface - Volcanic
BH-9 28000/<2 (Ag 5.8 ppm)
Dump - pEgr Ag (ppm)
BH-10 410/<2 - 2.6
BH-11 235/<2 0.2
BH-12 1900/<2 1.0 Cloudburst fanglomerate
Possible Exotic blocks in Fanglomerate lenses.
BH-5 20/<2
BH-6 35/<2
BH-7 40/<2
BH-8 25/<2
BH-1 45/<2
BH-2 25/<2
BH-3 25/<2
SAN MANUEL FAULT (?)
SAN MANUEL FAULT
GEOL MOD. from Creasy U.S.G.S. P.P. 471
• 57/<2 strobel samle Cu/Mo (ppm) - 1972
• BH-5 20/<2 JEK 1982 Cu/Mo
30 — Contours by JEK in PPM Cu - Based on Strobel samples
Note: No BH-4
GEOCHEMICAL SAMPLES ~ BLACK HILLS FAULT PLATE, pEgr footwall, Cloudburst H.W.
PINAL COUNTY - ARIZONA
1" = 2000'
JEK & P.S.

THE INTERIOR



BH 5 thru 12

		Cu ppm	Mo ppm	Ag ppm
BH	5	20	<2	Not analyzed
	6	35	<2	"
	7	40	<2	"
	8	25	<2	"
	9	28000 2.8%	<2	5.8
	10	410	<2	2.6
	11	235	<2	<.2
	12	1,900 .19%	<2	1.0

Mammoth Quad & Creasy Map (P.P. 471)
7.5'

(Number reference to ~~PI~~ Pencil notation on P1 1, P.P. 471 - JDL Library Copy.)

June 18, 1982
Reconnaissance, JEK
Blacks Hills Pinal Co Ag
NW of Mammoth
~~Edited Topo~~ Recorded Notes

P7!

① Tor Wash, going upstream, turn off of County Rd on Sec 12. Gila cgl, flat lying, at ~~mot~~ mouth of wash; ± 1 Mi above RR track (NW 1/4 Sec 14, T8S, R16E) beds assume a purple cast -- in this type cgl dip steepens gradually. Dipping NE as approach to outcrop (~~cgl~~) Rhyolite in center Sec 14 is made. Dips in

② Gila flat increase to 5° up to 15-25°, as mapped. Composition of dipping beds largely granitic sand & boulders to 1 ft (ave 4-6"). Other major type, cobbles to max 5" gen angular, are volcanics -- andesite and andesite porphy, like volcanics from T. Cloudcharst fm. Gen small Frags up to some 4" of Apache gp or tray qtzt.

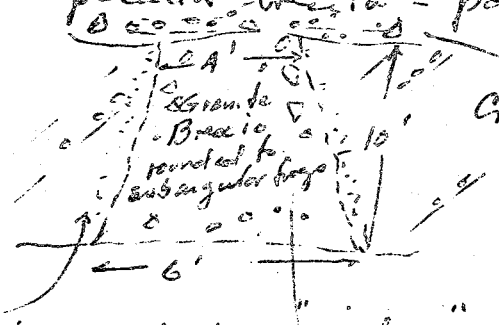
③ Tor Wash - ~~E~~ E. edge of ctc in Sec 14 - Rhy & Rhy porphyry, light colored fm granical. Creasy maps this correlative with the Rhyolite (intrusive) at Tiger. Contact on E with dipping Gila is abrupt -- South wall of wash cut well exposed -- Sedimentary contact w/ basal cgl of small angular frags of purple to dk brn volc. Lops onto BR of a rubble zone in Rhy. Fault below Sed. cont st. N or NW and dips N or NE. Gouge & Bx 2' wide with rubble or Bx on A (FW) Sides. Contact is clearly Sed, and probably overlaps an erosional fault scarp (pre-Gila) -- BR surface rises more steeply the cgl dip (which could be sed. dip?) -- and the Rhy was a slight Topo. high of at least 40 ft.

④ Tor Wash
Basal cgl to Gila upper member (Creasy). No dips mapped, but contact trace indicates dip to NE similar to dips in "upper member" just E of Rhy ctc.

Tributary to Tar Wash — 1/4 Mi. E W line of Sec 14

(5) Tar Wash, first exposures in wash of Cloudburst fangl.

South bank — peculiar breccia — possibly a breccia dike.



Gila cgl — Qtzt boulders up to 2'. Creasy's basal cgl(?).

Baking or structural "grinding" along margins, in Cloudburst fm.

(6) Tar Wash
Low dips in gila — frags are granitic sand & small gr frags, with much qtzt frags, also small, and secondary abundance of volcanics. All clasts smallish, ranging from an inch up to 2".

South Tributary to Tar wash
(7) Cloudburst fangl — purplish well ~~sorted~~ stratified cgl in beds ~~[illegible]~~ 1-4' thick with sandy layers intercalated in thin beds. Most frags are volcanics plus minor qtzt. Dips as Creasy has mapped. Some purple volcanic sandstone, well stratified; distinct X-bd locally — an 8' section of volc ss. (dark red to lightish green)

(8) Volcanic mint of Cloudburst — generally ~~[illegible]~~ andesite porph. & massive andesite, with rubbly breccia texture in some parts.

Tar Mine in Tar wash —
Vertical Shaft on south side of Tar Wash — short open cut drives in on N. side of Tar wash. Creasy reports verbal statement that shaft is "several hundreds of feet deep". No confirmation by size of dump, as much has been worked away, but what remains could represent ± 300 ft. Open cut drives in on narrow Cu silic stringers in the volcanic (andesite) of the Cloudburst, st N 50° W dips 50°. Bleached zones 2" wide surround the CuSiO₂ fracture (1/8"), and [illegible] found is [illegible] to CuSiO₂ or occurs as small spots of a CuSiO₂

Tor Mine (continued)

shaft dump - about 1/3 or 1/2 is pe gr., giving evidence that the shaft passed thru the andesite and probably thru the flat fault. Some of the granite is a green soft gougy material with crushing and shearing evident, and other parts of granite dump in fresh looking, perhaps slightly argillized, with some limonite after sulfides. Some qtz seams, and some distinct leached cavities after pyrite, and possibly after cpy. $CuSiO_2$ is abundant in the granite in the dump, but is rare in the volcanic material in the ~~dump~~ dump. No ~~S~~ $CuSiO_2$ seen at the surface at the Tor Shaft; some bleaching and epidote on fractures, is present near the shaft.

(8) So tributary branching off Tor wash, pe gr faults slices along Mammoth fault zone. Solid otcs of ~~[illegible]~~ Oracle gr where cut by wash; Evidence of faulting cutting thru the outcrops and between enclosing volcanics, as mapped. Otc's not too good. However, the cloudburst fanglomerate beds (granitic cg type) appears to envelop the granite, particularly on the SE edge, and appears to grade into the solid part of the granite outcrop. fangl made of granitic sand or grit w/ qtzt, volcanic, and feldspar (from Oracle gr) constituents. Dark carbonate mineralization along the faults cutting thru and on the edges of the granite. The solid granite otc's appear to ~~[illegible]~~ grade out into granitic ~~fanglomerate~~ cloudburst (sand), and the main gr bodies appear to be dipping parallel to the dip of the cloudburst (sand) fm. They are probably exotic blocks within the Cloudburst.

(9) Sec 21, So trib to Tor Wash, window of gr in Cloudburst volcanic section — Cannot find this at all!? Traversed from E contact of volcanic units to W (fault) contact in wash, as mapped, twice. Window should be in or adjacent to wash but is not.

(10) - Off Mammoth Quad - To North - - Lookout Mtn quad - starting 1 Mile NW of Tor Wash, turnoff crosses RR track to west and Rd goes up a very broad wash - do not have a base map with me. One Mile westerly of RR is conical Hill that stands out by itself, ± 1/3 or 1/2 Mi dia at base - - made of granite. Surrounded by dipping "older Gila" and is lapped onto? on E by flat dipping Gila cgl.

Rhyolite - see Notes 6/30/82

Tucson Wash gain upstream

Sec 27 - ~~[illegible]~~

Sample BH-1 PЄ o gr w/ big orthocl. phenocryst. Trace epidote. No other visible Min. Weathering strong.

Just E of Ford Mine - BH-2 PЄ o - similar to BH-1, but a little less weathered.

BH-3 PЄ Oracle w/o big orth. phenoc. Appears generally ~~[illegible]~~ Presher than prev. samples - No epidote. Sl Fe staining, prob derived from Py, on fract. - - wide spaced.

Tor Mine Supplement 6/19/82

Interview of C. Fulton - His Father and Uncle both worked at Tor Mine in 1933-34; Fulton lived in Mammoth in 1930's and knew the Owner - Zell Tar - who was making his living off this property and had a house there at the Mine. The shaft is "very deep" and the mine was a gold producer. Fulton was a boy at the time, so he did not remember much about the details of the underground workings, but thought they were extensive. "Several" miners employed.

This makes sense to me, because the strike is like the St Anthony deposit at Tiger -- a major Au producer in the upper levels, above 600'; the Tiger veins are N ± 20 W, similar to the Tor Mine, and are in the Tertiary volcanics. The Nolsfenite of Mammoth probably got the Mo by supergene solutions from San Manuel.

EK.

Pinal Co Ariz
+ EK

Reconnaissance Note
6/30
Black Hills pg 1

According to Joe Ruiz (of Mammoth) (verbal Comm.) the Tar Mine has much chalcocite in the Cloudburst volcanics. Tar shaft reported 700' deep. Also states the Pearl Mine has vanadinite/wulfenite along with Copper, like Tiger. Says Exxon drilled a hole about 1 mile toward the San Pedro from the Pearl, about a year ago.

Pearl Wash (Medora Krieger)

(11) Lookout Mtn Quad - G/a cgl dipp E on (Prob San Manuel fm (14) and (2))
Shown - Brownish, Diorite (age?) and some volcanics well stratified, thin bedded. Sand to 3" frags.

Pearl Wash

(12) Similar to (11) - lots of cloudburst frags and sand give reddish to brown color. Diorite (with mafic rich segregations (chloritized)?) in ~~whitish to~~ rock of white color having very white feld + chloritic mafics from 1" to 6" - mostly about 2".

(13). Intrusive Rhyolite Porphyry - See 11. Steeply dipping flow banded Pinkish gray. Resorbed Qtz Phenoxt. Matrix looks almost glassy. Weathering produced rounded hill more like granite - most of the Rhy (Tar Wash for example) is a ~~g~~ Coggy weathering.

(14) Dipping ss and cgl - purplish - looks like Hundle's San Manuel fm in Smelter Wash area ~~[illegible]~~ between San Manuel Town tct and the Town. Volcanics (Cloudb.) obvious, minor granite and diorite. Frags mostly small - a few 1' volc boulders.

(15) like (14) - looks as if it could be Quaternary [illegible] ~~from~~ from local occurrence of San M. fm. (Small [illegible] San Manuel [illegible] of [illegible] D.P. [illegible] E.)

(16) More San Manuel fm type - Brownish - mostly volcanic (Cloudburst andesite) frags. Some boulders 2 ft. Grit and sand is both [illegible] and granitic well sorted [illegible]

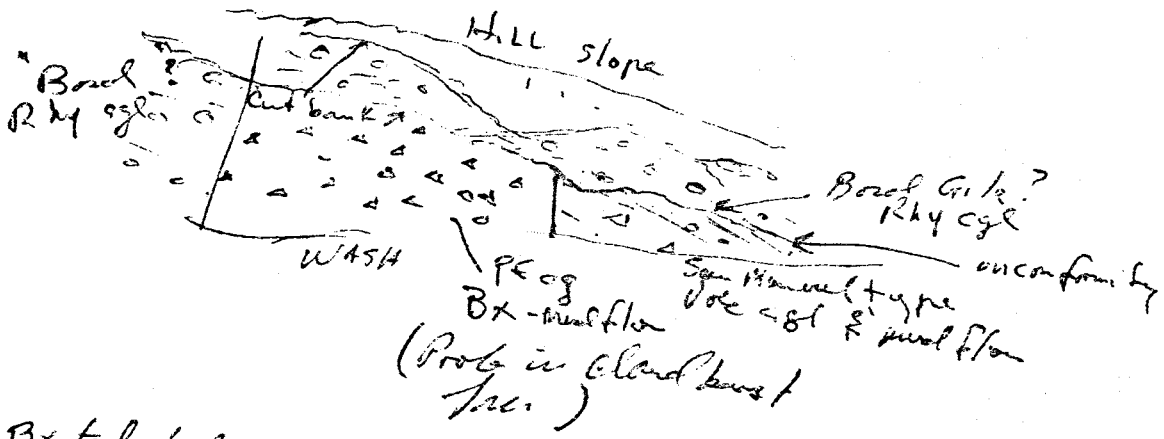
see pg 2

(17) Pearl Wash - Flow banded rhyolite.

Black Hills 6/30 pg 2

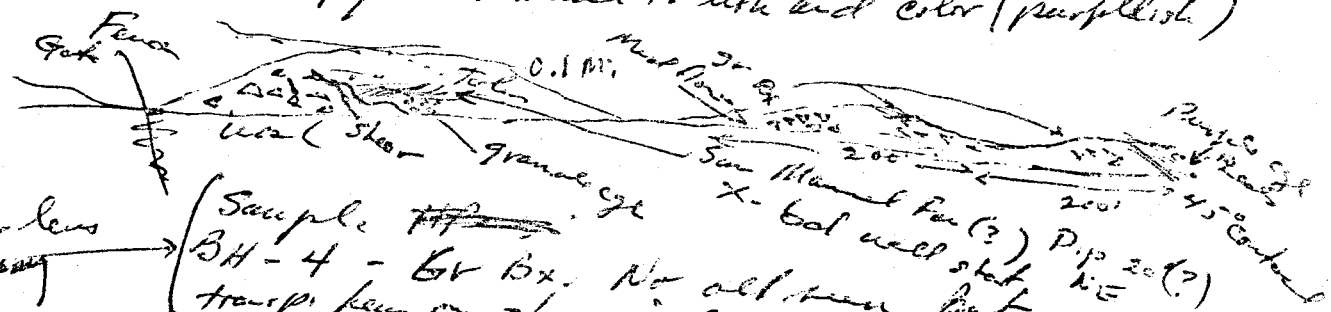
(16) (Cont) the (16) at Creasy's basal ~~Fx~~ cgl - Basal cgl consist talus - like deposit of Rhy boulders. below is the dipping brown cgl like San Manuel fm (not like Cloudburst in Tor wash, although similar. It is less consolidated with more muddy matrix.

This is in contact with 100' fault segment of monolithologic mudflow bx of Oracle granite. This is creasy is PEgr etc - is sed-mud.



(18)

Bx ted body of O gr - appears to be on lapped by ~~horizontal~~ beds, well lithified, of San Manuel F. lith and color (purplish)



Landslide lens Do not assay → Sample ~~[illegible]~~ BH-4 - Gr Bx. No alt seen. But transp. hem on shears in Bx.

(19) Cloudburst fm. cgl - dipping ~~[illegible]~~ N 05 W 55° NE well lithified. Andesite frags in well stat. beds 4-6' interlayed with grit in muddy matrix with some 1/2" = 8" frags. Brown and purple color range.

Overlain by purple stratified grit like at 18, flat lying.

(20) Andesite mudflow or Bx - interbeds of granite Bx or cgl.

Black Hills pg 3
6/30

Sample ~~HP~~ BH-5 pE Or. gr

in Pearl Wash SE 1/4 NW 1/4 Sec 16.

~~Med~~ Med Cse gr - not phenox t/line - typical texture.

Mod. chl/Bio. - Tr epidote.

Sample BH-6 - South side Sec 17 Pearl Wash, just below low-angle fault, Pre Proc gr, Minor chl on Bio, very wk clay alt. No evid. of sulfides. Trace Transp. Kern on fac.

(21) Pearl Wash, Sec 11, 0.4 mi SW of RR, change in dip - beds on NE (San Pedro side) dip more gently, ± 5° E or NE, and appear to lap onto dipping beds of older G.1a (equiv to San Manuel fm of Hemall, see note (11)). Prob. unconformity. This unconf. (if it is) may be equiv to change in beds noted 6/18 note (1), pg 1 that date.

(22) entrance to main canyon in Tucson wash. Sec 27 TCf is andesite Bx - very lithified - almost like a Laharic Bx. Occurs as deep maroon or purple, as thick beds ± 8-10' thick, with some 3 ft boulders seen weathering out. Most frags about 4". Some beds have more matrix and fewer clasts - more like a mudflow. ~~Whole things~~ Whole thing reminiscent of a volcanic mudflow. This appears more like a volcanic type than like the fanglomerates of Tar Wash with which it is correlate. Induration is pronounced, particularly near multiple rhyolite intrusions ~~[illegible]~~ on NW of NW Sec 27.

(23) Sheared and broken Pe Oracle granite, cut with stringers of Qtz, calcite, and Manganese. Cut through by rhyolite in dikes of irregular forms. Relation to Clouthurst not clear. (cont)

(23) (Cont) pЄgr -- contacts are covered, or are faults or rhyolite-intrusive contacts. General location of ctc suggests it could be a window, S of Turtle fault, showing basement below low angle fault that is N of Turtle fault.

Black Hills 6/20
Pg 4

BH-7 - area less affected by veining, south side of Tucson wash. Gr is hard, not soft & weathered as is usual for ctc of pЄgr, has some calcite, brown chl alt of biotite. Prob. affected by tiger type mineralization.

BH-8 pЄ Ogr. Phene of Orthoclase. Qtz epidote strgs 3 directions.

BH-9 Tar Mine = Cloudburst fm - Andesite. Main Shaft dump & surface at open cut. Bleached locally - Cu occurs as chrys on seams and as discrete blebs, generally surrounded by brown to red brown mineral, possibly cuprite. One residual grain chalcocite with an envelope of chrys., then cuprite(?). The general occurrence suggests direct oxidation of chalcocite. ± 1/4 of dump

BH-10 Tar Shaft dump. Sheared pЄ granite. Sl. chloritized. thin stringers of "cockscomb" quartz w/ Hm. One frag. of sample has quantifiable chalcocite, as small fine black grains. ± 1/4 of dump

BH-11 pЄ Oracle gr. - Tar Shaft dump. - No mineralization seen. ± 1/3 of dump

BH-12 pЄgr. Tar Shaft. Evidence of hypogene mineralization. Some chl, qtz, sericite. Kiggy qtz seams with Hm and melanite. Some Oxides (chrys and surrounding envelopes of cuprite(?)) and also discrete grains of "cu pitch" and as small seams of pitch with hm.

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Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TEV 459
July 27, 1982

PILLAR LOWELL & ASSOCIATES
Attn.: Mr. John E. Kinnison
5115 North Oracle Road
Tucson, Arizona 85704

Analysis of 3 Rock Chip Samples

ITEM	SAMPLE NO.	Cu ppm	Mo ppm
1	BH 1	45.	<2.
2	BH 2	25.	<2.
3	BH 3	25.	<2.

SKYLINE LABS, INC.
P.O. Box 50106 • 1700 West Grant Road
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TEV 464
July 21, 1982
PROJECT NO. BLACK HILLS

PILLAR LOWELL & ASSOCIATES
5115 North Oracle Road
Tucson, Arizona 85704

Analysis of 8 Rock Samples

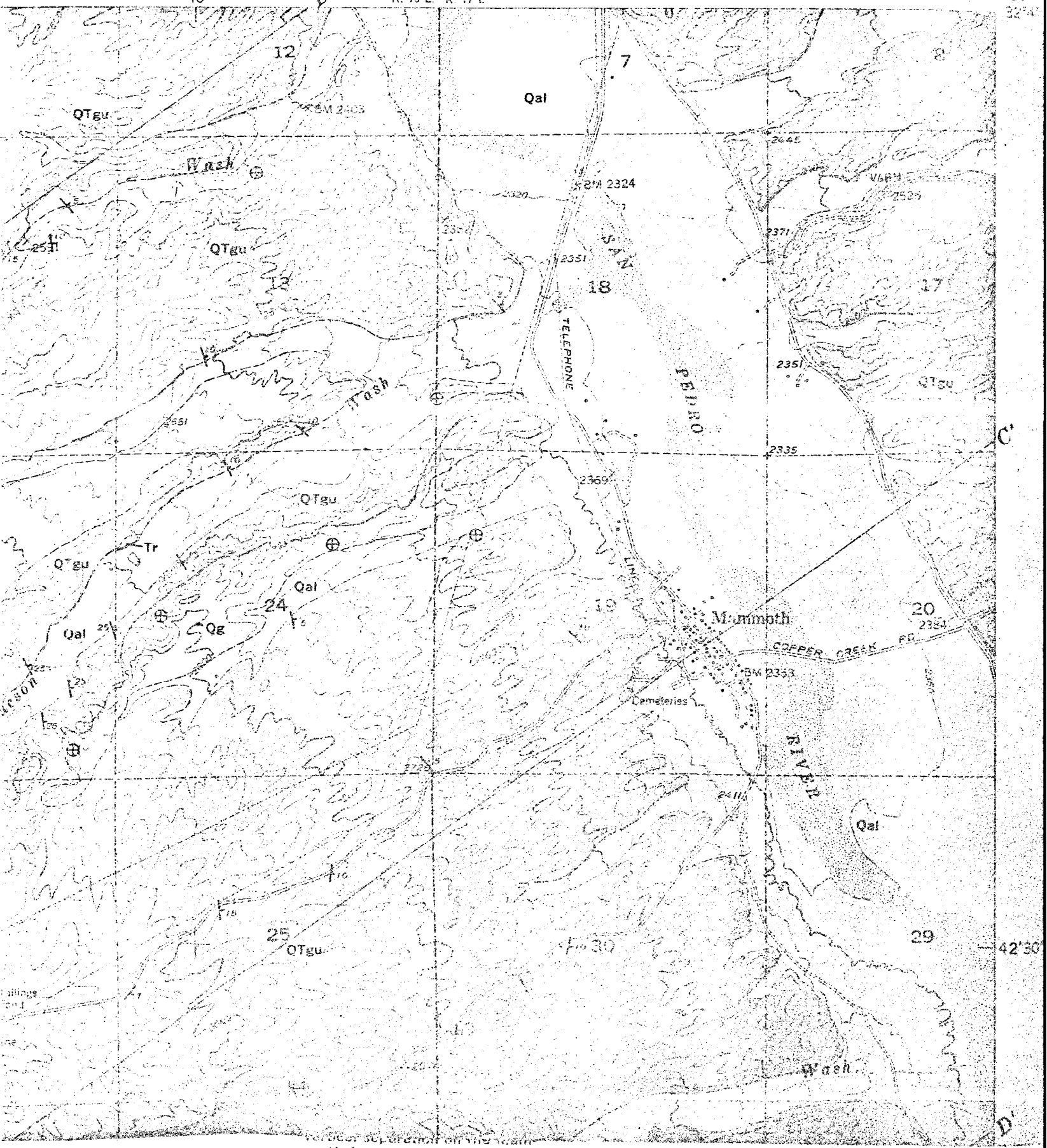
ITEM	SAMPLE NO.	Cu ppm	Mo ppm	Ag ppm
1	BH-5	20.	<2.	N/R
2	BH-6	35.	<2.	N/R
3	BH-7	40.	<2.	N/R
4	BH-8	25.	<2.	N/R
5	BH-9	28000.	<2.	5.8
6	BH-10	410.	<2.	2.6
7	BH-11	235.	<2.	<.2
8	BH-12	1900.	<2.	1.0

NOTE: N/R denotes analysis not requested.

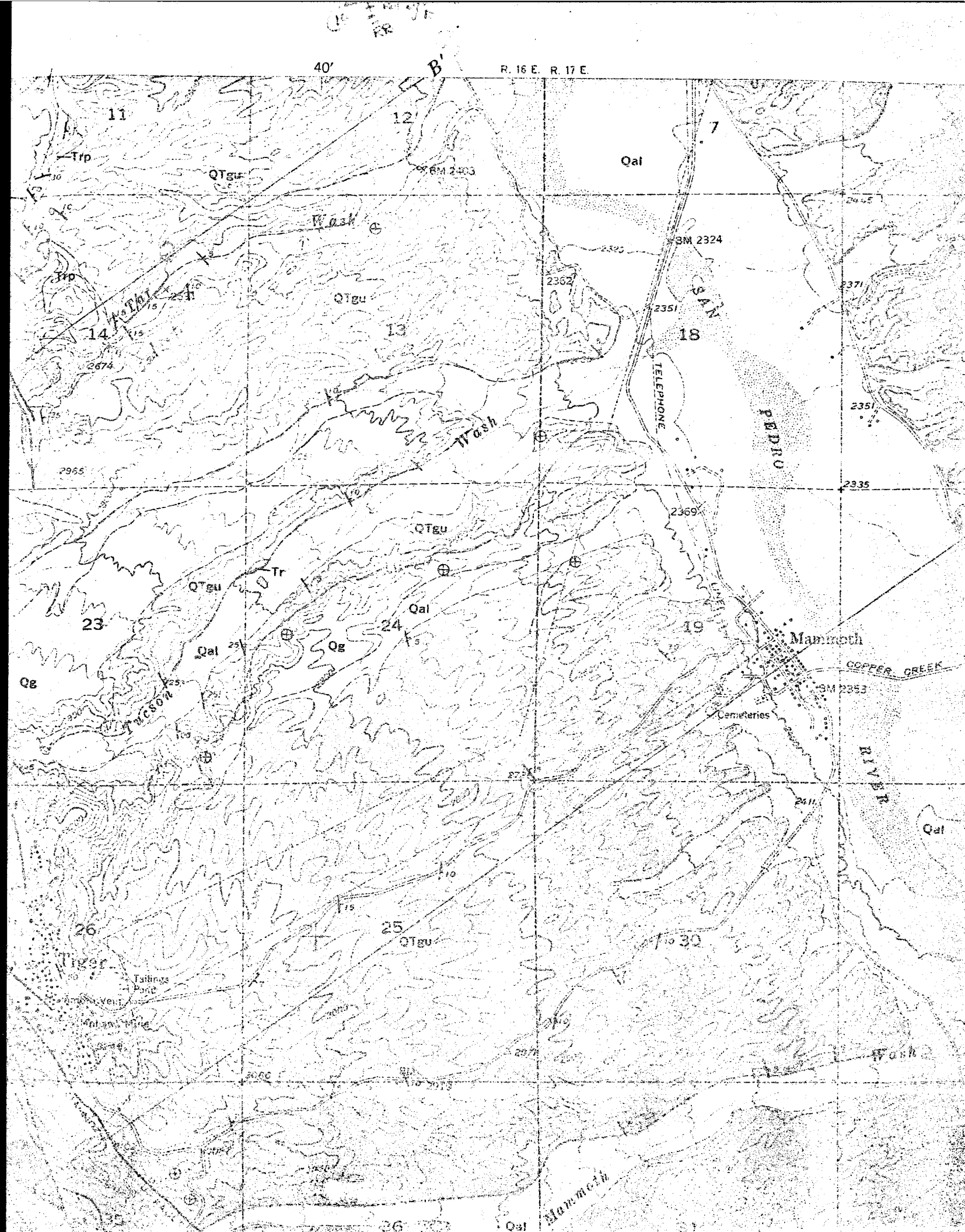
Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122



moth fault measured in the St
Anthony Mine



40′
B′
R. 16 E.
R. 17 E.
11
12
7
Trp
QTgu
BM 2403
Qal
Wash
BM 2324
2362
2351
SAN
PEDRO
RIVER
14
13
18
2674
TELEPHONE
2371
2351
2965
2335
2369
QTgu
Tr
QTgu
Qal
23
24
19
Mammoth
Qal
Qg
Qg
COPPER CREEK
BM 2353
Cemeteries
Tucson
Qal
26
25
QTgu
30
Tiger
Tailings Pond
Wash
Mammoth
Qal

NOTE FILE ON "PORPHYRY COPPER"

Location:	Black Hills, 3 miles NW of San Manuel Mine	**Property**	
		Area	
		District	Old Hat
		Mt. Range	Black Hills
		State	Arizona

Field Check by: J. E. Kinnison, February 1971
Sample Collection by P. S. Strobel — **Date** Nov., Dec. 1971

Recommended Company Interest Classification:

- ☐ Active
- ☐ Inactive
- ☒ None
- ☐ Scientific

Conclusion: Post-ore (?) volcanics overlie a low-angle post-ore fault, and conceal a potentially mineralized foot wall. Geochem sampling, however, suggests that no mineralization of consequence is actually thus concealed.

Notes on Reconnaissance: See sketch maps attached.

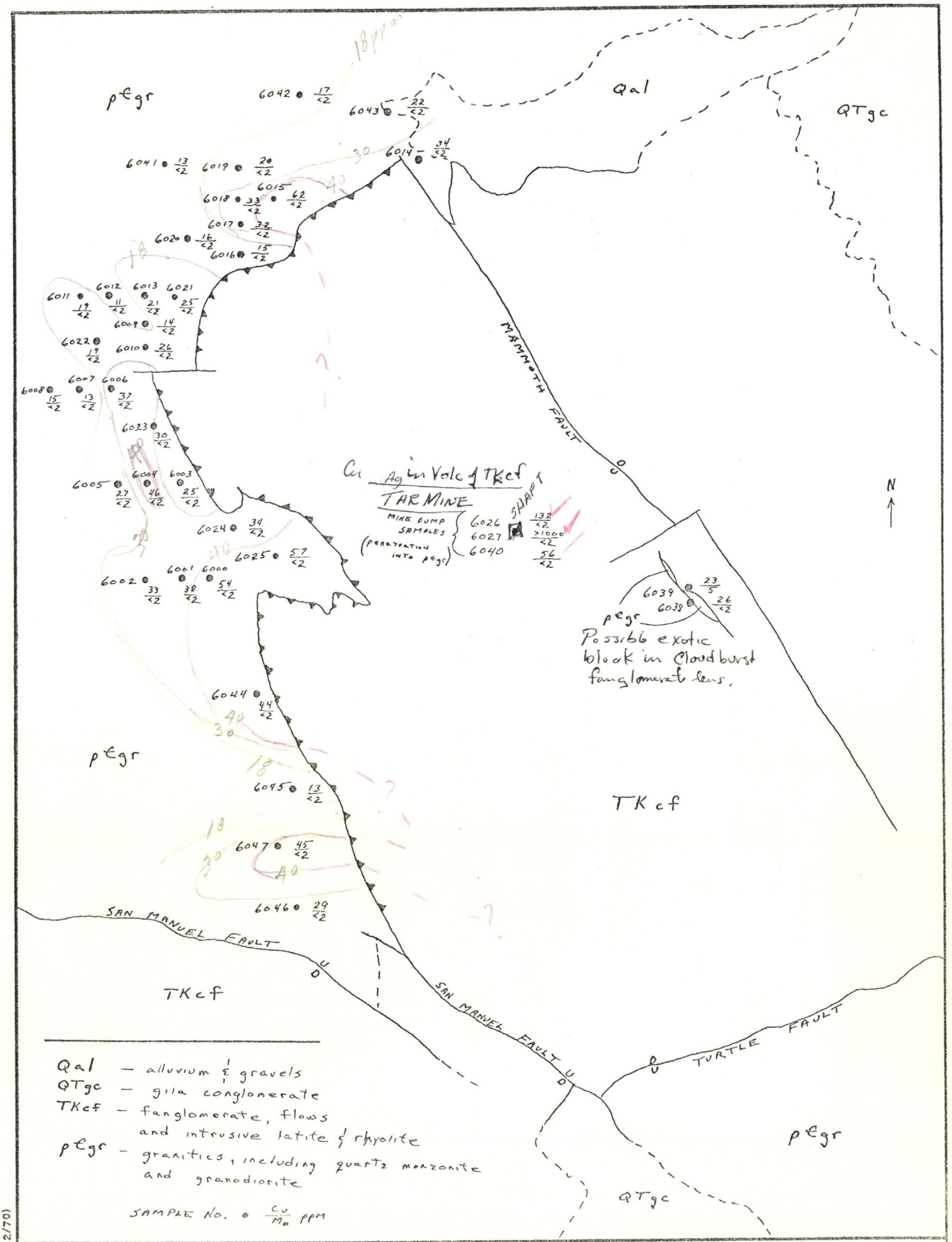
Basis for reconnaissance: Creasy has mapped a thrust plate of cloud-burst formation (volcanics and conglomerate) NW of San Manuel, overlying pE granite. Area thus concealed adjacent to a major porphyry copper deposit warrants consideration for satellitic or recurrent deposits. My field inspection confirmed Creasy's work and indicated the fault to be post-ore and either flat or very low-dipping east. Granite footwall, however, not visibly mineralized.

Geo-chem traverses by Paul Strobel failed to indicate anomalous Cu or Mo along outcrop of fault trace. Mine shaft in center of volcanic plate reached underlying granite, w/anomalous Cu in essentially fresh granite. Discounted since vein in volcanic (mid-T mineralization) may account for Cu in footwall. Sample 6039, from "horse" in a strand of Mammoth fault, must be taken lightly, since this is a NW extension of Mammoth-Collins fault and vein at Tiger (also mid-T).

Results probably not conclusive regarding potential east of Mammoth fault, but no encouragement is furnished.

Date January 7, 1972 By John E. Kinnison

JEK/bl
c.c. J. J. Durek

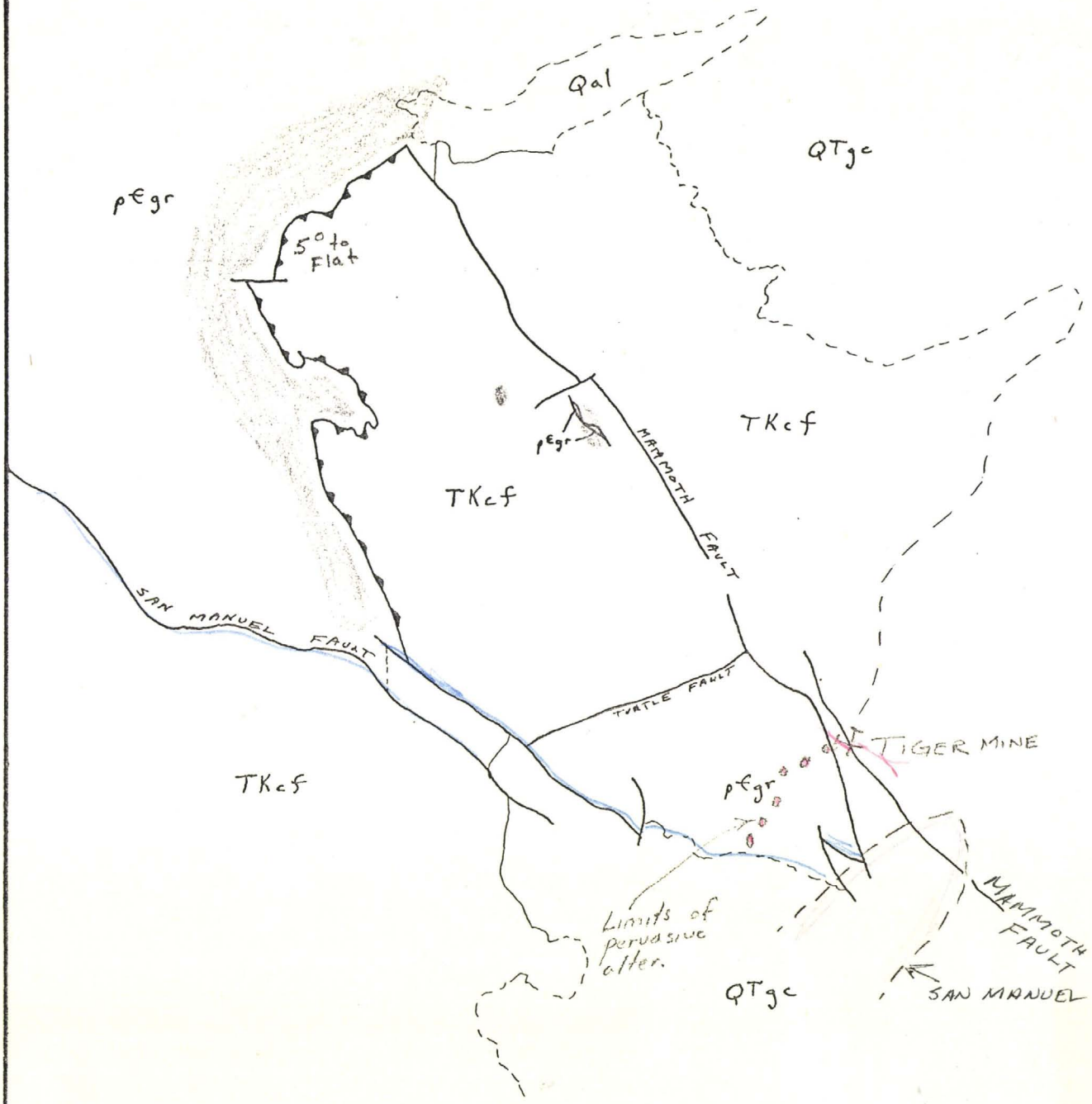


KAISER EXPLORATION & MINING COMPANY
OAKLAND, CALIFORNIA

GEOCHEMICAL STUDY OF pℰ GRANITICS
BLACK HILLS AREA — MAMMOTH QUADRANGLE
PINAL COUNTY — ARIZONA

SCALE: 1" = 2000' BY P. S. DATE 12/27/71 DWG. NO. 1

KACC 5419 (12/70)



Qal — alluvium & gravels

QTgc — gila conglomerate

TKcf — fanglomerate, flows and intrusive latite & rhyolite

p€gr — granitics, including quartz monzonite and granodiorite

— areas of geochemical sampling

— approx. limit of SAN MANUEL ore zone

KACC 5419 (12/70)

KAISER EXPLORATION & MINING COMPANY OAKLAND, CALIFORNIA	GENERALIZED GEOLOGY BLACK HILLS — SAN MANUEL MINE AREA Modified from Cressy SCALE: 1 in. = 4000 ft. BY P.S. DATE 12/28/71 DWG. NO. 2

Oak

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IDENTIFICATION	Gold OPT	Silver OPT	Lead %	Copper ~~%~~ ppm	Zinc %	Mo. ~~%~~ ppm	Cu %	
6033				189		15		Mariquita Cu Sonora
6034				404		37		
6035				678		10		
6036				271		65		
6037				>1000		15	0.11	
6038				26		< 2		Black Hills Cu Arizona Pinal Co
6039				23		5		
6040				56		< 2		
6041				13		< 2		
6042				17		< 2		
6043				22		< 2		

RECEIVED
DEC 10 1971
TUCSON
KAISER EXPLORATION & MINING CO.

J. E. K.
DEC 14 1971

REGISTERED ASSAYER
CERTIFICATE NO. 6784
H. E. RICHARD
Date Signed
Arizona U. S. A.

CC: Kaiser Exploration & Mining Co.
ADD: Attn: Mr. J. E. Kinnison
CITY: 5938 N. Oracle Road
ADD: Tucson, Arizona 85704
CITY:

REMARKS:

Trace analysis

Analysis Cert. By

Preparation $ 9.90
Analysis $ 46.00

ACC:	Date Spl. Received	Date Compl.		$
KAISER EXPLORATION & MINING CO.	12/2/71	12/9/71	TUC 345820	55.90

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