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James Doyle Sell Mining Collection

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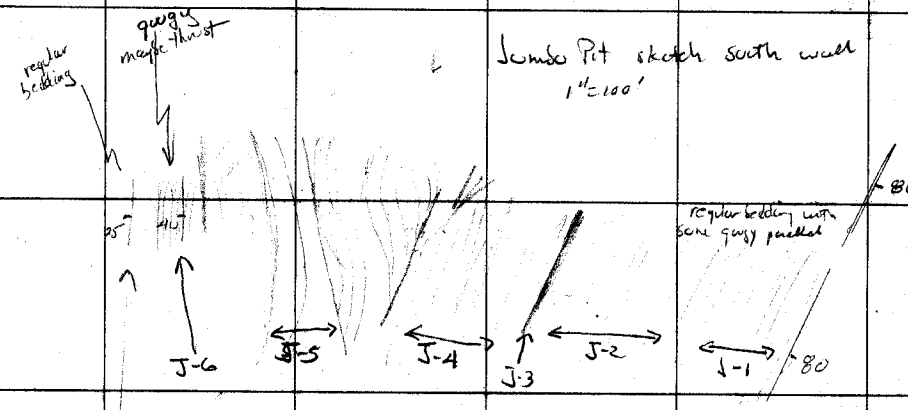
Field Notes

Jumbo Pit sketch south wall
1" = 100'



thin qtz veins w/ tops to bdd, dip out, see mostly in more massive beds

minor qtz veining some ~~alog gouge~~ zones strike at ~ to bedding and dipping nearly vertical

Rocks are metamorphosed ss and shales That both now contain much sericite
Shaly portion have lim pseudo > py cubes (not sediment). Sandstone (clay-sericite) contains some qtz veins thin, narrow, milky. Some cockleria? within rhombohedral form on fractures
Fe staining along most all fractures
Note — the qtz veining is quite constr in volume (many areas contain none at all)

J-1 massive calcite sericite sandstone, minor qtz vein mat'l, minor Fe stain
J-2 - shaly w lim pseudo > py
J-3 - shear qtz veins
J-4 - mostly massive gray to olive dirty sandstone
J-5 - massive ss like J-4 plus some qtz vein and chlorite bleached ss,
J-6 - much qtz vein material in shaly & ss in thrust?

LEVEL LOCATION
DATE SCALE SURVEY

MINE _____ LOCATION _____ LEVEL _____

GEOLOGY BY _____ SURVEY _____ SCALE _____ DATE _____

Pickard Ridge

NPR Dump 1 A - fines
B - pieces broken off large blocks } rhy porph
C - sulfide } some tuffaceous.
plotted on topo

NPR - 1R - along road prominent o.c. schistose rhyolite w. leached py cubes disseminated topo

NPR Dump 2 A, B, C } fines; high sericite Dump from 200 level
D broken off blocks
plotted KnopF

NPR Dump 3 A along base of Dump fines
B " " " " pieces from blocks - get 44 hard, blue rhyolite of KnopF

NPR Dump 4 A fines
B pieces from boulders

NPR Dump 5 A fines

NPR Dump 6 — N30E, 60N; 3"-2' quartz zone with 1-3' fn in hanging wall. Sample fines and pebbles size

NPR Dump 7 — main fault N35E 55N; sample fines and pebble size.

NPR Dump 8 — open cut N200E, work down to N200E to follow fault dip 65N

NPR Dump 9 opposite large (4-500 x 50-100') 30-50' deep open cut. Dumps cut 9 and two below (trend N35E) from tunnel "E" can't begin to acc't for volume of material taken out of cut (i.e. to the mill)
some sulfide on this dump; Most of dump is blocky material. From what horizon in cut??
Sample from fine to pebble size along top (track) of dump

NPR Dump 10 - sample fine to pebble size / tunnel goes to open cut?

NPR - 2R - highly silic. o.c. rhy porph with small qtz veins (say 1 per 4"-12") plotted on topo
Oct 5, 1960

NPR Dump 11 plotted on topo. small dump in hard to soft rhy porph. Sample both of fines & blocks. Outcrop not to surface. Apparently disc. in old times by shallow surface trenching. Some qtz v. exposed in dump material.

NPR Dump 12 plotted topo. Have to sift rhy w/ qtz veins. Sample fines and 2" size. Few pieces w. Sulfide
Between 120-110 water tank & road from cut of hard rhy w/ qtz veins as o.c. (joins also with 2R)

NPR Dump 13 Hard rhy w/ qtz veins. Pit no surface outcrop. V minor sulfide.

NPR 3R Extremely hard rhy porph (like 2R) with odd qtz veins.

NPR RD-1 cuttings - show two sizes (1/4" and powder) powder probably represents tuff.
NPR RD-2 cuttings ditto

NPR - Dump 14 sample fine & pebble N10-20E 55N fault?

NPR - Dump 15 sample fine & pebble

NPR - Dump 16 bull qtz vein, iron stained on dump. Also lot of big 1-2' blocks of rhy porph.

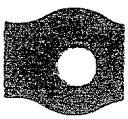
NPR - Dump 17 rhy porph; small qtz veinlets.

NPR - Dump 18 pebble & fines. not much qtz v. From 18 along ridge NE good o.c.

NPR - Dump 19 tunnel; med size dump. mostly pebble size - qtz v. not prominent

20 lot of qtz v. near working probably exposes main qtz v.

D9-2 gouge broken zone in pit
That shall serve on sample
from NE above shaft in
pit, that not sample the
exposed wall/hole



D9-1 10-20' below surface
of big purple ~~vertic~~ hanging wall.
To west py-copper stained stratum,
on west side of the cut and
midway.
Shaft below sample - also
tunnel above sill)

Packard Ridge Area

NPP - dump 21 shallow. sample of 1" pieces. little qtz. v. one piece S
dump 22 tunnel. 1" pieces. little qtz vein

oct 6, 1966

NPR dump 23 schistose rhyolite; slight Fe stain on blocks on dump; one qtz veining

dump 24 hard, silicified rhyolite from shallow pit. Some diss pyrite in some blocks. Some vuggy places filled with limonite. Few thin qtz v. slight Fe staining

dump 25 two shallow pits; most of dump material covered by soil and pits do not now expose rock. Sample small pieces of slightly Fe st. schistose rhyolite. Few pieces of qt v.

NPR AR O.C. rhyolite schistose to massive mostly hard; some "splotches" of qtz suggest secondary origin. Slight Fe stain. Dip? 15-20°W

dump 26 alt tuff; schistose, high sericite? some andalusite?

dump 27 on with small headframe. Alt tuff; some Fe st; some qtz v.

dump 28 large dump. Much alt tuff; dense rhyolite schistose; some qtz v + sul fide. Sample mostly fines.

dump 29 largest dump uphill (S80E) from (28). perched in gray-green tuff. most of dump material alt rhy; alt tuff. qtz v. present

RD-3
RD-4
RD-5 } cuttings only #5 has the powder from the tuff

dump 30 just uphill from dump 28; yellowish brown rhyolite; some gossan

dump 31 tunnel rod size dump, mostly white (alt) tuff

dump 32 1/2 white tuff; 1/2 iron st rhyolite

dump 33 small pit. Yellow stained rhy; some vein material.

dump 34 11 deep shaft. water start 50' down — dump has reddish, yellow; white material (sample has all) looks like replaced shear vein zone.

dump 35 second dump. Tuff-rhy look like replaced sample vein zone within tuff/rhy. most of rock "pretty bad lookin'"

.0500 = .05
.1000 = .1
1.000 = 1%
100 = .01%
10 = .001%

2,000
16
12000
8000
32,000 oz/T

2000
.00003
.06000
32,000 oz/T

16
.06
.96

16
.02
.32

31
32,000) 1,000,000
96
40
32
8

20#
20# = 320 oz.
.1 = 2# = 32 oz
.01 = .2# = 3.2 oz
.001 = .02# = .32 oz
.003 = .06# = .96 oz

.003% = 30 ppm

10 ppm = .001%

15		46	fine ; pebble size	✓
16	(37)	15		✓
17	(12)	C	rhy porph ; small qtz veins	✓
18		1.28	pebbles ; fines ; not much qtz v.	
19		1	pebble ; qt v not prominent	
20		2.39	alt qtz v.	
21		1.62	pebble ; some qtz v.	
22	(-1)	0.44	ditto	
23		missing	—	
24		0.52	—	
25		0.61	small pieces ; slt iron stain	
26		0.52	high sericite	
27		7.4	alt tuff ; some qtz v.	
28		32.2	alt tuff ; lesser rhy porph ; some qt v ; S	
29	(120)	107.	partial grey-green tuff ; clump alt rhy ; tuff qt v. present	
30		121.0	yellowish-br rhy some quartz	
31		0.72	white alt tuff	
32		3.7	½ white tuff ; ½ iron stain rhy	
33		4.2	yell-br st rhy	
34	(85)	66	shear zone ; white ; red, yell tuff	
35		14		

1R	(2)	307	schistose rhy. leached py cubes	
2R	(45)	32.3	highly silicif. o.c. few small qtz veins.	
3R	(58)	45	ditto ; ~~[illegible]~~ qtz veins	
4R		0.54	schistose rhy + hard rhy	

RD- 1	12.6	clay material + powder	✓
2	9.0	ditto	✓
3	1.82	vhy	
4	0.6	vhy	
5	3.13	- powder from tuff	

9R- A	27.2	10-20' below surface; vhy porph; contains some S	✓
9R- B	95.0	gouge + broken zone ; no sulfide (in pit)	✓

Nevada Richard Mine

1-11

Dump			ppm Ag		Samples in/near Pits, Cave
1	A		63	fines	✓
	B		134	pieces broken off larger blocks	✓
	C		16.3	sulfide	✓
2	A		25.9	fines - high sericite	✓
	B		10.8	" "	✓
	C		7.9	" "	✓
	D		76.0	pieces broken off larger blocks	✓
3	A	(34)	25.2	fines along base of dump	✓
	B	(38)	31.5	pieces from blocks base of dump	✓
4	A		11.4	fines	✓
	B		4.22	pieces from larger blocks	✓
5			10.4	fines	✓
6		(84)	49	fine & pebble size	✓
7		(188)	92	" " "	✓
8			6.4		✓
9		(128)	96.0	fine to pebble size along top of dump	✓
10		(62)	35.	ditto	✓
11			10	sample contain both fines & blocks	
12		(21)	20	mostly sample fines	
13			~~#2~~ 3.65		
14		(130)	112.0	Fine & pebble	Surface ✓

main dumps - represent underground workings

near surface

~~Dump Samples~~

Field work was conducted in the Packard Ridge area. Because Knopf (page 73) USGS Bulletin 762 states: "In addition to the ore, there is an immense amount of rock carrying several ounces of silver to the ton — in fact, the striking feature of Packard Ridge is the widespread dispersion of the silver and its concentration in sporadic shallow bodies of ore".

Attachment A shows the general geology and sample sites and Attachment B shows the silver in ppm. Analyses were done by Asarco geochem lab SLC by the atomic absorption method. The sampling does indicate that silver exists over a large area ~~but not in quantities sufficient quantities to allow for a large open pit operation~~ (~~but the quality is low~~) outside of the main cuts the content is low. Previous mining, see Knopf, USGS Bulletin 762, has indicated that the values diminish rapidly with depths of less than 100 feet ~~and therefore increase of ~~ there appears to be little ~~with depth is extremely unlikely~~ ~~Dump Samples 1-4~~ ~~reason to suspect~~ likelihood of developing a sizeable zone of economic silver in this area.

Several types of dump samples were taken, these are indicated below:

			ppm Ag
D1	A	fines	63
	B	pieces broken from large (+1 foot) blocks	134
	C	sulfide	16.3
D2	A, B, C	fines, with extremely high sericite content	25.9; 10.8; 7.9
	D	pieces broken from large (+1 foot) blocks	76
D3	A	fines along base of dump	25
	B	pieces broken from large (+1 foot) blocks	31

D4 A fines 11

B pieces broken from larger (+1 foot) blocks 4

The remaining dump samples were ~~of~~ composed of fine and pebble size material, ~~and~~ In general ~~see~~ samples with higher silver values were from the dumps or outcrops containing more quartz veining and/or iron staining and leached cavities.

this sample is
~~is~~ close to the best mineralized quartz monzonite.

76620. Eudako

5 mile 12/66 1

$5,254,100 12/31/66

---

copper Pb-Zn 1,000,000 T.

iron 17,000

JHC Jan 4, 1967

dk Melford

Richards letter expl. conf. S.L.C. attend

Feb 23 1967. 8 a.m. Broadway Inn
1546 6th St

papers —

Saturday

Laurence

Sage original permit
to
Idaho mining (Sage interest?)
to
~~Walker~~ Martel (Idaho retain interest)

Suppose Martel or Walker-Martel
has completely bought out Sage

Walker-M management when
Ocid deal started

Idaho mining still has interest
Thru Walker-Martel (or Martel?)
Sat interest has dropped as
years wore on. Why?
don't know

#1 Intrusive (NW most on Calico Map Sheet). Mostly rich, medium to coarse granite to most of rock here. The "Blueboy Type" [illegible] bounding, [illegible] several dikes (aplite: acid). Development of activity: old from the bulkhead and in places clear of alteration. Really few specks of leached pyrite.
Good chance that outcrop is faulted.

#2 Extremely variable with dike (change with few feet) into the coarse diorite

#3 Quartz vein N 55° E 45° NW (in "granite" rock. Bleached white qtz/sericite some clay/serpentine?

10 W 50N/ yellow

Workings head of Willow Creek. Pershing County Nevada

Area has been drilled with rotary

A. Drill road on north side from cabin
last hole to north

NPWC - 1 hole dit water
diorite bk shale, gray ls

100' S NPWC - 2 ditto

85' S15W NPWC - 3 ditto pyrite

100' S45W NPWC - 4

100' S70W NPWC - 5

100' S70W NPWC - 6

230' S70W dd (ash/white)

NPWC-7 adit just South 70W of Cabin
chip just inside portal — altered hard
stiff layer — bk shale, fr st shale —
chert; silicified?

NPWC-8 grab off top of dump
bk chert, shale, hfs with pyrite
some brown diorite fgr

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Clarke trench run to Tracy

NPWC- 1-6 drill holes appear to be about 20-30' above the Is unit — likely 3,14,x

Hills on lower drill road (30')
Solar mostly collared in limestone.
Is caps out along main road.

NPWC-9 drill hole lower road further north, Sample
Fow 3 holes
Lk shale alog; diorite alog Is ogt?

100' S/W NPWC-10 drill hole mostly Is some diorite w/ no pyrite

60' S350W NPWC-11 drill hole mostly Is. (lost circulation)

NPWC-12 pit by 11. garnet marked Lk.

150' S450W NPWC-13 drill hole Is; shale.

14- Is cut along road Calcite stringers

15 dump metavolcs
16 float of Is. Bk, garnet
Rx Type? metavolc

	NPWC	17.	O.C. [illegible] Brownish clay, finely bedded; mole [illegible]? [illegible] this Ft stain.		
		18	Dike: pept. of Feld in Sidtti fg grd mass. Altered along north margin to fuchs [illegible] Sample cut + [illegible]		
		19	Banded shale [illegible] not to date Frost, [illegible] gang		
	Near current working adit NW Corner Jay Bird — Harry Beechwood Chrysolla				
		20	Drill hole cutting most grd?		
		21	Drill hole mostly shale blk carb		
	Rest of area Dr Cardwell (?) Uncommon				
	Drill holes by Blanco Oil Texas Results not given to owners				
		22	band lis/ with leached pyrite nearly none sulfate [illegible] Ply is just below contact Below 22 is massive [illegible]		
		23	Sil/Fe stain Hf (acid?) dk color; some thin slim veinlets		

Fold exposure below 22
" exposed about 22 area working

24 Dump [illegible] Shiny brown [illegible] Feldspar.

25 Ridge. Grad. of [illegible] Chlorite
[illegible]

26 Grad in [illegible] Shiny, gray, [illegible] quartzed
zone. Feldspar. [illegible] stain.

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Big Mike July 4, 1969

Watchman on duty

Frank hill east of area.

Small pit (steep sided) — red on west; greenish brown-olive on east. About 50' wide elongate NW-SE.

New drill sites laid out east of pit on 50' centers or less. Air rotary, — then diamond drill.

Material on dump piles — some dark brown (gossan); some brown in quartz (?) some reddish some white.

Don't see sulfides at 15 00 ft

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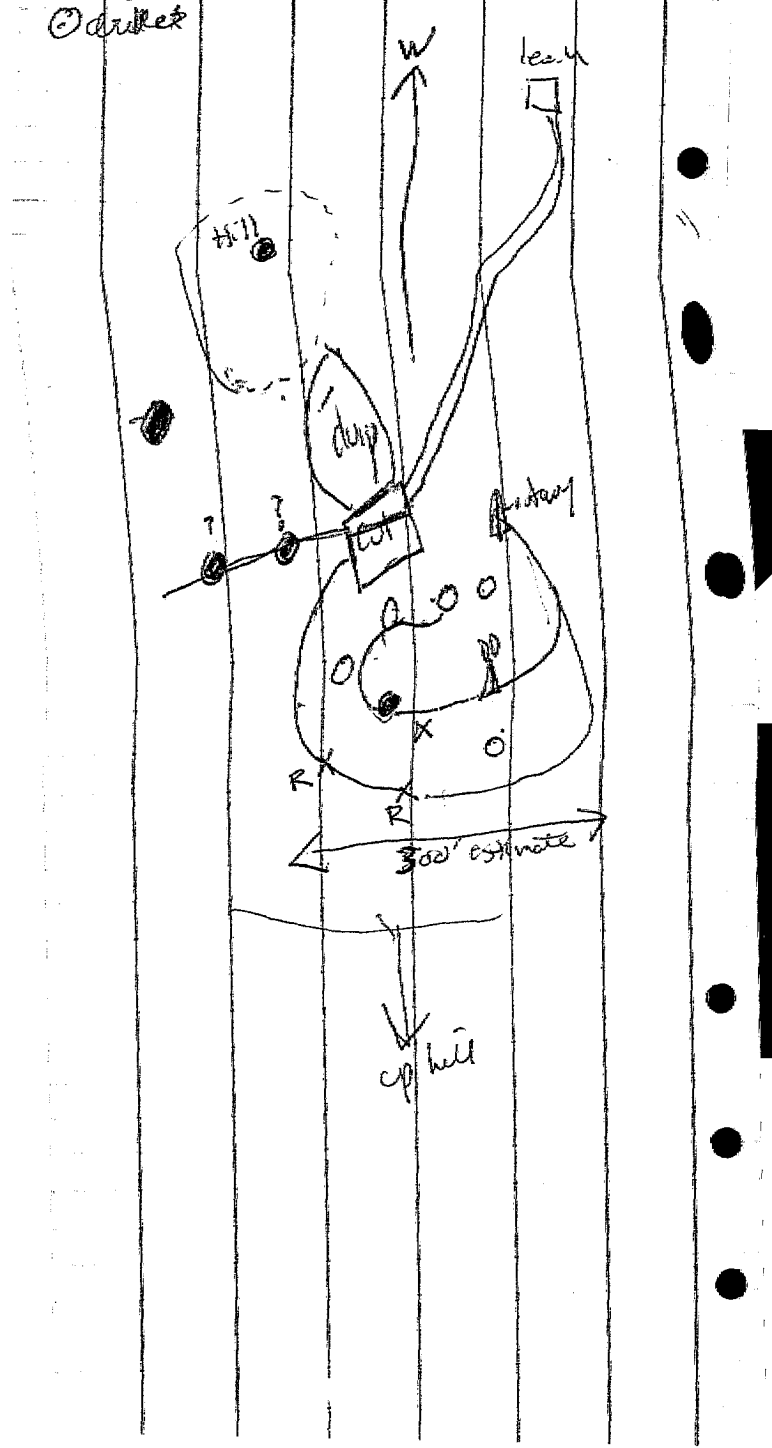
driller
W
lease
Hill
dump
lot
R
R
300' estimate
up hill

		North Contact	
	NC-1	quiet dump slide ls / some cgl on dump not sampled	
	NC-2	dump. Porphyritic CQX. Silicified ls v. many stringers ls veins of dump CQX off slab of cgl which follows folded & no small faults. Cgl hill to east — bk contact ls than on top (Loc. Chem Loc) with siliceous ls.	
	NC-3	silica ls white on loc. C-2	
	NC-4	Dump (3) silicified limy, porphyritic CQX	
		Just across gulley to west south of vein bx zone in the silicified (qbt-sericite-type) not sampled	
	NC-5C	silicified limy, w/o Cu in sample. Porphyritic CQX on dump. Small shear in sketch	
	NC-6	silic. limy Dump. Fell porph (qtz) stained w/ CQX. Only there out bumpy in Chemcent. Few dikes in spread.	
	NC-7	Dump Pk-wh silic. limy Chemcent also on dump. Dikes here on dump	
	NC-8	Talus over qbt, few dikes limy	

NC-9R	Shaft	Qtz	& Qtz	V.			
		CLX	on dump	with	Fe Ox		
		Sample:	Qtz	w/o	CLX		
NC-10R		Qtz	blk sili	line			
		can't	dtem	Qtz	on	this	edge
NC-11R		Very	bulbiform	rd.	just	below	va
		blk	lim	&	silicified	lime	
NC-12R		Hornfels;	some	Mn	in	dmp	Pl
		Fe	st	on	fractures		
Sh	con	rec.	11	small	fracture	zones	
			two	of	very	very	
			small	can't	stern.	Nearer	
		Rks	on	this	Sebscha	&	Dme
		mostly	flat	lying			

DON JUNG July 1967
% Codero Mine
McDermitt Nevada

New Pass Mine Area
Controlled by Jung (Fathers son-in-law)
Engineer at Codero

NP-1 Glass w/o gts. v. from Thomas W dump. Fe stained (red cast) can't tell original rock type (mudst?)

NP-2 surface chip just west Thomas W
layered fissile slate-mudstone; trace Fe st
very carbonaceous looking

Ls N40W 45SW to the west of Thomas W
highly fossiliferous, metallifeous frag to pebble

N20E fault zone looks like yellow st. curve

NP-3 alunite rd. snow from jewel (old mill)
alt Pl st mudst?
also just above Gold Shaft

NP-4 Gold dump. Fic 3-4" pieces w/o gts. Fe st alt mudstone

NP-5 Gold dump - flows & cores
vitrifaction gB v. weathered

NP-6 Gold dump coarse & fine
same but not as much gB v

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NP-7 [illegible] chl-epidote
magnetite traces pyrite

appears to form block between the
Thomas W - Gold Belt on west and
the Superior on east

NP-8 flags from surface NOT o.c. and
200' between andesite and Superior
zone (west of Superior). Superior zone 10'
Rx alt. fine st mudstone

andesite
old m.p.

Alt. to east (by float) 50-70' Then
back into green andesite

NP-9 across gulley to N from Co. West of old
shaft along dump trail
Sample small 3' o.c. of silty rock
well fract. iron st mudstone; silty dolo?

Margin here at 9 to west is a bx (rock fragm)
in ly matrix)

Saddle
Summit - looking down N into Bull Canyon
Old claim Golden Portage 1963
[illegible] South

Uphill east from saddle, greenish rocky rock?
could be meta andesite or metamudstone.
Hard green amt ly
NP-10 Sample green rock under fast making pots

July 29, 1967

NEW PAS

NP-11 From old prospect pit summit looking north into Bull Canyon
All mineralized; Hematite; Little to no qtz veins

Ophir west from saddle across highest point part way down slope to west saddle to west (where washed this am)

NP-12 Prospect at first west, Sphalerite Thin 2-3" qtz vein Sample w/o qtz

East at highest point (about 300' from 12)
NP-13 First mineralized Chips from ore

NP-14 Shaley pit at first/big mineralized (uphill west from NP-11 where parked truck)

Superior Vein

NP 15 dump large piece w/o qtz V all hit mineralized
2nd dump up hill of dump That am in line

NP-16 } biggest dump (No. 4 Tunnel to Superior)
17 } Pieces along base west of dump. Little to no qtz V in sample

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L. Jung
Laytonville, California

Clear Creek July 18, 1967

@ Small tunnel 30' follows N15E 25E
shear-fracture zones in
with quartz and calcite veinlets
CC-1R Grayish brown
fg. dolo w/ diss mag by nearly

Nearby main qtz vein and fract N40W 40 NE
with fric fract near vertical cut of Xs

CC-2R Surface chips silty ls w/ calcite veining
minor qtz veining. Silty ls dk gray
weathering - weak looking

CC-3R N50W 30-35 N. Ls/silty ls
silty has fric lg 2ry; Ls has
calcite. Hand specimen

CC-4R surface chips. Ls; silty ls
with ~~qtz~~ calcite veining

CC-5R Zone N80W across hill; shear-fract
zone with calcite. Ls + fride silty ls

CC-6R Isolated calcite + ls w minor calcite

CC-7R Finely banded silty lime dolo +
a little ls w calcite. Possible v minor
diss py (lens) in silty dolo

42

CC-8R dump soft bk ls/sh (?)

CC-1T Turned in 100'
black is with lots of gauge
a a bx. Min calcite
vein

CC-2T 200'
delta

CC-3T 300'
P/H white dike rock w/
disp by plus black gauge lb
with lb

Rv at portal well bx, gauge scatter
all dike

CC-1D SE top dump 22" blks & mostly
Hardy black matrix
2D Entire top delta
3D NW top delta

4D bottom dump. Broken off larger
pieces, mostly w/o vein

5D bottom pieces mostly
vein, mostly calcite
some gouge

CC-9-10R ls / silty limestone
calcite veins
beds much crumpled

CC-11R talus ls / silty ls w/ calcite

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James E Stewart
4401 West 5740 S
Kearns
Tel 801-288-0985

Christensen
1467 Arequipa St
801-359-9501

3 miles NE 29 Palms
2-3 acres, massive

1121 U3O8
18 Thorium oxide
540 rare earths

Los Angeles 213-~~257-2220~~ (Harold) Stewart
213 257-3129

Los Angeles - Charles Stewart
Carlisle

Los Angeles - Bud Reed

Charles Stewart -

Stewart

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Drilling cost per foot
I.P. Coverage
Cross Sections
Rough logs of drill hole 5,

CA 5 O— Vol

CA 6 O— Vol

Austin Quad
Kingston- Big Cowed Rd

AQ-1R black crystals shale b
with frost in road cut
Hard Spec

AQ-2R deep blk shale with py

May 15, 1987

TO: MR. REA, FOR INF. OFF.

Washington Canyon

N. Shoshone Creek

WC-1R N30W; 65 NE. Shear in ls about 6' dump sample; mostly gtz w/ minerals; contains galena, in a siliceous wall; ls, Carb above unlike.

WC-2R

WC-3R outcrop above slate w/ some FeOxd; limonite, also in most amounts
near EW contact ls to N.; slate rocks
meta chert, jasper at contact

WC-4R bkt with adits, dump at prospect pit

WC-5R small prospect, galena, Sph v.
Sample carbonate bedded shale with
some fr. stringers

WC-6R crushed metaline with pyrite; stringers of
some greenish silicates?

WC-7R dump small workings. Sphalerite; slate, silicified

San Juan Canyon

A4 trip above house

SJ-1D dump sample silicified wall of prospect
lots of Sph v. py, galena, tal on dump
rock looks like silicified mudstone, siltst

SS-2D [illegible]

sample fines - slaggy, lite clay
mottled w/a sulfide

SS-3D dump: good qt veen in
bottom. Sample dump of
silicified fines mixed; mostly py
Tr sft

SS-4D dump zone of py, spotted gal veen
sample mudstone w/ py minor as
qtz v. in sample

SS-5D Knoll on bench (lagoon)
Qtz v. subcrop on dump
sample greenish mudstone w/ py

SS-6D shale on dump
7D qtz v. blk shale
8D fines blk (pos w/ sulfides?)

Reese River Mag Dist
New York Canyon

NYC-1R Qtz, dk, microcrystalline with Fe stain
some pyrite
Just east of first tunnel. Surface chips

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Grave Mound Dist.

East side range; N of road
29 July 66 Navajo Group
J. M. Edgar; Dennis Crouse
witness Harry C. Bishop.
1 p. rem (line D 36)

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Ravenswood

1R Clays 1s with iron stain; leached sam S; pretty silicified; Mn oxide veinlets

2R Separate area; wind up hill to south. Sample Greenish 1s away from vein with copper. Some iron stain and calcite veinlets. Zone at least 15'-20' wide

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							TR. MK. REG. U.S. PAT. OFF.
	Bow Claims						
	BCM 6 of 65						C of 4 (Pol 66)
	T 29N, R 47E Comm. cor 26, 27, 34, 35						
	Bullion Mag Anom						
	Utah						

Sat	Sep		1967			
PY 1D-6D	—	Pyramid Lake Dump. Along base of dump ~~foothills~~ closest to Lake				
PY- 7D		lower Cheney directly below shaft				
PY- 8D		Upper Cheney by Shaft				

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11/11/65

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Lowboy #1,2,3
Wm Wilson; Glenn Woods, Charles Cavanaugh
Robert Frank; Orville Garlock
1959 leased to Fred Vollmar.

Lowboy workings: incline shaft filled, cuts along contact; few short 60' tunnels
Mineralized shale/chert some qtz. at contact with grd which locally altered. Main trend N57°W 70°NE. Cuts expose numerous faults. Major one on the southeast end is a shallow fault dipping NW tho' apparently its attitude changes to dip SE as progress to the northwest. To the SW (up hill) there is also altered, min shale/chert. The area is peculiar possibly just have thin zones of calc/min. Then go into qtzt which appears mineralized. Also small area of Tr float (shown on topo map)

Across the gulley to the NW are creeping area of similar appearing chert/shale

Ridge to SE has claims staked 1955
Box 506 Tonopah called NURA Kohlmeyer et al
can't read name of stake
Quite a bit of qtzt some bx area and black silicified shale float. Also some grd & cal float

Samples plotted on topo map.

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

3 mi S of 11/12/65
Round Mtn, Nye Co, Nevada

Jan. 12, 1965
NOTICE AT PROPERTY

Theodore E Stevens owner

Steigmeyer Estate Gold Shale Lode Claims and Mill Site is not responsible for any act or obligation of

WESTERN METALS PRODUCERS CORP.
P.O. BOX 2021 RENO NEV.
Lessee-Optionee of said property.

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ORIGINAL COPR. 1910 EMIL C. PARKER
LEFAX, PHILADELPHIA 7, PA., MADE IN U.S.A.

ORIGINAL COPR. 1910, 1941, C. PARKER

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12/7/65

LEANCURD CREEK SEC 35? T R

CLAIM LESTER R. HORN 11 AUG 60
SOLAR #2 P.O. BOX 672
Cottageville Oregon
States lead contains Cu, Au, Ag

Orville Farbes(?) Aug 62
Willamenucca
Little Scotty
see 8½x11 pad also

12/8/65

JACKSON CREEK (south) AREA
Jackson Mtns. (Coppage Prospect)

1. P. Line along road (small stake with Al arrow to) ("Jackson Creek Line 1 S.O-West")
500' triple spacing

Claims BCMC 20 July 1905
by P. H. Kirwin Claim name JC

Coppage claims called Humboldt Star

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

August 9, 1967

Austin, Nev. met Sam Lewis, Kennecott consultant.
He is mapping 3 15' quad. Pleasant Pk.; ___; ___.

Last year he turned up the Belasteguin Bodaloch Dept. Bcme distributes. Now "West Toledo stock"
Co — Bondanton, Ruegg et al have opt to Bcme. West Toledo stock .14¢ → 4¢

Good prom — Cal/1¢/Cu/Mn/Mg/Pb/Zn
Sex shaft drill holes.
Large 1/4 around centers about 40m o.c. goes under Bt, quinsitey, Hawthorne Apparently quite hot calc-silicate in the Hawthorne.

Lech's estimate 1 billion tons in 1/4 around set grade cutoff.

② He turned up on the property Bcme stated. Small interest approaching some has dropped.

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LEFAX, PHILADELPHIA 7, PA., MADISON U.S.A.
42

③ Milford Utah.
Airborne Imperial Mine
Calc-silicate w/ copper forms
Symbiline — does Longer
exists ! 1:1 stoppin BCM
currently working on it

④ Did mappin Rocky

2 MAY 67
COPRITE, ESMERALDA CO
NEVADA

GJT N45W 30-40E

(1) Qtzt unit, rusty weath; contains local dissem py (1-3%). Thin band GJT to east NE SW-NW and alt GJT to west. Qtzt seems to localize the ccct.

2M67-1R bleached well fract; FE st
Qst. No qtz veining

2M67-2R Highgraded sample of lim; qtz veining in GJT; bleached; limonite stained.

2M67-3R Chips across cont vol sediment. White; gelluvial; very in cont FE st pits.

2M67-4R Found one place in gulley where rock contains py in seams & very fine disseminations.

2M67-5R white; gelluvial; macro shaly rock (altered)

ON WEST SIDE IN VALLEY
yellow pebbles; 2 people
claim staking?

Some claim in area by
Mr. Roberts of Gold Point. Claim
contain the outfit for Than
Clay, silica content

Old Nicols area south of Divide

NE portion

3MY67- 1R GE with albite coarse sst

2R Fresh falling

3R From scraped area. Like 1R

N20-E [illegible] 70S

Adding N20-E 20°SE

From S side of intersection N25-11-E is a vein zone that dips from 20-50° SE. It occurs along the dip slope of a small ridge. This gives initial good impression it is a thick zone. However it probably does not exceed 100' and is plainly much less. There is rather about small veins. Look at it & it may run zero, about is up to 8' Thick, probably aver 4-6'.

Whole hillside is honeycombed in workings.

Vein shaft, south, over gulley, latest vein and GE as evidenced from dump.

NE of shaft 2 air rotary holes - 200' deep.

Ore closest to shaft hit GE

" farthest NE (600'!) is only 3MY67- 4R

[illegible] hill if any values above vein

42

Area on SW of claim has several old pits. Some tailings here. No evidence of LP ever here. Might be ~~[illegible]~~ area for RCW LP.

5 MAY 67

5MY67-1R Alt Excel. Rare Shiny black lenses dense pits. Alt-Carb: Excel Mun fan.

2R Hard shiny & soft gray Excel with alt and pits & [illegible]

MASS: 65 New ophitic alt. about 4' wide, Excel 6x on either side. Pentacles just latite. Vent to no mineralization

Latite-and alt (fine) dk gray soil with embedding gummy clays. Inequigranular flow and [illegible] on edges of this alt picked up in soil NSSE

There are (pink) ophitic latite alt gray. Alt dis There are the most bx with clayey latite (x minor ol). The contact below pink (coarse) becomes la to sharp. Surface crazy rock included first as dikes and intrusive in and then pink included which further brecciated and fractured yet Excel + coarse.

Tolore Unit green or red probably same as pink

3R Clays along contact between and diss pyrite

4R Bx + lots alt; minor lin pits with pyrite; some thick jarosite [illegible]

(10) [illegible] Intrusive (diorite?) (maybe intrusive equivalent Exeter) zone of brecciated altered; weakly pyritiferous. Looks like some rocks as country (diorite) but matrix dolomitic; glassy [illegible] Fields smaller

From this zone there implies intrusive at areas occur

9 Intrusive up range (to main out zone) begin getting blocks of cut Exeter in diorite.
* And in one place a 2 element block of quartz-hornblende.

* At the pt. rock changes to more of the rock; continue with dike of pebble Fields.

5R. Alt lot little; include some of jasperoid red flecks specks in it; mainly Clay

12. Alt/altered Fields
All zone just to north here the intrusive becomes grade from diorite into alt diorite; then 5x; then silicified Exeter. Now have [illegible] with pyrite dis in diorite?

13 Minor tuff contains fresh diorite AMPHIBOLE here in Exeter which also has some [illegible]

6R Altered (shaly and silicified)
iron stained.

sandstone units in Excelsior

gb latite dike on west cut
at alt zone

40 to north on ridge same alteration but less mostly
extrusive type latite lgb latite

15 Unalt and a dior. ?

CDE A Ag Campment of
Campbaylor (Jones county)
In redbirds from the Schiffrock
Cycle?
No gh vectors.

TEAM MARSH 11MY67

West side road: 1) QM vacant
2) rust stain area (roadcut)
carpn basic rock; some gtz pockets; fault zone on QM. No good barite in carry intersection area

* West side road main drainage alt QM (spec)

* West main canyon south — road go way cpc. Similar cutbank

Old claim corner in canyon
Foster (Calif) 1955

Road goes into property Sunset Mining Co.

At basin Ferruginous sinter
N of basin hill gtz/QM wk alt; some barite qtz v; some aplite; zone into high sr (text still good) pods red-yellow lim [Sample 17]
Also in this first small fr. sinter present. Rhyolite NZ.

Get down into pods of qtz brecc (clear smoky qtz)

[illegible] west part of [illegible]

Run down road [illegible]
Trail d/c [illegible] expected d/y
fault
Granite

4820

4705

11 MAY 68
West Peak Marsh
MINWAC CO NSW

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

N
Claim Filed on 1 May 68
Geol. Dept. 11 May 1968 Granite Pit
Granite
Quartz
Qtz
Qtz
Qt

Rosebud Mine Area

RB-1 footwall of N75°W STO.S fault shear

RB-2 hanging wall of Scem

silicified (in part) vlydit/latite wedge
Fault zone 2' thick composed of bx silicified with alsit jarosite.

RB-3 - 30' tunnel up hill from old hoistshaft in reddish area (red soil)
Peculiar bx. block of felsit and vel bx in smaller pieces and red clay
Landslide bx? Amazing the rock stands

RB-4 Sulfide(py) from dump at loading chute

Instead of wide alt(py) zone as it heard often here with constant
There are three narrow 4'-30' zones separated by fresh Nff (porphyry)

Fault zone strike N75-W to E-W
dip steeply N 50° S

RB-5 small rounded hill with numerous bulldog east up main canyon.
Tuff - latite. Stem pit expose dangerous greenish (fe) mineral - some of it is so fe st

March 11, 1907 : Rock Hill - Redick Siding

1. N60E 20N ; which crooked gauge

Difficult to tell if all sound gravels
stuff on outlying indicates some white to buff pumiceous tuff
that when seen in filling in (P.) temporarily ? Can't
trace for any distance.
There is a limit to weathered gm as shown on map. This
could be due in part to rotting over of more recent
weathering of dis, Grc. Ord. etc. ; or maybe, not to
try and determine a different erosion period.

No Tert vol from seen anywhere (stuff in place only)
No possibly chert rubble except along drainage by railway

* RR Grade N 20W

Short tunnel in gravels.
Compare N5EW 20N ? Sdek.?

Vol Inlier West of NS 80E bounding

Pumice tuff east edge (N60W 30 NE ?)
Pit below where porcos trails suggests fault contact
between gravel/Vol

(2) Shaft - 20-25' All in the min gauge. To north (where crooked
occurs) rubble of fine disintegrated tuff occurs but no good
o.c.s. The pulling sequence (more recent than pits) are in
the min gauge just above tuff.
Big Trench past S shaft. Suggest Min Gauge N5EW 25 NE

Small [illegible] shaft in creek bottom.

Marcasite and [illegible] (low) rutile prob. [illegible] or andesite that appears to be in a fault belt zone.

Immediately above this rock, in place, is a block of chert/[illegible] (Permian?)

To north of this shaft (5 degrees this shaft) rock looks like brownish tuffaceous, [illegible] but in places looks like has gouge in it and a silicified rock (contains silicified shale frags in section, dense, siliceous, [illegible] [illegible] in part and often plucked looks like broken silicified shale/grit.

There is north in creek bottom [illegible] yellow gray purple tuff [illegible]

In creek north of shaft gray quartz veins cut the rock are different than pattern looked at this area in east portion of the [illegible] range.

There are more basic with [illegible] and [illegible] [illegible] fold.

Also in this [illegible] [illegible] many rounded [illegible] of [illegible] [illegible] about

Rock Hill - well and Gull/SN/Fault/Rock. Top of hill is all a chert/pebble conglomerate. Good till hit 5' dip very well NNW SUN.?

* Fault located the rock and identify it (see note it fine grained. Dip is there shattered zone. Shear zone <1-6"

At Base on west end of hill a fine grained zone N30E vertical 1½ wide. (another) This zone likely to dip back. Gouge bedding suggests tops to north. Cut (EE) equal zone of this. Repeat step end of ex spot.

I do not recognize any Cod Palmata. At SW side of hill at base some chert boxed but appears to gradate into one certain area of chert/pebble conglomerate.

N70W Ovl backside by LM

Vol is rel N65E 35 S

Mem hill Pl Gage N70E 75 N above Fault

The cut (see on hill) looks like fault between Pl and vol (slumpy)

(4) What Ord cut by db (dikes) strike of Ord near EW N35 NW

Above this colored ore fault and db which as prev. followed go into fault Pl. At contact the Pl very coarse and suggests might be contact but at PL, AT gouged still coarse and strike NE dip 20 NW

At A Fault N85W 70N

East of A main canyon joins N along fault with the "vol looking" rx at base. Don't know relation this is the gouged Ordov it is similar to that rock on front hiway This may indicate roll in the thrust This gouge goes limit on south by N65E vol fault is the Pl

(9) Fault zone in Ord. N's 40E; 1½' [illegible] Filled. The Ord is a phyllite with small lenses of [illegible] with sample [illegible] solution from material on dump of small shaft (20-30')

(10) Sedder Fault zone: 6x 45V with small shaft. Sequences Ord/A [illegible] in line with suspected fault to west and lines up with [illegible] 7E [illegible]

Across from main PC [illegible], state highway cut a # of N50E 60SE faults, shaft [illegible]

As projected the PC in Fault zone not across face of main hill facing highway, i.e. the no CORDOVICIAN HERE A cut (main one) exposes volcanics/A contact

The area across highway between two shafts is sun cut of rock type

GM
GM
GM

LUCKY DAY CLAIMS
Lander Co Nev
N. END FISH CREEK

Dec. 13, 1966. North S[illegible] Creek Range

LD #3 West of clix of LD 30 claims in gulley

LD Claim 34 Trench, in sandstone. Iron ? Py on West. Few thin descont veinlets. Copper stain. Thin on some fractures.

LD #4 Pit West from trench, claim 34. Samples of SS-sh in pit with stain. No copper seen.

LD #1 claim. Pit 1s/ss with manganese & stain on pb + copper. Few thin zones of good possom. N30W SW moderately

LD #3 Claim N15E steep W 6' wide opal like zone (greenish yellow) with some LUOX between SS, walls

LD #5 ~~West slope of~~ West slope looking across at [illegible] facility, West of the T

LD #6 Introduce QM with bedding in plates but secondary? Little chips on front of U. manganese stain in field

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L.D #7 carbonate grey with fresh diss grains of pyrite

Dec 14, 1986

L.D. 8 dk slate/black + tan qtz/carb. last at long hole. Out to north. Qtz/carb typically at weakly bleached. The dk slate/black look unaltered.

L.D. #9 N15°E 75°W carb/qtz/slate with no bleaching. Few specks lim diss in rock from specks (non-calc) pyrite seen in rock when break into fine pieces. Then is light grey-blue color (like 7).

L.D #10 Prospect pit. Carb/mudstone with fine stain. No signs of visible mineralization.

Short Shaft (x) a N25°30E brecciated zone, could trace for certain extent of collar of short shaft. Skin + spalling unusual altered. Copper staining not abundant.

Short (b) 110-20' 5-10' skarn (garnet-epidote) diopside? zone with copper oxide not abundant. Hanging wall bedding? Shallows dip 40°W then footwall which is more W and steeper dip but it is exposed in shaft.

Zone thins Northward: curved Qtz S seems to strike into shaft a.

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Mineralized in FE

L.D.# 11 N5E 45W bx zone. Bleached. V. minor Fe stain yellowish reddish. This trend Qtzt? Original vx? Qtzt now bx highly silicified

Boulders of gt. Qtzte in gulley

#12 No sample. on south soil reddish contains frags of Qtzt + arge. West at them look unbleached & weakly bleached. No ore in place. To south bt comes into gulley bottom

L.D. #13 Qtzt with more than usual iron staining Contains thin qtz veins, some open space fillings with wk to mod bleached pyrite.

Trace copper staining

L.D. 168 claim ~~locate~~ discovered is on west edge of this o.c. (claim 1350E 50W)

In flat N side of Fish Creek
BCMC claims Can 829
29 Dec 64 G. S. Stathis locator.

L.D. 14 QM alt; lin (yellow brown) on fract some cuox on fract (v. minor) some limy cuox (minor) dis in rock.

L.D. 15 silicified rock with lin staining some sulph. leached along fract

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Tgl above LD15, Partially covered
as 4 Fkm dipping gently NW

above 15 to south pit exposes small
6x. Coal fell disintegrated. bleached

L.D 16 Bx zone in Ph NSW steep dip west?
This might offset Tgl to South.?
Also Sandst?
No samples
near 16 LN suggestion Tlt overlying Tgl

L.D.I 17 alluvy road. stratified red sandstone in
mudstone. May be cover the
overlying Tgl

L.D. 18 gravel gbt. Nb Fl stream
other than alluvium

Reville

1/10/01
Reville
Nevada

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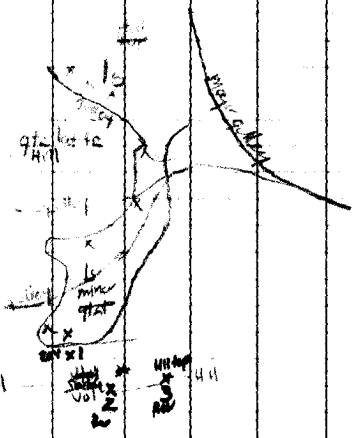
VU

workings follow gte-colitic zones in localities
of the district w/ gte belt & Kan. workings
numerous but just except the line between the
chance for open cut where tonnage



E

REV 3 Hilltop. Sw/leach S.

REV V-2 high sericite/high v. flat diss Sulfides (py?)

REV-1 gte belt; some fe st fract; some fl diss mag
in part from hi- in part S.

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South of Hilary (Dutch Mountain) 8 A
between least two hills the pro That
once was heritage road from Copper Bar
Octcrop Prospectory ex. Fluctuated Sediment
Sample 15 Dec 66

27 Jan 67 P.I. Stake Claim
J. Hum
R.W. Sayers (Naval?)
Some stake Dec. 67
Hundred Co. Alex Highway
at Stone Hill

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LEFAX, PHILADELPHIA 2, PA. MADE IN U.S.A.

Jan 20, 1969

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

Monarch Hugo (South Behest) see Ans
Tonopah Sheet

Claim:
MONA Group. 20 April 66
Pilot Exploration Co
6660 So 23rd E mst
SLC Utah
W. L. O'TOOLE Agent

Bulldozed pits.

ORIGINAL COPR. 1910 BY J. C. PARKER

LEFAX, PHILADELPHIA 2, PA., MADE IN U.S.A.

21 JAN 67

windy go health

ORIGINAL COPYL 1910 RY & G. PARKER

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S of Lida; W of Gold Point

PHOTO # 733

① Small rounded hill. Contain several poorly exposed large (3') qtz v. that contain tr. MoSe. Wall rock mod silicified and contains pl. phenos, some small <1" qtz v. Rock equigranular to porphy qtz monz granite. Some aplite, some "graphic granite" type. Rock mostly disintegrated. Type of outcrop that could be in vicinity of better mineralization.

② Pair qtz vns to qtz. Contain narrow altered zone (silicic or clay?) trending NNW. Few qtz v.

③ Tolicse fault zone; pits

④ Small rounded hill. Mod silicic developed in porph GM. Couple qtz v.

⑤ Alt zone in bi qtz & aplitic material. Yellowish brown overall color with spots of dark red. Mod silicic; leak py on fract, mind than qtz v. with leak py. Overall S < 1%. Fault, recent crosscuts and well fract partly post mineral.

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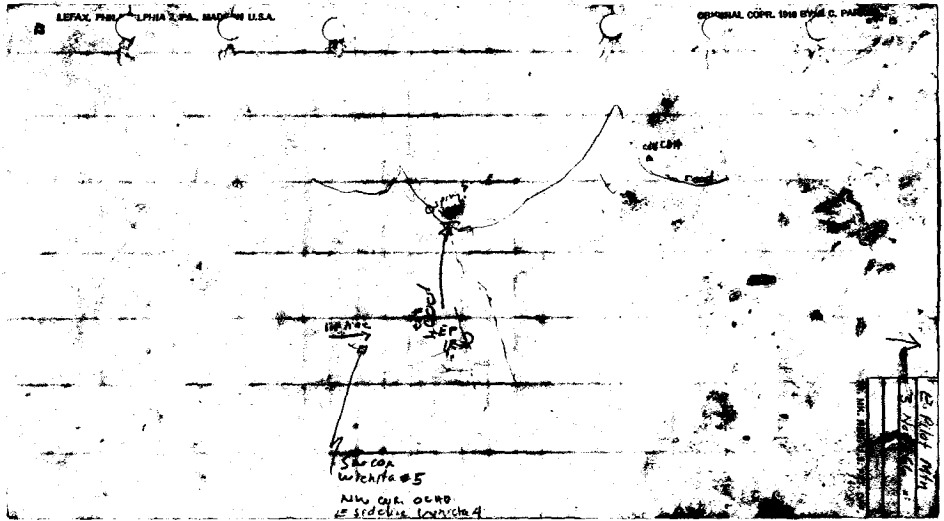


Further south
claim Kansas #5 3 Sep 66
Blackmore & Thomas → 760 Pepper Dr
L.E. Phillips III → EL Cajon Calif
→ Wichita, Kansas

Buckle working a little more to south

L.P. [illegible] off of Kansas #5

above Kansas #5 in gulley [illegible]
then dike (?) rock along fold in
[illegible]
flinty rock with slight iron stain

Uphill (west) from Kansas #5

Tree 160 [illegible]
John C Rockmore 12 May 65
along with [illegible] Rockmore
and apparently relocated
3 Sep 66 by Blackmore & Thomas
and called White Place #6
also this is site of 4 places
Wichita Place #5
14
#5

To north again – see gulley south (one south
of gulley Grid was put with
NE cor WP #4; SE cor WP #3
(looks like [illegible] of the [illegible] post??)

sec. 19 T.8S R37E

Wannacle [illegible] & Spring
[illegible]

[illegible] Chr UP 87 3- 3625
Emery Joe Belt 87 3- 3626
[illegible]
[illegible] 2 miles
turn left at market gth house

Clim of Belt

Tunnel claim #1
S60W - copper zone in health
- the le is complex between Diorite on south
and Gneiss on north. The Diorite
has some qtz/feld, tourmaline, epidote veins
just to S60W. The veg
strike seem to be EW vert

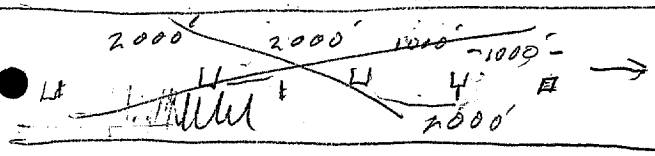
3 Disc 6' wide lots of CuCO3 pockets
with fibrous grey mica wallrock?
rifted on contact

70 x 20 grandiorite-gneiss melange
well fol EW vert

Uphill n grd-gn are zones
of gabbro. Gabbro qtz feld vein
w/ tourmaline i CuCK

Disc #7 Qtz feld/tourmaline
vein up to 1' in width sheared along
bottom of vein. In part contact i
between gabbro i grd-gns but not
entirely

SANTA FE DISTRICT



Belzer + Borgagno appear to have relocated in Quitana Mts.

Afterthought

Zone of IP (drilling) is located within a band of metaseds, possibly a little ig right at contact or else rock thoroughly sextall. Only evidence is limited pyrite except for very, very meager Cu stain in a few places

Hottentot

Altered intrusive — silica, mafic destroyed some greenish mineral; areas not much altered (?) possibly secondary biotite plus cloudy feldspars. Very little evidence of original sulfids.

Few small zones of ~~any~~ magnetite, in part in what is altered sediment(?)

There is certainly not the indications at surface of the magnetic anomaly or drilling results.

Oct 10, 1966
Jessup Dist
Churchill Co Nevada

Recent claims in this old declined
PRINCETON GROUP
LOCATED 17 MAY 65
RICHARD A. HUGHES
BOX 8697, UNIX STATION
RENO, NEVADA

Carlin — Bill Johnson

dikes; silica alteration; pinpoint leached py

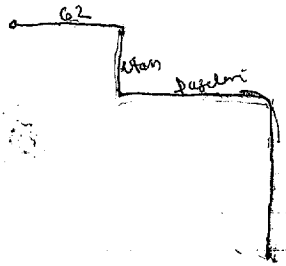
crossing NW shear zone
2 barite veins in pit
Question of fm in pit Johnson
thinks its the Roberts mtn Formation
of silicified limestone and not
a siltstone.

Johnson sampled area that
had alteration & dikes and
.02 oz gold at surface and
drilling didn't get any better
at depth.

2 miles N 29P T rt on road to Amboy

29.5
34.4 Turn left (N) Pinto Mtn road
36.3 Turn left follow to end
W. Gr. Moses
367-9736
365-2611

Backwards
62.4
63.5 left down canyon
70.3 usually open gate paved rd at corner of Morning Drive and Sahara Ave
70.9 left on Base Line
74.5 Rt on Utah (So Dr-Rd)
72.5 L 62
73.5 62 jst to rd with Marine base



Olsen PhD 196[redacted]

Birch MS 1940 Little Willow Dist 378.242 B6179

Johnson MS Warship-Coalville 1957 J68a

Lee MS Warship-Park City 1952 M928g

Larsen MS Rockport-Warship 1951 L3346a

O'Toole MS Keetley-Kamas 1951 O88g

Paddock MS Newfoundland mtns 1956 P123g

Siegfus, S.S. MS Promontory Pt Mining Dist 1924 S571m

Wood Coalville area 1953 W881a

Austin PhD Geochem expl in silicate deposits at Darwin California 1958 A935g

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$$\begin{array}{r} 13 \\ 11 \\ \hline \end{array}$$

$$\begin{array}{r} 110 \\ 119 \\ \hline \end{array}$$

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$$\begin{array}{r} 557 \\ 155 \\ 2 \end{array}$$

WEST TINTIC

SW 11S

sec 32 state section applied for 9/63

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6W 12S sec 2, 16, 32, 36 } State Selection 9/63

as above

Vernon Smith

2901 E 3rd

327-9356

Mining Engineer [illegible]

Texas [illegible]

To be submitted for publication in the Arizona Geological Society Digest X (March 1976).
(Not used).

SYNOPSIS — PAST, PRESENT, and FUTURE — ARIZONA TECTONICS

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In 1972 when M.E. (Spade) Cooley, J. David Lowell, and ~~myself~~ I discussed aspects of compiling material for a Tectonic Map of Arizona it became very evident that the complexity of geological events precluded a solution without a diversity of opinion. From this ~~of~~ initial meeting grew the idea of requesting papers on various segments of Arizona geologic history. This was done and I wholeheartedly THANK all those who responded and contributed papers. The scattering of papers did not provide the depth and width of coverage as it had been initially envisioned. Luckily for all of us, Jan and Judy undertook the task of holding the papers submitted, reopened the doors to the unreceived papers,

filled in some of the gaps with new specific requests, and with the spontaneous papers received, have compiled the Arizona Geological Society Digest X — Tectonics of Arizona.

Digest X brings to the student of Arizona geology a diversity of opinion, some new thoughts, reinforcement of previous bias, and a glimpse into the multitude of problems. If any overall theme is evident, it is that the place known as Arizona, has been and still is a dynamic, moving, pulsating, everchanging landscape throughout geologic time.

Anderson and Silver have brought together their mapping and age-dating data of the Prescott-Jerome area. They relate the similarity of the Yavapai Series of folded and metamorphosed volcanic rocks to many features found in the Older Precambrian greenstone belts of the world. Some of these belts are discussed along with various ideas on the development of the craton. The age documentation of the Prescott-Jerome area suggests it is among the oldest in Arizona.

Anderson and Silver note the interplay of volcaniclastic deposition and vulcanism followed by deformation and culminated by early plutonism in a cycle which may be repeated several times. A style of tectonics repeated in other areas of Arizona at different time spans.

Lingley reports on the Older Precambrian rocks in the Grand Canyon between Clear Creek and Cremation Creek. He discusses three phases of deformation and notes that the clastic and volcanic rocks of the Vishnu were strongly deformed and metamorphosed prior to the synkinematic emplacement of the Zoroaster, with continued deformation stress being active. The resultant schist-gneiss complex was intruded by late pegmatite and aplite masses (as well as non-foliated granite) which were in turn involved in late structural deformation. Lingley's report is one of the studies of recent vintage coming out of the Grand Canyon. Expanded treatment of the Older Precambrian has been published as Chapter One in the "Geology of the Grand Canyon" (edited by

W.J. Breed and E.C. Root, Museum of Northern Arizona, 1974).

Peirce gives an overview of the Paleozoic and brings forth several piercing questions concerning sedimentation, tectonics, and interpretation. Although the Arizona Paleozoic record is apparently devoid of intrusive activity and ~~possibly~~ ~~possibly~~ possibly has a less severe tectonic style, it was by no means a quiet sequence of sedimentation. Indeed, Peirce points out examples of major structural trends and areas which probably reflect fundamental patterns found in the Precambrian and in turn preview the more recognizable features of the Cenozoic.

Schumacher, et.al, sharpen up part of the Devonian portion of the Paleozoic overview. Through the use of conodont biostratigraphy they have reassigned the upper Devonian strata of southeast Arizona into the Martin Formation (lower limestone units) and the Percha Formation (upper shale and ledgy carbonate sequence). Based on their studies and reinterpretation, through the use of isopach maps, they conclude that the more

positive areas during Martin time were strongly downwarped and were the recipient of thicker accumulation of sediment during Percha time. Interestingly, the overall isopach value for the entire Devonian is nearly constant in the main portion of the study area. The interchange boundary between accumulations of thick Martin-thin Percha and thin Martin-thick Percha perhaps again exhibits the basic fabric of the Arizona tectonic framework.

Purves uses the Mississippian to arrive at happenings of a later date. He reviewed a number of outcrops and collected detailed samples and after processing compiled their conodont and foraminiferal content. From the collection, and using the premise of the Clear Water Sedimentation Model, he has developed a model for Arizona Mississippian deposition. By the CWS model constraints, he can conclude that vertical tectonics played only a minor part during Mississippian depositional time. The present Mississippian outcrop patterns, and their bio-content, are segmented and Purves attributes the destruction and displacement of the

model to large scale strike-slip tectonics occurring in post-Triassic time. He relates the change in stress-field to the intraplate tectonic activity. Acceptance of his model and extension of the concept to other sedimentary units, would place numerous contraints on original and ultimate lateral displacement of units.

Tittley has pieced together a Mesozoic linear tectonic pattern based on measured thickness and facies changes of various units and their relationship to underlying units. He believes part of the pattern was acquired from the Paleozoic tectonics and all were strongly modified by events in the Mesozoic. Tittley has identified six discontinuities which cut through southern Saskatchewan. Each has a northwest trend and isolate linear ~~blocks have~~ strips having a width of 30-40 km. In one block, thick accumulations of Triassic-Jurassic volcaniclastic units are intruded by Jurassic plutons. A style of deformation similar to that suggested by Anderson and Silver for the Older Precambrian. In Tittley's adjacent block, similar Jurassic plutons occur but have very thin

to no associated Triassic-Jurassic volcaniclastic units. It is pointed out that the Jurassic plutons are generally in proximity to the linear discontinuities and probably reflect emplacement along deep-seated structural zones.

It should be pointed out that a similar style of involvement is reflected in the late Cretaceous-early Tertiary volcaniclastic units and associated Laramide plutons.

A recent study by Davis (Davis, G.H., 1975, Tectonic Analysis of Folds in the Colorado Plateau of Arizona: University of Arizona Office of Arid Land Studies Bulletin 9, 68 p.) in the Mesozoic of the Colorado Plateau suggests strong control of the surface structures by discrete basement-fracture zones which have a spacing of about 45 km. The pattern and spacing is similar, but apparently much more complex, to Tilley's pattern to the south.

Mayo has shared his extensive knowledge and feeling on the subject of fluidization and its role. After reading his paper on intrusive fragmental rocks, one may find themselves overwhelmed and somewhat

"discombobulated", that is, discomposed and discomfitted. But after reading the paper what new discernment will be placed on those gruesome, head-scratching examples of "conglomerate-breccia" found in outcrop and drill core! How many times will your mind conjour up another example and the muttering of "Oh My!" and "Ah, yes" pass from your lips as your eyes continue down the page unreading? (place number here _____).

Drewes has brought the full force of recent mapping, age-dating, and interpretation into a preview of a regional compilation to be published by the U.S.G.S. in the near future. He proposes that southeastern Arizona is covered by major thrust sheets which were emplaced in post-Jurassic — pre-early Tertiary time. The thrust sheets are extensive and imply large scale translation of units and are a part of a regional system of thrusts extending from Canada to Mexico and beyond. The problem is complex and his title apropos.

Rehrig and Heidrick review and restate their thoughts and evidence for the regional stress field operative

in Arizona during the time of Laramide porphyry copper intrusive emplacement and also for the mid-Tertiary period. A differential vertical stress with weak lateral compression is favored which allowed the emplacement, largely oriented ENE, of the stocks, dikes and veins of Laramide age. During the mid-Tertiary pulse of magmatic activity, the apparent relaxation of the compressive stress, although small, allowed elongation of the crust such that the NNW striking fractures were the favored site for dike emplacement.

In Loring's review of an extensive search and compilation, she concludes that basin-range faulting began as early as Late Mesozoic and continued to be active into Quaternary time as a continuum of normal faulting. She finds this premise in conflict with several hypotheses for the origin of the Basin and Range Province. Loring point out that the study result and interpretations are hampered by the sparseness of radioactive dating of critical and bounding units.

Peirce in his paper on thick evaporite deposits covers

a number of salient points concerning the Basin and Range Province versus the Colorado Plateau. One point, covering what is now basins among ranges, is that the three discussed basins probably were not initiated prior to upper Miocene (18-16 m.y.) and were filled with extensive anhydrite-salt deposits within the next 10 m.y. Constraints on the age of basin development in these basins is clear. The implication of vertical differential movement of tens of thousand of feet, during this post-porphyry copper period, enhances the concept that basins may have similar preserved geology as is found in the adjacent ranges and their pediments.

Within Digest X, a number of specific areas have been described which bring into focus the problems-questions and interpretations by the authors.

Lovejoy's reassessment of the Grand Wash fault complex places major movement between the Colorado Plateau and the Basin and Range Provinces as being well developed in "Laramide" time. His numerous cross-sections support this premise and shows the separation between

relatively flat-lying beds on the east with steeply tilted beds on the west. It is apparent from the cross-sections that as one goes westward in the adjacent mountain blocks, the stratigraphic units found are "up" in relation to the units of the Plateau.

Mayo and Davis dissect the Red Hills - Piedmontite Hills uplift into its many structural elements. They reassemble the pieces to suggest that the thick section of Triassic volcaniclastic units were uplifted into a double-plunging dome by an intrusive complex of Jurassic age. This was followed by partial erosion of the dome prior to the area being completely buried under Cretaceous arkosic sediments. They believe that Laramide plutonic activity became an active force ~~in the more general area~~ and again dilated the domal area with structural complications. More forceful intrusions of mid-Tertiary age occur to the northwest outside their study area and part of the complications may be associated with this later event.

The status of several man-years of detailed nose-elbow-knees

investigations is reported in the Tanque Verde-Rincon Mountain area by Davis and Frost. This work has added considerable insight into the complexity of deformed units as a consequence of vertical uplift and gravity sliding under an implied cover load.

Vroman ties together geophysical ~~to~~ and outcrop data at Black Mountain to suggest that a hinged fault extends some 13 miles NE and 20 miles SW of Black Mountain. As some of the exposed volcanics, with an age of around 24 m.y., were emplaced along and subsequently faulted by structure in this trend it is suggestive that the zone is one of reactivation.

Keith and Barrett tackle the complex Central Dragoon Mountains and give us a new look. Basically they point out that the features found do not necessarily indicate large scale thrust fault movement for the genesis of the range.

~~Kintapodation~~, Near the site of the only Civil War battle in Arizona, remembered by a monument and plaque, Shafiqullah, et.al., have dated the volcanics and indicate that the

sequence in the Picacho Peak area is 22-20 m.y. This bracket included a flow lying on metamorphic rocks in the southern part of the adjacent Picacho Mountains to the north. They also report the age date of around 14.5 m.y. on the volcanics found some 2000 feet below the surface of the valley in Humble State 74-1 well located 8 miles NW of Picacho Peak.

Implications of this large displacement of units along ~~was previously undertaken in Peirce "salt" paper.~~ the north-south trending eastern boundary of the Picacho Basin was previously undertaken by Peirce ("exports" ~~salt~~ paper, this Digest) Travelers on Freeway I-10 should note the 6-8 foot monoclinal fold, with a north-south axis, developed in the Freeway at a point 4.4 miles west of the Picacho Peak interchange. Does this suggest continued crustal instability?

Richardson has constructed a set of 51 cross-sections, spaced at about 8 mile intervals, across southern Arizona. In his article he mentions some of the philosophy behind this monumental undertaking. As noted, some of his

data is from sources outside the general literature. The full set of sections are on file at the Arizona Bureau of Mines and should be of interest to those studying the complex Arizona geology over large areas.

Sumner, et. al., have compiled a free-air gravity anomaly map of Arizona (included with this Digest). Their evaluation concludes that the Colorado Plateau area and the southeast corner of Arizona, ie, the Basin and Range Province east of the San Pedro River, are under different isostatic conditions than the remainder of Arizona (and the ~~remainder~~ majority of the Basin and Range Province). They discuss the model, and features found elsewhere in the world, with the various implications for Arizona.

By now the reader has been contorted, disrupted, pulled, pushed, slid, stretched, and hopefully, reassembled — though perhaps, never to be the same. As one of my professors was apt to say: "It was all so simple until I sat down to explain it".

Where does Digest X leave us? It leaves us with a broader appreciation of the complexities of Arizona ~~geologies~~.

It leaves us with some of the approaches used in trying to understand even some of the apparent easier complexes. It has shown the increased availability of age dating techniques in clarifying the time domain sequences. It points out the use of, and the need for, the evaluation of parameters within methods, be it age dates or biostratigraphic or other data, and their relationship to the reported results. It speaks for the upgrading of all types of data, for the clarification of meaning, for the restatement of the problems, for alternative, and for multiple ~~dis~~ discipline evaluations. Certainly the availability, reporting, and critical evaluation of outcrop and drill hole exposure is continually needed.

Yes, <u>applied</u> words, thoughts, and deeds will unravel the complexities of Arizona tectonics. Digest X is dedicated to all those who have done and will do just that.