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FIELD GUIDE-NOTES
to the
COMMONWEALTH MINE,
Pearce, Cochise County, Arizona

Prepared for the 1988 Field Trip,
Arizona Geological Society,
October 22-23, 1988

by
John M. Guilbert,
Department of Geosciences,
The University of Arizona,
Tucson, Arizona,
85721

INTRODUCTION

It is a little-known fact that R.A.F. Penrose, he who was to become the greatest benefactor of the Geological Society of America in its history and one of the founders of the Society of Economic Geologists, visited the Pearce area in 1893. Recently graduated from Harvard (in 1886), he was seeking to make his fortune. Optimist that he was, and already philanthropically inclined, he renamed the prospect at Pearce "The Commonwealth", and acquired it in 1895. It proved to be the basis of a career that included co-founding the Utah Copper Corporation that was to become Kennecott. He sold his interest in the Commonwealth at a huge profit in 1903 and went onward to the benefit of us all.

The mine itself is a 'little-known fact'. Oddly, the Commonwealth, along with the Great American, Ash Creek, Stein's Pass, and other epithermal mines and prospects in southeastern Arizona, has never been included on maps and inventories by USGS scientists, in spite of excellent exposures of classic volcanic-hosted epithermal mineralization that occur there. There are only two publications of any consequence on the Commonwealth, namely M.S. theses by Lewis A. Smith (1927) and Kim K. Howell (1977), both at the University of Arizona. The Advanced Ore Deposits class at The University of Arizona is currently engaged in a comprehensive study of the district, with the cooperation of Warren Hinks and Westland Minerals Corporation, that will result in a 1989 paper.

PRODUCTION

Smith (1927) reported that production from the Commonwealth to that date had been 940,000 tons at an average grade of $11.71 per ton. The price of silver in 1927 was $0.65 per ounce, close to the average for the 1895-1927 period, so the average grade was about 18 ounces per ton (560 ppm). The value then was $10,407,000, about half of which was profit. At today's $6.50 per ounce, gross modern revenue would be over $100 million from the 17 million ounces of silver extracted. Gold apparently ran about 0.1 oz. per ton (3 ppm), so some of the $11.71 historic value (about $2 at $20.00 gold) resulted therefrom.

The mine closed in depression times, and has been sporadically and trivially operated, mainly by leasors, since then. Stamp-milled amalgamation and younger cyanidation tailings piles north of Pearce Hill (Figure 2) have recently been reprocessed.

The mine reached the 8th level about 500 feet deep down dip from the "D" Shaft near the east end of the main hill. A major collapse of some 500,000 tons of hangingwall volcanics in 1905 resulted in the slot at the surface and the dangerous glory hole at the east ead of the main hill near "D" Shaft.

Modern exploration -- mostly shallow drilling without known benefit of modern lithologic-structural mapping until now -- has not revealed significant new ore. Westland Minerals seeks new extensions of the Main Vein and intercepts of disseminated values that would permit bulk mining methods. About 20 reverse circulation rotary holes are planned for completion before year's end.

GEOLOGY

The Commonwealth Mine (Figure 1) is a classic vest-pocket-size epithermal volcanic-hosted bonanza precious metal silver-gold deposit in Bisbee Group sediments (?) and, almost totally, Mid-Tertiary felsic volcanics. Bisbee Group sediments outcrop at the base of the Pearce Hill and to the east near Huddy Hill. The Pearce volcanics that make up the whole of the Pearce Hill surface include andesite flows described by Drewes (1980) as Eocene or Oligocene mainly greenish-gray propylitized pyroxene, amphibole, and feldspar porphyritic flows and pyroclastics, and younger extrusive vitric and crystal rhyolitic and rhyodacitic flows, welded tuffs, and pyroclastics with sparse volcaniclastic sedimentary units. These younger units are coeval with the main Chiricahua volcanic event at 25±2 my. Excellent petrographic description and stratigraphy is provided by Howell (1977), who distinguished several easily recognized subtypes on the Pearce Hill.

The principal veins (Figure 2) are the east-west North Vein that dips 40-50° S and the N70°W Main Vein that dips 60-80° S. The North Vein can be traced along surface through the silicified, heavily veined area east of D Shaft; the Main Vein runs through the collapsed zone and the glory hole and on to the southeast. They comprise massive to banded and comb quartz in normal faults with associated steep sheeted zones. Clear quartz and amethyst predominate, but values lay in greenish, oily chalcedonic veins and veinlets.The vein structures contained high grade ore shoots that were originally sulfide-sulfosalt (proustite, tetrahedrite, chalcopyrite, galena) but were silver halides (embolite, bromyrite) and native gold, oxidized and locally redistributed by supergene processes, when mined. Smith (1927) described several subhorizontal enrichment bands that he related to old proto-Wilcox-Playa lake levels. The primary system was undoubtedly a near-surface hot-spring environment.

Alteration consisted of ubiquitous silicification, with propylitization in andesite and potassic alteration in all rocks at upper levels and near the veins that 'upgraded' rhyodacites and latites to trachyte-rhyolite compositions.

BE CAREFUL -- OPEN SHAFTS, STEEP SLOPES, LOOSE ROCK !!!

FIELD TRIP TARGETS

We will park at D Shaft if the bus can make it or at the base of the hill on the north side east of the Thetford mill if it cannot. In either case, proceed to the D shaft where maps and sections will be posted. There are excellent specimens of classic epithermal textures on dumps, in outcrop, almost everywhere. It is especially worthwhile to roam the hill west of D Shaft and east along the North Vein to see "exploration outcrops" of undisturbed surface.

Two maps will be provided, one 1:1200 (1"=100 feet) by Tom Patton, courtesy of Tom Patton and Westland Minerals, one 1:920 (1"= 85 feet) by Kim Howell. Use them to establish your own traverse, which should include a trip through the caved area to see the contact in the west wall of rhyolite breccia (TCP)-First Flow (KKH) beneath and Upper Andesite (TCP)-Second Flow (KKH) above. The veins and workings are exposed here too. Waxy green mineraloid like Vaseline is embolite; earthy green is montmorillonite. Bisbee Group outcrops at the west end near the Thetford mill building. (NOTE: fragments of specularite-diopside-pyrite-chalcopyrite skarn here are from the Black Diamond in the Dragoons, not the Commonwealth. Custom milling was done here.) Work along eastward past the glory hole, with splendid samples of comb quartz, amethyst, etc. As you proceed east with Huddy Hill to the near east-northeast and Metat Hill to the near east-southeast you pass over outcrops of Upper Andesite-Second Flow that have been extensively potassically altered to trachyte-rhyolite. The new drill-hole location stakes in general bracket and define the trace of the Main Vein. Don't miss the strong veining that webs between the North and Main Veins out to the east along the ridge before you get to Huddy Hill. All the while imagine yourself in the shallow roots of a hot-spring system -- sulfur-depositing springs were active a few miles east (hence the Sulphur Springs Valley name) until the 1887 Bavispe Sonora earthquake.

REFERENCES

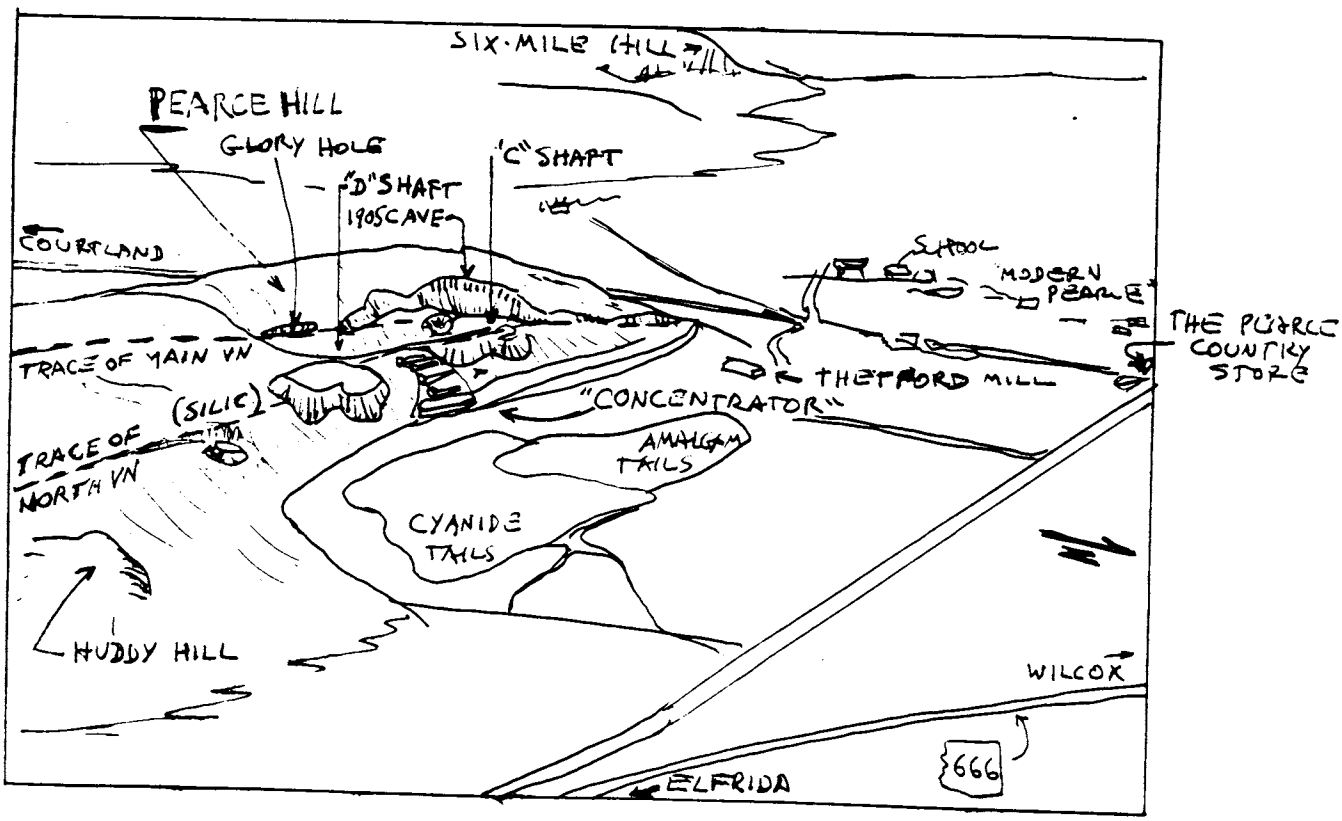
Drewes, Harald, 1980. Tectonic Map of Southeast Arizona, Map I-1109, USGS.

Howell, Kim K, 1977. Geology and Alteration of the Commonwealth Mine, Cochise County, Arizona. Unpub. M.S. Thesis, University of Arizona, 225 p.

Smith, Lewis A., 1927. The Geology of the Commonwealth Mine. Unpub. M.S. Thesis, University of Arizona, 73 p.

Figure 1 (above). Oblique aerial photo toward the southwest showing Huddy Hill (lower left), the old concentator foundations downhill from the Main Vein cave zone on Pearce Hill, and Six-Mile Hill (right center, upper margin) The old Pearce store is at the upper right margin.

Figure 2 (below). An overlay sketch map showing pertinent geography-geology and culture.



~~GAP~~ File
~~KJS~~
~~SNG~~

Cochise Co.
Ariz.

DEPCO, Inc.

MINERALS DIVISION

MEMO TO: J. B. Imswiler DATE: January 22, 1980

FROM: N. L. Archbold

SUBJECT: Notes on the Blue Jeep Property (other names include Gibbs and Cartmell) (See also PRR 83 - Douglas 1° x 2° Sheet)

Location: Three miles east of Pearce, Arizona on top of small hill near center of sec. 35, T. 17 S., R. 25 E.

References: This property might be the subject of a TEI report or some state report on fluorite. General geology in USGS Prof. Paper 281 and Ariz. Bur. Mines Geologic Map of Cochise County.

Rock Types: The following six lithologic types were noted on the property. Contacts between them are not exposed.

1. Dense rhyolite ranging from gray to red and locally flow banded. This is the principal rock on the property.
2. Rhyolite breccia. This covers the top of the hill on the northeast end of the property. It is not clear whether this is flow or intrusive breccia, and its contacts are not exposed. It contains fragments of the dense rhyolite noted in #1 above.
3. Gray, tuffaceous sandstone and conglomerate crops out in a gully on the east end of the property and in the easternmost open cut.
4. Two arkosic-looking outcrops occur along the top of the ridge that trends northeasterly on the east end of the property. These appear to be sedimentary but could be same form of volcanic breccia.
5. Fissile, shaly, red zones occur within the rhyolite on the west end of the property.
6. The PRR report mentions "limey" material. I saw some areas where fragments of rhyolite were set in a limestone matrix. These were not put on my map, because I interpreted them as caliche zones, but again, they were not well exposed.

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Structure: Relationships between the units are not exposed to the extend that overall structure is clear. The principal prospects, however, seem to occur along a brecciated and sheared zone that extends about 1500 feet in a northwesterly direction. The zone does not reveal any through-going fault structure.

Mineral Deposits: Mineral deposits fit into three overlapping types. (1) Minor uranium occurrences have been noted in a shear zone in a massive rhyolite near the northeast part of the property. (2) The older workings were apparently for gold and silver from shafts on the northwest end of the breccia zone, but there is no evidence or proof of any actual production. (3) Fluorite occurs as stockworks and filling of breccia on the southeast end of the breccia zone.

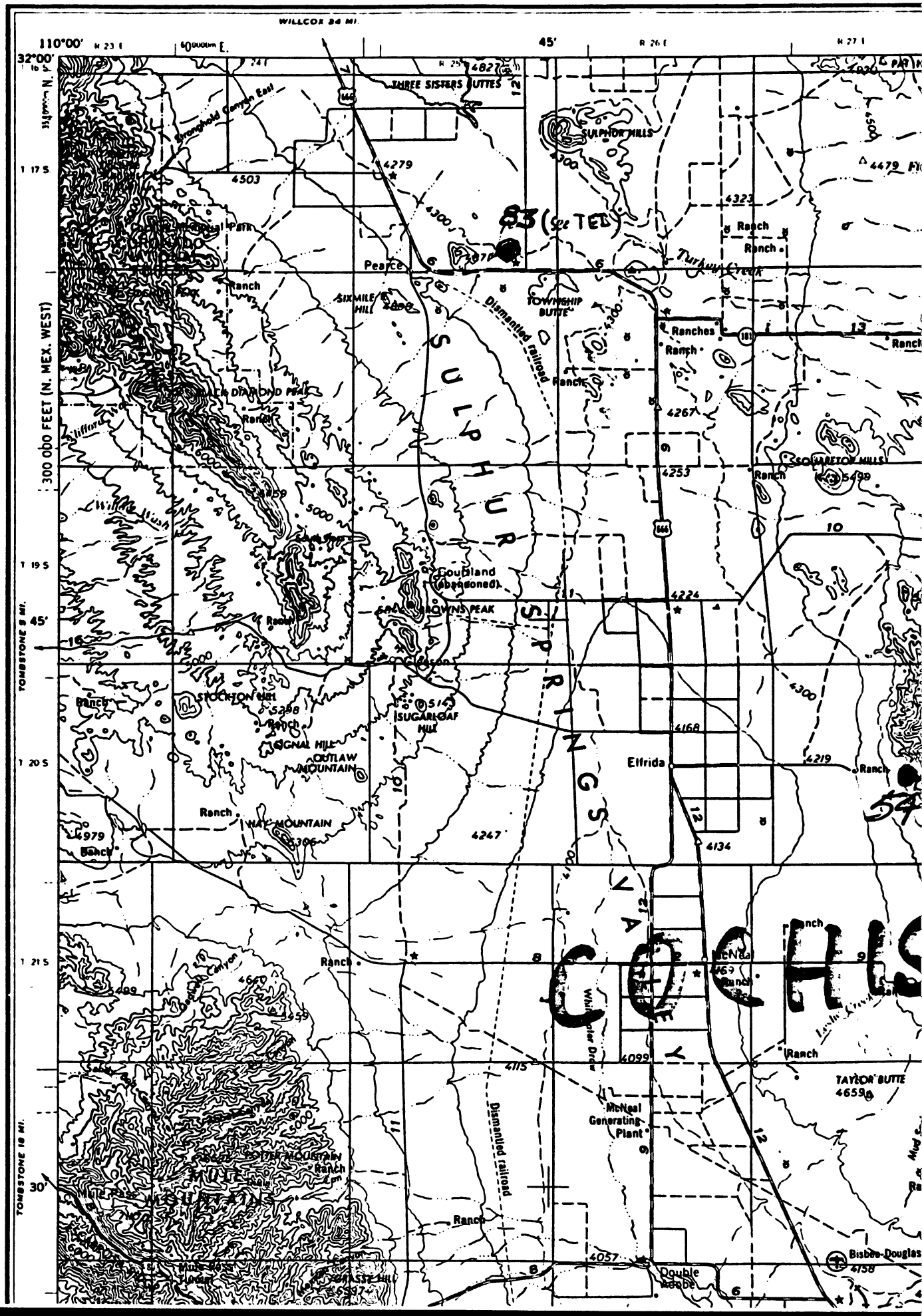
Previous Work: The present owners report that numerous small operators and promoters have attempted some work on the fluorite, but there has never been any significant production. At least the following major companies have visited the property in recent years: ASARCO, Union Oil (minerals), Occidental, Portland Gas and Electric, Urangesellschaft.

Recommendations: I see no major interest here unless the samples I took for gold and silver show unexpected values.

LIST OF SAMPLES

Sample No.	Description	Gold (ppm)	Silver (ppm)
29545	Gray, moderately indurated tuffaceous sandstone and conglomerate. 3 feet vertical cut.	-0.1	-1
29546	Fractured, Fe-stained rhyolite on south wall of cut. Chips across 10 feet.	-0.1	1
29547	Arkosic-looking, fine-grained breccia. Looks sedimentary but occurs as small outcrop on ridge top. Random chips from outcrop.	-0.1	2
29548	Fractured rhyolite with minor fluorite and cherty veinlets. Chip sample for 6 feet across east end of cut.	-0.1	2
29549	Fractured rhyolite and vein quartz. Chips for 6 feet across east end of cut.	-0.1	19
29550	Brecciated rhyolite with red surface coatings of Fe-oxide. Chips for 10 feet along south wall of cut.	-0.1	13
29551	Fractured rhyolite where it contains some fluorite. Sample is probably 20% fluorite.	-0.1	21
29552	Brecciated rhyolite and red gouge. Chips across bottom of 12-foot pit.	0.1	22
29553	Gray rhyolite chips off dump. Contains traces of very thin quartz veinlets.	1.1	2
29554	Fractured, gray rhyolite off dump. Minor fault(?) breccia and quartz veinlets.	0.1	55
29555	Sheared, Fe-stained rhyolite off dump.	0.1	36

WESTERN UNITED STATES 1:250,000



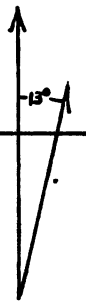
DOUGLAS

LORDSBURG 38 MI.
30 MI. TO U.S. 80
LORDSBURG 36 MI.
15'
109°00'
45'
R 20 W
R 19 W
HARRIS MOUNTAIN
Corral
Cochise Mines
Cave Creek
ARIZONA
NEW MEXICO
Antelope Pass
Animas
Ranch
4141
5067
CATHEDRAL ROCK
SAN SIMON VALLEY
ANIMAS VALLEY
Animas Creek
4395
4128
Rodeo
6000
4681
4694
Apache
Airway beacon
5281
SQUAW MOUNTAIN
4282
BLACK MOUNTAIN
MOUNT BALDY
5356
Corral
5111
HIDALGO COUNTY
Paramore Crater
Corral
5036
Station
Taylor Draw
CORONADO
NATIONAL
FOREST
OUTLAW MOUNTAIN
5358
5086
Foster Draw
Clanton Draw
5669
BLACK POINT
Black Draw
ANIMAS PEAK

Gibbs-Cartmell or Blue Jeep Prospect

Sec. 35, T. 17 S., R. 25 E.
Cochise Co., Ariz.

Compass and pace survey
M. L. Archbold
12/30/79



Scale 1" = 500'

Rock Types

- Dense, massive rhyolite
- Rhyolite breccia
- Tuffaceous sandstone and conglomerate
- Arkosic looking breccia

Fence line

Blue Jeep #2

match point for overlays

Tank

water pipe

Blue Jeep #3

Volcanic breccia

massive rhyolite

fissile red, shaly rhyolite in road

Mud stock

arkosic breccia

Tuffaceous ss

cairn

Tuffaceous ss.

strongly brecciated

match point for overlays

DATE_____ SCALE_____

MINE_____

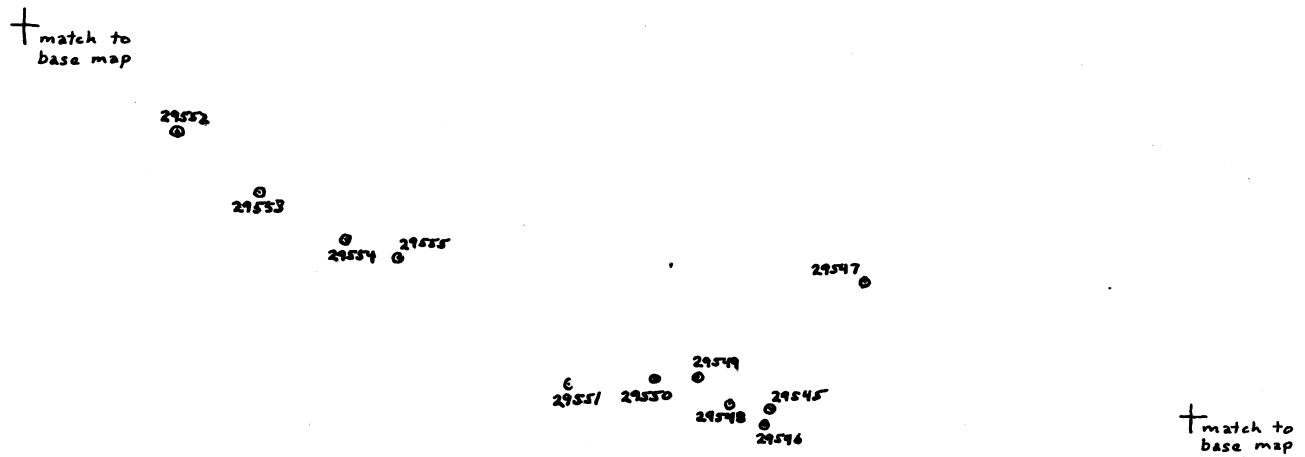
LEVEL_____ NOTES BY_____

T.S.M. Form No. 10

Overlay to map of
Blue Jeep Claims
Cochise Co., Ariz.
to show gamma ray
C.P.S.

Overlay to map of
Blue Jeep Claims
Cochise Co., Ariz.

To show localities
of samples for
Au + Ag



Douglas

FILE A-P-335

PRELIMINARY RECONNAISSANCE REPORT

EXAMINED BY R. L. Robison
DATE(S) EXAMINED 4/12/55

2. STATE Arizona COUNTY Cochise
DISTRICT Pearce
NEAREST TOWN Pearce
PROPERTY Elanna Claims

LOCATION:
SEC. 35 T. 17 S R. 25 E

1. SAMPLES

NUMBER	TYPE AND WIDTH	RADIOACTIVITY eU_3O_8	RADIOACTIVITY cU_3O_8
A-3345-1	Select shovel from hot spot bottom of pit	.15	.20
A-3345-2	Grab from stockpile	.14	
A-3345-3	Chip across shear zone 2.0' wide		

3. TYPE OF EXAMINATION:

Surface Radiometric

4. DIRECTIONS TO DEPOSIT: Going S on US 666 go 1.6 mi. past second Pearce turnoff (3.1 mi. past first Pearce turnoff) then turn L through wooden gate; take middle fork and proceed 0.9 mi. to property.

5. OWNER OR OPERATOR: B. A. Gibbs
ADDRESS: 3902 East Pima, Tucson, Arizona

6. MINE OR PROPERTY HISTORY, PRODUCTION AND WORKINGS: Several old prospect pits for gold. One new pit approximately 15' deep.

7. RADIOACTIVITY: B.G. 0.06 MR/hr.
Max. 1.2 MR/hr.

8. DESCRIPTION OF DEPOSIT *(Discuss under: A. Topography, B. Geology, C. Mineralogy)*

A. Small to moderate round-topped hills rising from valley floor.

B. Shear zone in highly silicified limey shale near contact with volcanic agglomerate. Low angle fault with gouge material giving some count.

C. No uranium mineral is visible.

[redacted]

11. PROOF OF OWNERSHIP RECEIVED? No
PERMISSION TO PUBLISH RECEIVED? No

12. OTHER INVESTIGATIONS:

WILLIAM J. DAFFRON
MINING AND GEOLOGICAL CONSULTANT
8015 MOUNTAIN ROAD PLACE, N.E.
ALBUQUERQUE, NEW MEXICO 87110
TELEPHONE (505) 268-5080

June 25, 1982

Dekalb Mining, Inc.
2659-G Pan American Freeway, N.E.
Albuquerque, New Mexico 87107

Dear Sir:

This letter, when accepted as set forth below, shall serve to confirm that John A. Stephens, President of Excel Mineral Company ("Excel"), is willing to permit you to examine drilling information and records, assays, geological maps, geophysical data, production information (historical), information concerning underground workings including sampling and assays thereof, and general geological reports obtained as a result of exploration operations conducted by Excel near Pearce, Arizona, for the purpose of determining whether Dekalb Mining, Inc. is interested in pursuing negotiations with Excel to conduct a joint program of exploration, and if warranted, development and production within an area consisting of portions of Township 17 South, Ranges 25 East and 26 East and Township 18 South, Ranges 25 East and 26 East, G.& S.R.M., Cochise County, Arizona, subject to the condition that Dekalb Mining, Inc. shall not, for a period of two (2) years from the date hereof, negotiate for or acquire any mineral rights or other property interests within an area as shown on the attached topo map and described as follows: An area four (4) miles wide and eight (8) miles long with the NW corner being Sec. 30. T17S, R25E, and the SE corner being Sec. 8, T18S, R26E, G. & S.R.M., Cochise County, Arizona, unless with Excel's prior written consent and on its behalf (excepting such rights or interest, if any, heretofore acquired by Dekalb Mining, Inc.)

This further acknowledges and agrees that John A. Stephens and Excel Mineral Company, Inc. assume no liability whatsoever for any injury incurred by Dekalb Mining, Inc. personnel while examining said property as herein described.

If the above correctly expresses your understanding of our agreement, and by signing you acknowledge you have the authority to sign for Dekalb Mining, Inc. et al., and hereby agree to the conditions upon which such data is to be furnished, please indicate your

acceptance thereof by executing and returning to the undersigned the enclosed copy of this letter. Upon Acceptance, please feel free to contact the undersigned to arrange for review of the data.

Sincerely,

W. J. Daffron
Agent for Excel-Mineral Co., Inc.

ACCEPTED AND APPROVED this_____day of_____, 1982.

DEKALB MINING, INC.

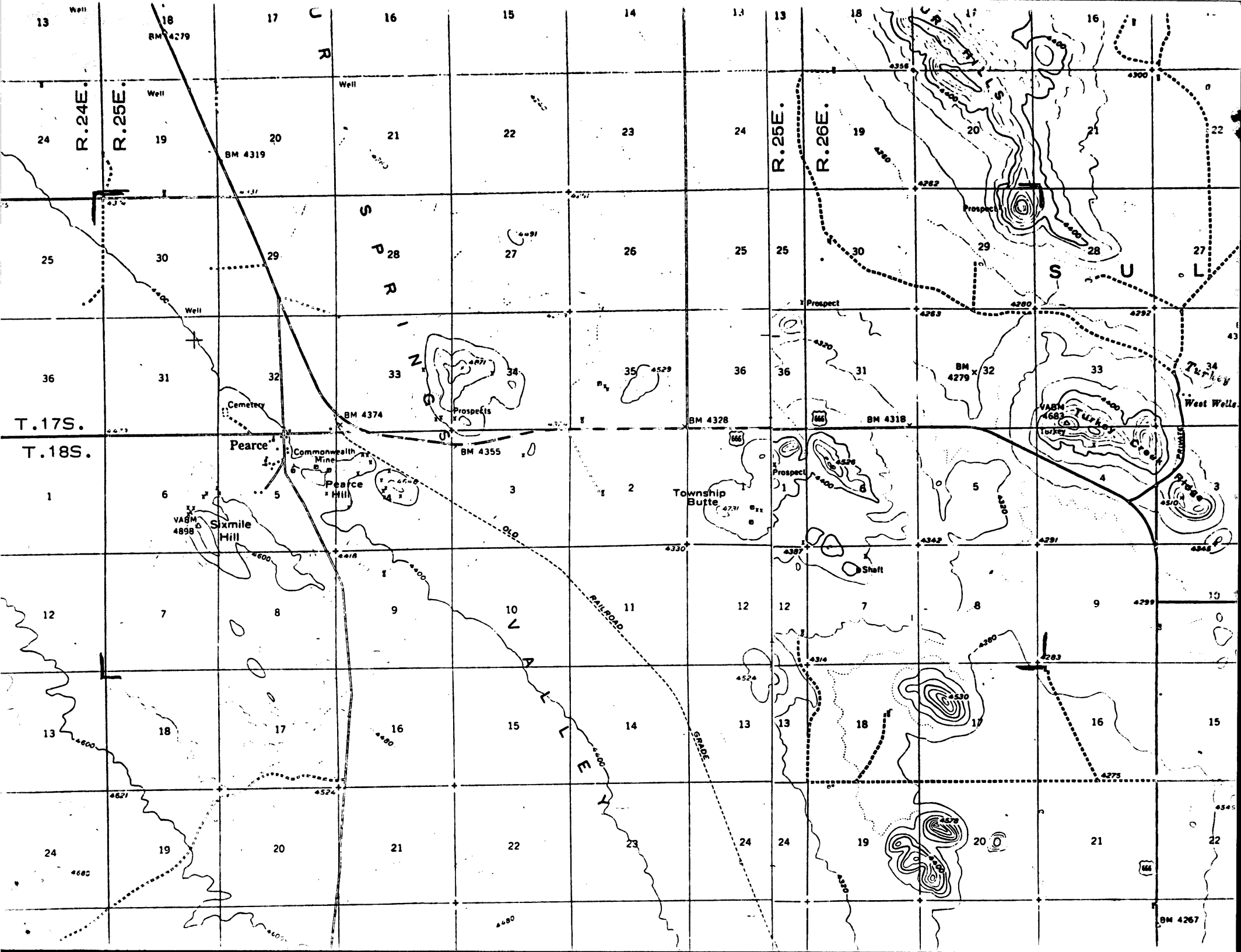
By_____

STATE OF_____)
) ss:
COUNTY OF_____)

Subscribed and sworn to before me by_____, who is known to be the person who appeared before me this_____ day of_____, 1982.

_____
Notary Public

My Commission Expres:


R.24E.
R.25E.
R.25E.
R.26E.
T.17S.
T.18S.
SPRING VALLEY
SUL
Pearce
Commonwealth Mine
Pearce Hill
Sixmile Hill
Cemetery
Township Butte
Prospects
Prospect
Shaft
Turkey Creek
Turkey
West Wells
Pass
OLD RAILROAD GRADE
BM 4279
BM 4319
BM 4374
BM 4355
BM 4328
BM 4318
BM 4267
VABM 4898
VABM 4683
Well

ins prior to the 1850's but there was little mining
in the district until the establishment of Fort Hua-
n 1877. Some lead-silver and gold ore was produced
n the 1880's and the early 1900's, but exploitation
rals was intermittent and not more than a few hun-
ns of ore was produced. The tungsten deposits were
nd worked extensively at the time of World War I
Reef mine has produced several thousand tons of
n ore. Spotty, local deposits of base metal sulfides
en worked from time to time but there have not been
sistent large operation. Since 1950 there has been
roduction from the district.
cota production from the Hartford mining district
1970 has been about 9 thousand tons of base metal
ecious metal ore yielding some 37 tons of copper,
s of lead, 188 tons of zinc, 393 ounces of gold, and
sand ounces of silver with a total value of 140 thou-
llars. Accurate records on the total tungsten pro-
are not available but may have amounted to 170 or
ons of 60 to 78 percent WO_3 concentrates.
geologic features of the district have been carefully
(Hayes & Raup, 1968) but there has been no de-
over-all study made of the relationship of the scat-
nd diverse mineralization to the complex and often
g geologic conditions.

PASS MINING DISTRICT

is bulletin, the mineralized area at the south end of
goon Mountains has been arbitrarily designated as
ate mining district since it represents a distinct unit,
phically and geologically. Previously the mines of
ea have been included either in the Dragoon, Pearce,
quoise mining districts.
of the metalliferous deposits of this district, such
k Diamond and Middlemarch, were worked in the
00's while others, such as Abril and San Juan, be-
mportant in much later years. None of the mines
ge nor have any been worked continuously for more
few years at any time. The production has consisted
of base metals but some tungsten and barite also
en produced. There has been little production in
years.
rough 1970, the total base and precious metal out-

put has been about 76,000 tons of ore containing some 1,005 tons of copper, 137 tons of lead, 4,626 tons of zinc, 337 ounces of gold, and 147,000 ounces of silver, for a total value of about 1.725 million dollars. Tungsten production did not amount to more than about two tons of concentrates. Some 75 tons of sorted barite ore has been reported as shipped from the district.

The known ore deposits of the district occur as relatively shallow pyrometasomatic mantos and chimneys in Paleozoic limestones just south of a large Laramide intrusive body. It would appear that the eastern edge of this district could be of interest for possible deposits hidden under the alluvial cover.

PAUL MINING DISTRICT

This small mining district has no evident metalliferous mineralization but includes the Paul Lime operation in the high quality, Cretaceous Mural Limestone.

PEARCE MINING DISTRICT

This relatively small mining district includes a series of isolated hills of Tertiary volcanic rock outcropping through the alluvial cover in the middle of the Sulphur Spring Valley. The production statistics were often included with the Turquoise mining district. One mine, the Commonwealth, which was worked almost continuously from the late 1880's to the early 1940's, has produced almost all the ore, although there are several small occurrences of base and precious metals, fluorite, and traces of uranium in other volcanic rock hills.

Since 1895 through 1970, the district has produced some 1,341,000 tons of ore yielding about 26 tons of copper, 8 tons of lead, nearly 138 thousand ounces of silver, and over 12 thousand ounces of gold for a total valuation in excess of 10.6 million dollars.

The alluvial cover in this district appears to be relatively thin and exposures of pre-Tertiary formations can be found with the Tertiary volcanics. The local but strong silver mineralization at the Commonwealth mine and the evident northwestward extention of favorable formations and structures from the Swisshelm mining district into the Pearce district suggests that the area warrants detail study for possible hidden ore deposits.

ELLOWSTONE MINING DISTRICT

This district was prospected at least as early as the 80's and some unconfirmed reports state that there was me gold production around that time. Scattered and weak lfide and gold-quartz mineralization has been worked on small scale in the past but not much more than 125 to 150 ns of ore was ever shipped out. Prospects for substan- l mineralization in this district are not encouraging.

TABLE 1
PRODUCTION SUMMARY OF BASE AND PRECIOUS METALS
1879 -- 1970

MINING DISTRICT	Short Tons Ore (1,000's)	Pounds Copper (1,000's)	Pounds Lead (1,000's)	Pounds Zinc (1,000's)	Ounces Gold	Ounces Silver (100's)	Total Value (1,000's)
California (Chiricahua)	38	299	8,631	1,179	100	152	$ 1,750
Cochise (Johnson)	1,640	74,775	605	93,650	229	734	32,180
Dos Cabezas-Teviston	106	4,026	1,413	39	10,082	429	1,775
Dragoon (Golden Rule)	19	18	356	249	9,741	72	340
Hartford (Huachuca)	9	74	588	375	393	25	140
Middle Pass (S. Dragoon)	76	2,011	274	9,251	337	147	1,725
Pearce	1,341	55	16	—	138,409	12,020	10,660
Swisshelm	49	97	11,853	211	5,230	330	1,985
Tombstone	1,500	3,018	45,000	1,179	240,000	30,000	38,800
Turquoise (Courtland-Gleeson)	887	54,823	7,777	2,561	56,641	1,575	14,090
Warren (Bisbee)	150,991	7,693,257	309,756	378,450	2,630,572	100,312	1,834,365
Whetstone	2	37	—	—	8	620	15
Total	156,658	7,832,490 (3,916,245 tons)	386,269 (193,135 tons)	487,144 (243,572 tons)	3,091,742	146,416	$1,937,825

Table 4, Cont.

MINING DISTRICT AND MINES	LOCATION T.	R.	Sec.	MINERAL PRODUCTS	GEOLOGY	TYPE OF OPERATION AND PRODUCTION	REFERENCES
3. Fittsburg prospect (Six Mile Hill mine group)	18S	25E	SE¼ 6	Ag-, Au-	Silver and gold halides in irregular, narrow stringers in fractured Tertiary rhyolite.	Shallow workings. A few tons of ore produced about 1895-1896.	ABM file data
4. Fluorine Hill mine (Little Jessie mine group; Capt. & Cartwell Bros., Fluorine Mng. & Mlng Co., Enviromental Engineering and Chemical Co.)	17S	25E	SE¼ 33 SW¼ 34	Ag, F, Cu-, Au-, (U)	Spotty silver and gold chlorides in narrow irregular, and discontinuous quartz-carbonate-fluorspar-iron oxide veins along fissures in silicified Tertiary rhyolite porphyry. Sparse uranophane or autunite associated with fluorspar.	Shaft and surface workings. About 1100 tons of silver bearing siliceous rock shipped intermittently in 1904, 1907, and 1927. Some fluorspar being shipped in 1971.	Smith, 1927, p. 42 USGS Trace Element Investigation, AEC Prelim. Rec. Rpt. M-1497, 1954 Granger & Raup, 1962, p. A3-A4 Keith, 1970, p. 287, Table N ABM file data
5. Little Mary mine (Copper Hill; Little Mary Mng. Co.)	17S	25E	W. Cen. 35	Cu-, Ag-, Au-	Weak and spotty oxidized copper mineralization in fractured Tertiary andesite.	Shaft and pit workings. About 11 tons of ore produced in 1903 and 1910.	ABM file data
6. Vision Point prospect	18S	25E	SE¼ 1	Cu-, Ag-	Weak and spotty oxidized copper mineralization in fractured Tertiary volcanics.	Shallow shaft workings. About 20 tons of ore produced in 1929.	ABM file data
X Peloncillo District (Peloncillo Mountains, Amarillo-Quien Sabe) (See Fig. 1.)	13S	32E	SW¼ 35	Cu-, Ag-	Very weak and spotty copper oxides with trace of sulfides in Tertiary rhyolite and andesite volcanics.	Surface workings. A few tons of picked ore produced in 1941.	ABM file data
XI Rucker Canyon District (Gardner, Technocracy) (See Fig. 1.)	19S	30E	18	Ag, Au	Relatively weak oxidized mineralization along fault zones in Cretaceous Bisbee Group formations.	Open cut and shaft workings. Some 15 tons of ore produced in 1935-1936.	ABM file data
XII Swisshelm District (Swisshelm Mountains) (See Fig. 7.)	20S	27E	----	Pb, Zn, Ag, Cu-, Au-	Irregular, oxidized, replacement orebodies of base metal sulfides in folded and faulted Pennsylvanian-Permian Naco Group limestones, mainly above a tabular diorite porphyry intrusion along a strong thrust fault.	Numerous adit and shaft workings. Some 49,000 tons of ore produced, mainly from 1937-1953.	Loring, 1947 Galbraith & Loring, 1951, p. 30-36 Cooper, 1959 ABM file data
1. Apex mine (Four Horse Mng. Co., Apex Mng. Co.)	20S	27E	NW¼ 12	Pb, Ag, Au	Oxidized galena in small, irregular orebodies along a fault zone in porphyry intrusive.	Tunnel workings. About 225 tons of ore produced during 1934-1935 and 1938-1939.	ABM file data
2. Chance mine (Chance Mng. Co.)	20S	27E	So. Cen. 12	Pb, Ag, Au-, Cu-, Zn-	Galena, cerussite, minor pyrite, and other base metal sulfides and carbonates in several small, tabular replacement orebodies along or adjacent to fracture zones in a folded and faulted overthrust block of Pennsylvanian-Permian Naco Group limestone, underlain by diorite porphyry.	Shaft and adit workings. Some 7000 tons of ore produced sporadically from 1880's to 1956, mainly in 1945 to 1951.	Loring, 1947 Galbraith & Loring, 1951, p. 34-35 ABM file data
3. Colford Copper mine (Scheerer; Colford Copper Co.)	20S	27E	Cen. 12	Pb, Ag, Cu-, V-, Au-	Oxidized galena, vanadinite, and minor copper mineralization in irregular replacement orebodies in folded and faulted Pennsylvanian-Permian Naco Group limestone.	Tunnel and shaft workings. About 100 tons of ore produced intermittently from 1880's to 1926.	ABM file data
4. Great American mine (Heney and Alpine tunnels; Great American Mng. Co., Alpine Mng. Co., Swisshelm Mng. Co.)	20S	27E	SE¼ 1	Pb, Ag, Au	Oxidized galena in irregular replacement orebodies in folded and faulted Pennsylvanian-Permian Naco Group limestone.	Tunnel workings. Some 1500 tons of ore produced intermittently from 1880's to 1940.	ABM file data
5. Mammoth & Whale mines (Swisshelm Gold Silver Co., Swisshelm Mountain Gold & Silver Mng. Co. Swisshelm Development Co., Conan Mng. Corp., Gold Metals Consolidated Mng.)	20S	27E	No. Cen. 12	Pb, Ag, Au	Irregular, oxidized orebodies of galena as replacements in an overthrust block of Pennsylvanian-Permian Naco Group limestone.	Shaft and adit workings. About 2000 tons of ore produced intermittently from operations in 1880's and in 1918 to 1958.	Loring, 1947 Galbraith & Loring, 1951, p. 35-36 ABM file data
6. March mine (Rydbom)	20S	27E	So. Cen. 12	Zn, Ag, Pb-, Cu-, Au-	Oxidized zinc and minor lead and copper mineralization in irregular orebody in overthrust block of Pennsylvanian-Permian Naco Group limestone.	Shaft and tunnel workings. Some 210 tons of ore produced during 1960-1961.	ABM file data
7. Mountain Queen mine (Schribner; Randall Lease, Four Horse Mng. Co., Manhattan Consolidated Mines Development Co., Gold Metals Consolidated Mng.)	20S	27E	So. Cen. 12	Pb, Ag, Cu-, Au-	Mostly oxidized galena with minor copper in irregular replacement orebodies along the contact of folded, faulted and fractured Pennsylvanian-Permian Naco Group limestone and diorite porphyry intruded along a strong thrust fault.	Shaft workings. A total of some 50,000 tons of ore produced intermittently from 1885 to 1913, 1921 to 1933, and 1939 to 1954.	Loring, 1947 Galbraith & Loring, 1953, p. 33-34 ABM file data
XIII Teviston District (Tevis, Dos Cabezas Mountains) (See Fig. 4.)	13-15S	26-29E	----	Au, Ag, Cu-, Pb-, Zn-, W-, marble	1. Weathered quartz veins containing spotty gold and silver values in Precambrian granitic and schistose rocks. 2. Sporadic base metal sulfides and oxidized products, with occasional scheelite, in irregular fissure veins or in pyrometasomatic zones in complexly folded and faulted Precambrian to Cretaceous formations that have been intruded by Laramide and Tertiary granitic rocks. 3. Marmorized Paleozoic limestones. 4. Gold placers in alluvial basins or near mouths of canyons.	Many, relatively small, scattered mines, prospects, and placers. Some 4,500 tons or more of ore produced and some $17,000 in gold recovered from placers at irregular intervals from the late 1800's to recent times. Very minor marble production.	USGS Min. Resources, 1883-1923 USBM Min. Resources, 1924-1931 USBM Min. Yearbook, 1932-1969 Tenny, 1927-1929, p. 224-227 Wilson et alia, 1934 (1967), p. 117 Cooper, 1960 Wilson, 1961, p. 67-68 ABM file data
1. Apache Pass mines (Gold Belle, Helen Dome, and Quillan groups, Lula Gold Nuget, New Year; Apache Pass Gold Mng. Co.	15S	28E	SE¼ 4 NE¼ 9 No. ¼	Au, Ag-, Pb-, Cu-, Zn-	Spotty gold and silver values with minor oxidized base metal sulfides in irregular quartz-filled fissure veins cutting Precambrian granitic rock.	Numerous scattered pits, shafts and adits. About 600 tons of ore produced intermittently since 1870's.	USGS Min. Resources, 1906-1907 ABM file data

1.	Abril mine (Dos Hermanos; Bargin Mines, Inc., Shattuck Denn Mng. Co.)	17S	23E	So. Cen. 34	Zn, Cu, Pb-, Mo-, Ag-, Au-, (Bi, Li, Cd, Ga, Co, W)	Sphalerite, chalcopyrite, minor galena, sparse molybdenum, and minor rare minerals in irregular pyrometasomatic deposits with garnet, epidote, and other lime-silicates in a tactite zone in Pennsylvanian-Permian Naco Group limestone cut by granitic intrusive and rhyolite porphyry dikes.	Adit workings. Nearly 30,000 tons of zinc-copper ore produced intermittently since 1914 but mainly during 1945-1952.	Wilson, 1951, p. 23-26 USAEC Prelim. Rec. Rpt. D-502, 1952 Warner et alia, 1959, p. 95, 97 Cooper, 1962 Meeves, 1966, p. 56 ABM file data
2.	American group mine (Escapule)	18S	23E	NE¼ 3	Pb, Zn, Ag, Cu-, Au-	Partially oxidized lead and zinc mineralization in folded and faulted Cambrian Abrigo Limestone close to strong thrust fault breccia.	Shallow adit workings. A small tonnage of ore produced in 1938.	ABM file data
3.	Black Diamond mine (Englander; Black Diamond Copper Mng. Co.)	18S	24E	So. ½ 19, 20 N ½ 29, 30	Cu, Ag, Fe, Pb-, Au-, (Ti)	Chalcopyrite, bornite, argentite, and copper carbonates and oxides with magnetite and hematite in irregular, tabular, pyrometasomatic bodies in silicated Mississippian Escabrosa Limestone.	Tunnel and shaft workings. At least 7,000 tons of ore produced intermittently from 1903 to about 1957.	Copper Handbook, 1907 Tenney, 1925-1927, p. 219-220 Cederstrom, 1946a, p. 86-87 Harrer, 1964, p. 22-24 ABM file data
4.	Christmas mine (Dragoon; Dragoon Copper Mng. & Smltng Co., Giacoma Bros.	18S	23E	No. Cen. 13	Cu, Ag, Au, Pb-	Copper carbonates, bornite, and chalcopyrite with minor galena and lead carbonate in irregular pyrometasomatic replacements in Cretaceous Bisbee Group limestone along a contact with a porphyry intrusion.	Tunnel and shaft workings. A total of some 250 tons produced in 1905 and 1948.	Copper Handbook, 1906 ABM file data
5.	Cobre Loma mine (Cobre Loma Copper Co., Middlemarch Copper Co., Arizona Middlemarch Copper Co.)	18S	23E	SE¼ 2 NE¼ 11	Cu, Zn-, Ag-	Chalcopyrite, bornite, pyrite, and minor sphalerite in a pyrometasomatic tactite zone in limy hornfels of Cretaceous Bisbee Group along the contact with a porphyritic intrusive.	Tunnel workings. Probable up to 5,000 tons of ore produced from 1915 to 1920.	ABM file data
6.	Festerling mine (Elsicor)	18S	23E	NE¼ 24	Cu, Zn, Ag, Pb-, Au-	Chalcopyrite, sphalerite, and minor galena in irregular replacement bodies along faults in Cretaceous Bisbee Group limestone.	Surface and shaft workings. A few tens of tons of ore produced between 1937 and 1947.	ABM file data
7.	Garnet and Moonlight groups (Escapule Mine group	18S	23E	So. ½ 24	Pb, Zn, Ag, Cu-, Au-, (Mo, V)	Oxidized lead, zinc and minor copper mineralization in bedded replacement deposits in folded and faulted Cambrian Abrigo Limestone.	Adit workings. Approximately 50 tons were produced intermittently from 1938 to 1955.	ABM file data
8.	Middlemarch mine (Missouri; Middlemarch Copper Co., Arizon Middlemarch Copper Co.)	18S	23E	Cen. 12	Cu, Zn, Ag, Au, Pb-	Copper, zinc, and minor lead carbonates and sulfides in an oval-shaped chimney orebody associated with lime silicates in a fault zone cutting Paleozoic and Cretaceous limestone beds.	Adit and shaft workings. Some 5,000 or more tons of ore produced intermittently from the early 1900's to the 1950's.	Cederstrom, 1946, a, p. 87-88 ABM file data
9.	Muheim mine (Zinc Basin, White Metal)	18S	23E	E. Cen. 10	Pb, Zn, Ag, (Bi)	Anglesite and hemimorphite in an oxidized pyrometasomatic deposit in badly deformed Cretaceous Bisbee Group limy beds along a strong thrust fault.	Adit workings. About 200 or more tons of ore produced in the 1920's.	Cederstrom, 1946 a, p. 89 Wilson, 1951, p. 28 Cooper, 1962 ABM file data
10.	San Juan mine (Gordon)	18S	23E	Cen. 10	Zn, Pb-, Ag-, (Bi, Be, Li, Ga, Cd)	Sphalerite with minor galena, iron oxides, and helvite in irregular manto-type bodies of pyrometasomatic limy silicates in impure shaly Abrigo Limestone, where it is cut by faults.	Adit workings. Over 17,000 tons of ore produced since 1913 but mainly during 1947 and 1951.	Cederstrom, 1946 a, p. 88-89 Wilson, 1950, p. 20-23 Burnham, 1959, p. 30 Warner et alia, 1959, p. 96 Cooper, 1962 Meeves, 1966, p. 56 ABM file data
11.	Silver Cloud mine (Escapule)	18S	23E	W. Cen. 25	Cu, Pb, Zn, Ag, Au	Base metal sulfides in small orebodies and vein-like deposits along faults in altered Cretaceous Bisbee Group limestone.	Shaft and adit workings. A few tons were produced intermittently from 1921 to 1955.	Cederstrom, 1946 a Wilson, 1951, p. 28 ABM file data
12.	Standard Tungsten mine (Head Center, Black Prince, Johnny Boy; Standard Tungsten Corp.)	18S	23E	Cor. 13, 14, 23 & 24	W, Pb, Ag, Cu-, Ba-	Spotty, straw-colored, coarsely crystalline scheelite with minor base metal sulfides and barite in replacement bodies in intensely silicated Mississippian and Pennsylvanian limestones.	Shaft, adit, and surface workings. About 1.5 tons of tungsten concentrates and some 75 tons of sorted barite produced in 1932.	Dale et alia, 1960, p. 57-59 Stewart & Pfister, 1960, p. 10-11 ABM file data
13.	White Tail mine (Grant group)	18S	23E	E. Cen. 10	Zn, Pb-, Ag-, Cu-	Oxidized and siliceous zinc ore with minor lead and copper in irregular masses in fault breccia made up largely of Paleozoic limestone fragments.	Tunnel workings. Some 105 tons of ore produced in 1917-1918 and about 45 tons in 1965.	ABM file data
VIII	Paul District (Paul Spur, Paul Lime quarry; Paul Lime Co.) (See Fig. 9.)	24S	26E	No. Cen. 7	Limestone and lime	Outcrops of Mural Limestone of Cretaceous Bisbee Group	Quarry operations. Up to as much as 5 million tons of limestone mined, mainly for lime production, since 1918.	Wilson & Roseveare, 1949, p. 26 Keith, 1969a, p. 391 ABM file data
IX	Pearce District (See Fig. 6.)	17-18S	25E	----	Au, Ag, F, Cu-, (U, As)	Oxidized gold and silver mineralization, mainly halides; fluorite; minor and spotty oxidized copper sulfides; and traces of uranium, in quartz-calcite veins, in breccia zones, and in narrow replacement beds in folded and faulted Tertiary rhyolite and andesite volcanics resting on Cretaceous Bisbee Group beds.	Over 1.3 million tons of gold-silver ore produced from one major and a few smaller mines from 1895 to the 1940's. Fluorite being produced in 1971.	Gilluly, 1956, p. 116-118 ABM file data
1.	Commonwealth Extension mine (Commonwealth Extension Mng. Co.)	18S	25E	NW¼ 4	Ag-, Au-, Cu-	Spotty oxidized silver-gold mineralization in fissure veins and narrow replacement bodies in altered Tertiary andesite and rhyolite breccia.	Shaft workings. About 1880 tons of ore produced from 1915 to 1930.	Smith, 1927 ABM file data
2.	Commonwealth mine (Pearce, Silver Ware; Commonwealth Mng. & Mlng. Co., Montana Tonopah Mng. & Mlng. Co., Commonwealth Development Co.)	18S	25E	NE¼ 5	Ag, Au	Irregular silver-gold halides and minor sulfo-salts with some manganese in quartz-calcite fissure veins and in fault breccia zones in silicified Tertiary rhyolite and andesite volcanics.	Shaft workings. Over one million tons of ore produced from 1895 to 1942.	Endlich, 1897, p. 571 Scott, 1916, p. 187-188 Smith, 1927 AEC Prelim. Rec. Rpt. PRR A-P-46, 1953 ABM file data