

CONTACT INFORMATION

Mining Records Curator
Arizona Geological Survey
1520 West Adams St.
Phoenix, AZ 85007
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

The following file is part of the

Arizona Department of Mines and Mineral Resources Mining Collection

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

PRINTED: 09/21/2001

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: HUMP MINE

ALTERNATE NAMES:

AGUINALDO MINE GROUP
BLACK BEAUTY
PURCELL CLAIMS

PIMA COUNTY MILS NUMBER: 867

LOCATION: TOWNSHIP 17 S RANGE 10 E SECTION 26 QUARTER W2
LATITUDE: N 31DEG 54MIN 58SEC LONGITUDE: W 111DEG 17MIN 46SEC
TOPO MAP NAME: PALO ALTO RANCH - 15 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:

MANGANESE OXIDE
SILVER
COPPER
GOLD
MOLYBDENUM

BIBLIOGRAPHY:

ADMMR HUMP MINE
AZBM BULL. 189, P. 131, 1974
USBM IC 7990, P. 119-120
USGS BULL. 725, P. 416-417
ADMMR MAPS, FLAT STORAGE, DRAWER 5 (AZ PRIDE)

02/05/87

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: HUMP OR PURCELL CLAIMS

ALTERNATE NAMES:

AGUINALDO MINE GROUP
BLACK BEAUTY

PIMA COUNTY MILS NUMBER: 867

LOCATION: TOWNSHIP 17 S RANGE 10 E SECTION 26 QUARTER W2
LATITUDE: N 31DEG 54MIN 58SEC LONGITUDE: W 111DEG 17MIN 46SEC
TOPO MAP NAME: PALO ALTO RANCH - 15 MIN

CURRENT STATUS: PRODUCER

COMMODITY:

MANGANESE OXIDE
SILVER
COPPER
GOLD
MOLYBDENUM

BIBLIOGRAPHY:

ADMMR HUMP MINE
AZBM BULL. 189, P. 131, 1974
USGS IC 7990, P. 119-120
USGS BULL. 725, P. 416-417
MAPS - FLAT STORAGE, 5TH DRAWER (AZ PRIDE)
ADMMR HUMP MINE CONFIDENTIAL FILE

ASSAYS & SCHEMATIC GEOLOGIC SECTION
DRILL HOLES 4, 5, 6, 8 & 9

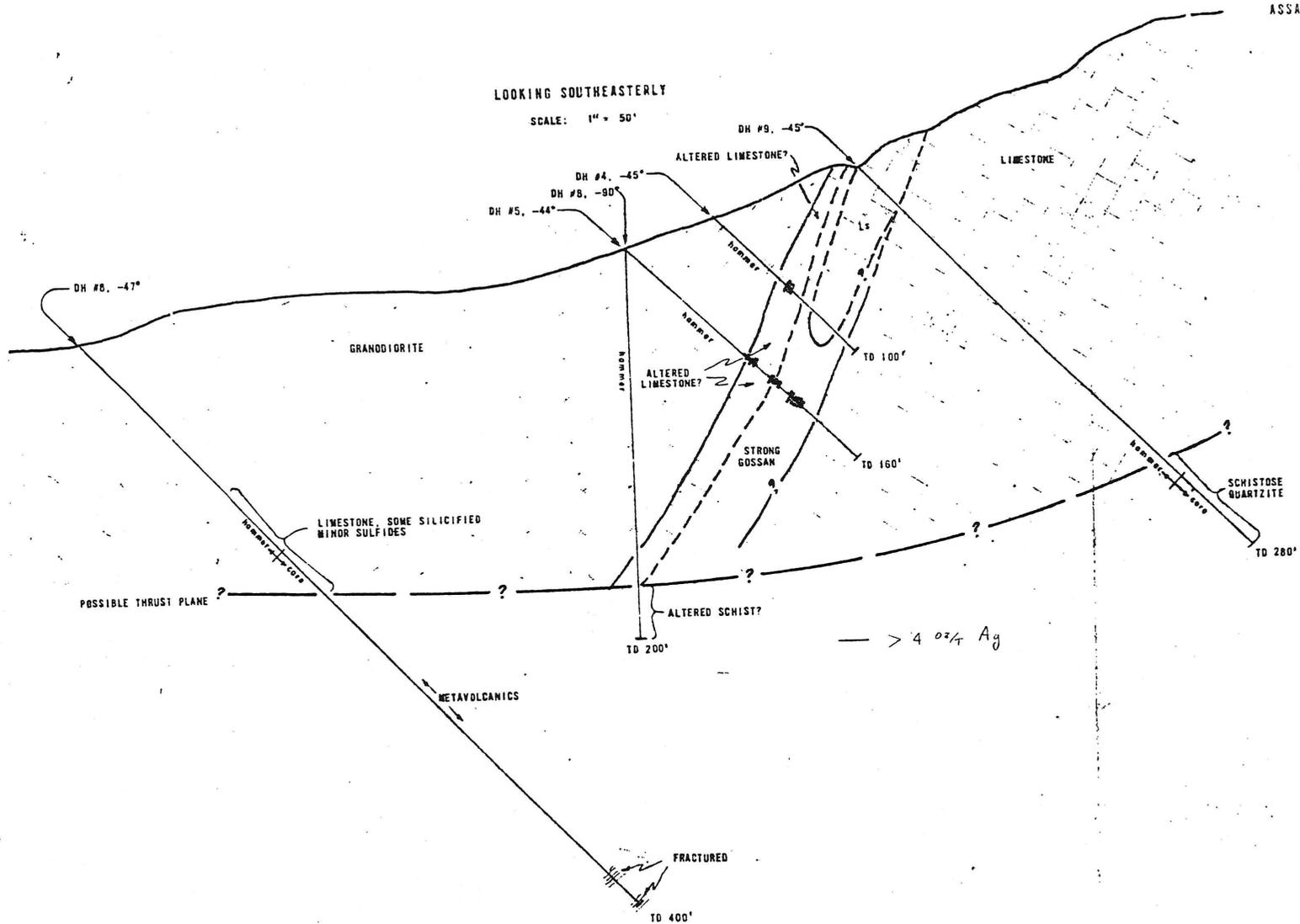
AGUINALDO AREA
PIMA COUNTY, ARIZONA

for
DREYFUS-NOXOTA-BRIDGER-BRUCE

by
HEINRICHS GEOEXPLORATION COMPANY
P. O. BOX 5964, TUCSON, AZ 85703
Job number 902-74 September 1974

LOOKING SOUTHEASTERLY

SCALE: 1" = 50'



Ag Assays
in oz/ton

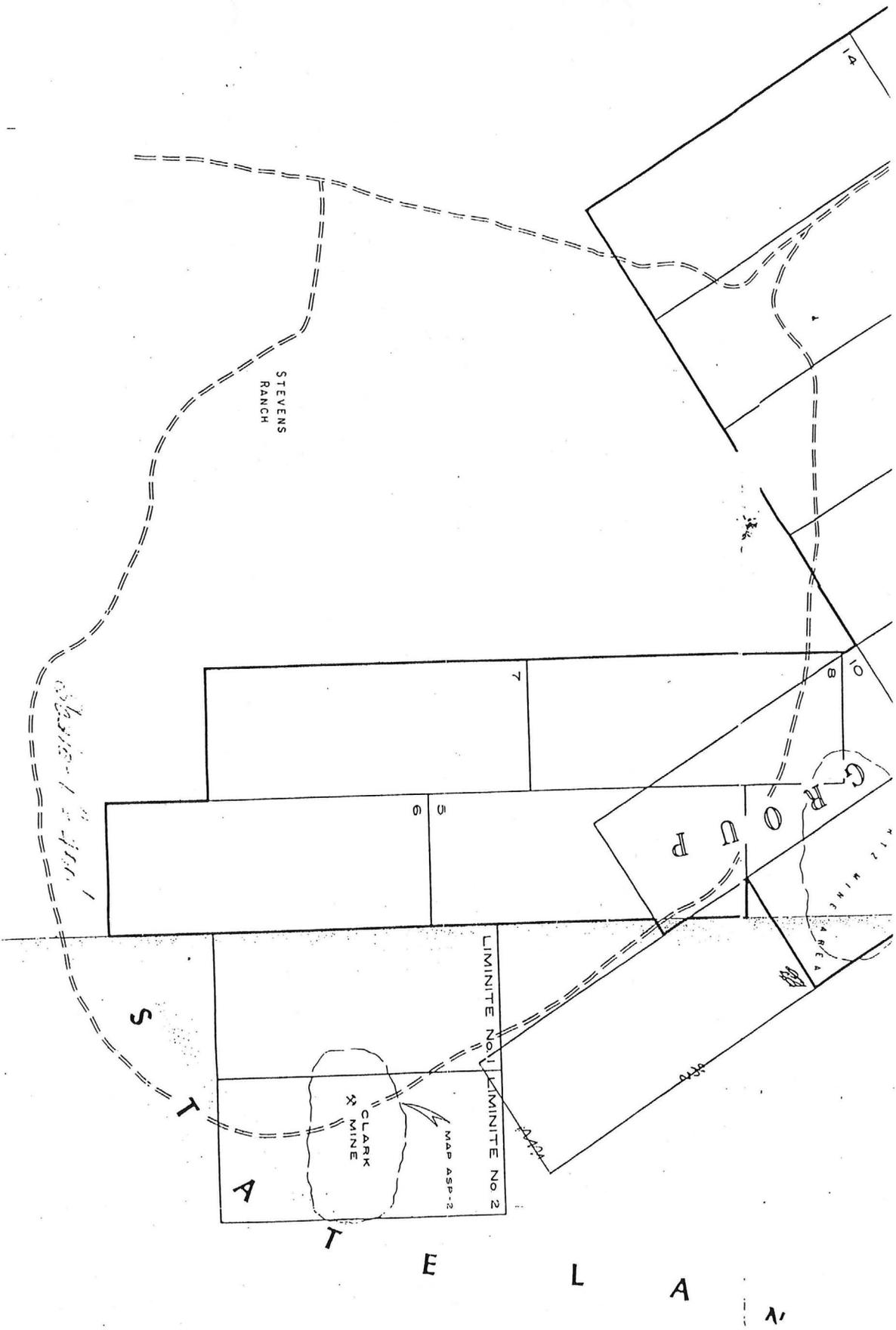
DH #4		
40' - 45'		2.45
45' - 50'		1.60
50' - 55'		4.85
55' - 60'		1.85
60' - 65'		2.70
65' - 70'		1.35
70' - 75'		0.45
85' - 90'		1.10
95' - 100'		0.60

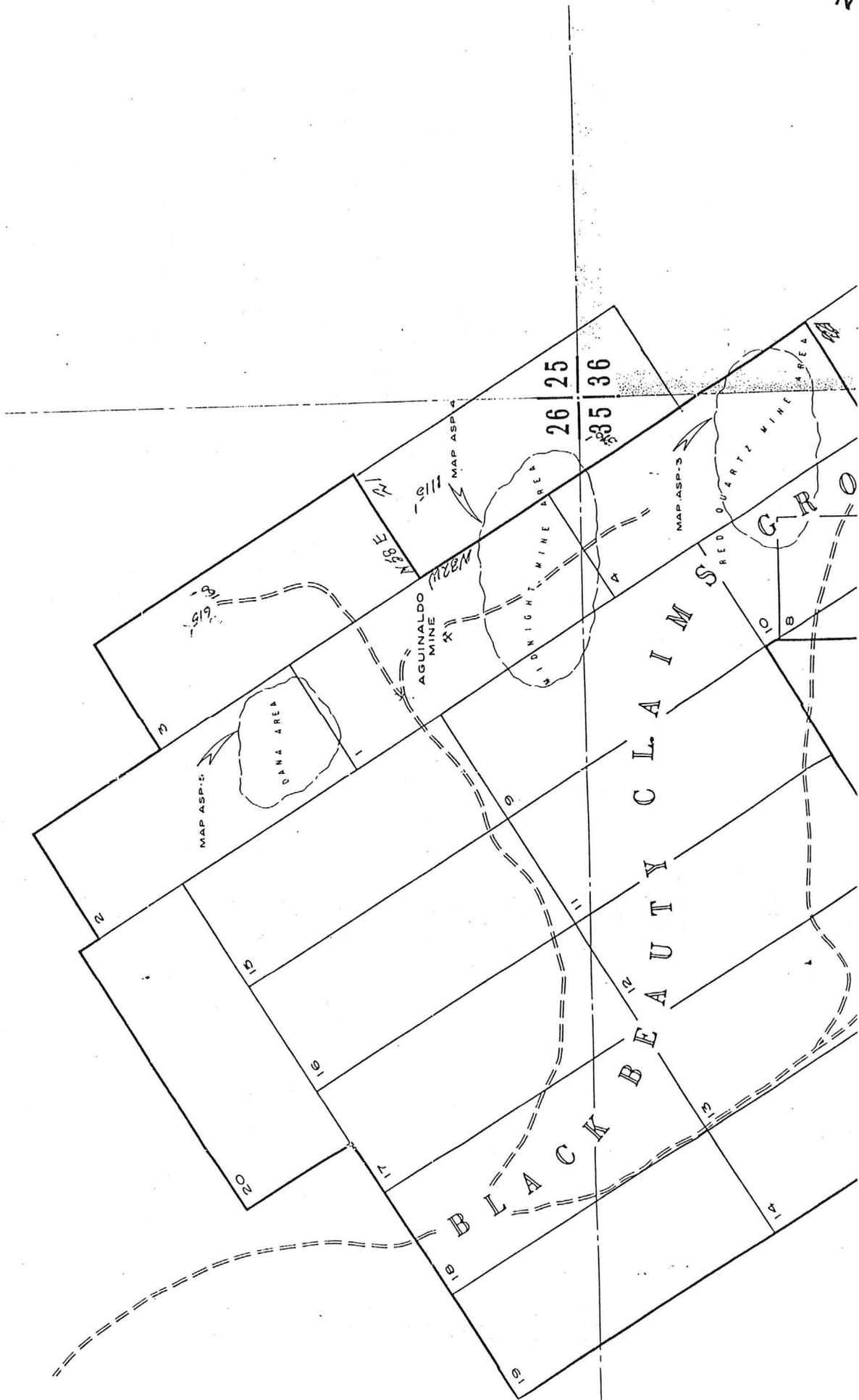
DH #5		
70' - 80'		0.60
80' - 85'		11.45
85' - 90'		6.20
90' - 95'		0.75
95' - 100'		17.00
100' - 105'		4.25
105' - 110'		1.15
110' - 115'		8.10
115' - 120'		8.40
120' - 125'		2.85
125' - 130'		2.30
130' - 135'		1.30
155' - 160'		0.15

DH #6		
80' - 100'		0.05
100' - 110'		0.10
110' - 120'		0.15
120' - 130'		0.10
130' - 140'		0.05
140' - 147'		0.10

DH #8		
150' - 155'		0.25
155' - 160'		1.80
160' - 165'		0.55
165' - 170'		0.30
170' - 180'		0.15
180' - 190'		0.10
190' - 200'		0.10

NOTE: All above intervals
also assayed for Au and all
were 0.015 oz/ton or less.





MAP ASP-3

DANA AREA

AGUINALDO MINE

D. NIGHT MINE AREA

MAP ASP-3

RED QUARTZ MINE AREA

BLACK BEAUTY CLAIMS

GR

26 25
35 36

2

3

15

16

17

18

19

11

12

12

14

10

8

4

10

2

ASSAYS & SCHEMATIC GEOLOGIC SECTION
DRILL HOLES 2, 2A, & 7

of
AGUINALDO AREA, PIMA COUNTY, ARIZONA
for

DREYFUS-NOXOTA-BRIDGER-BRUCE
by

HEINRICH'S GEOEXPLORATION COMPANY
P. O. Box 5964, Tucson, Az 85703
Job number 902-74 September 1974

Ag Assays in
oz/ton

DH #2

45'-49'	4.80	} 14.25 $\frac{oz}{T}$
48'-54'	35.30	
54'-61'	3.68	
61'-70'	1.15	

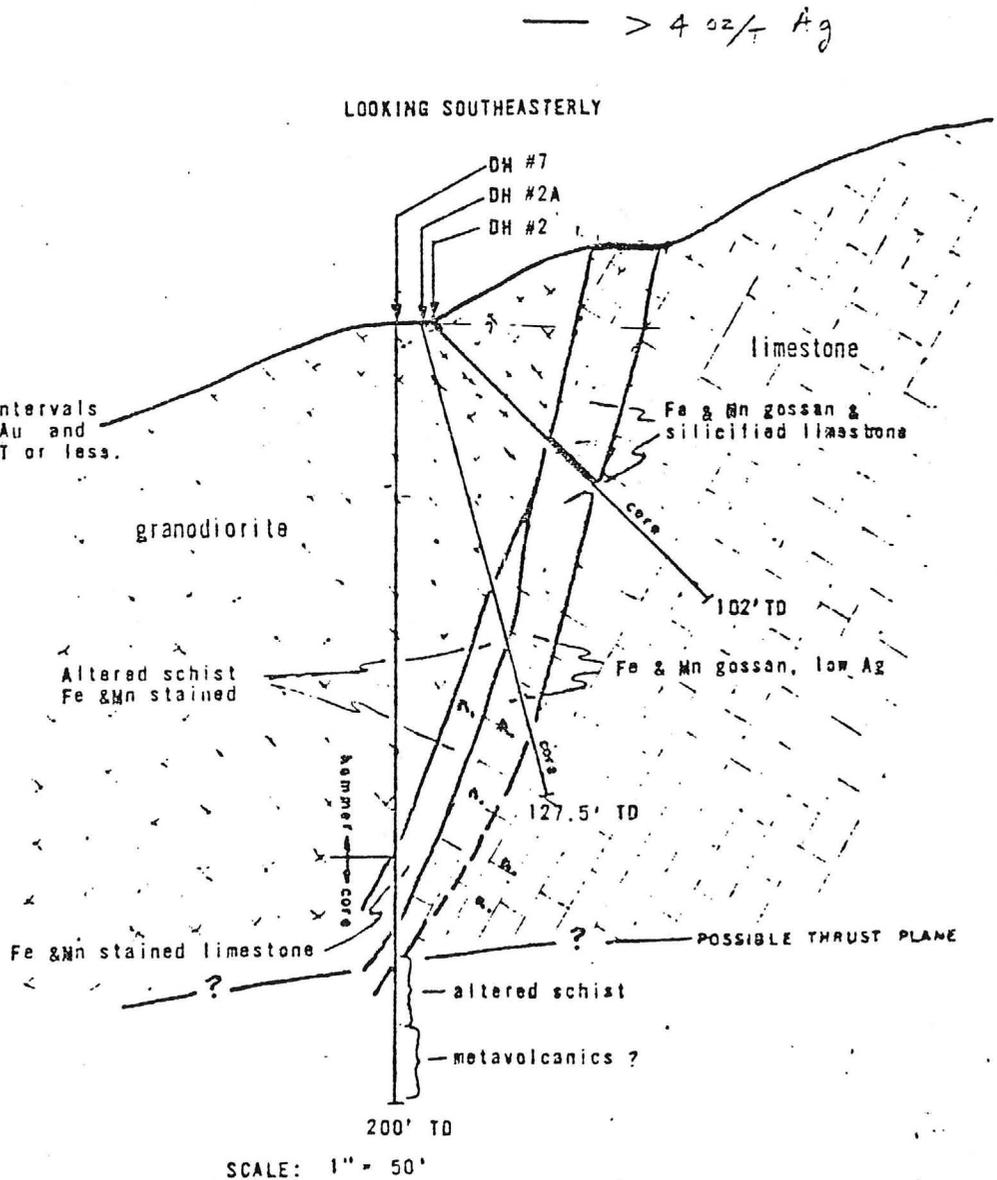
DH #2A

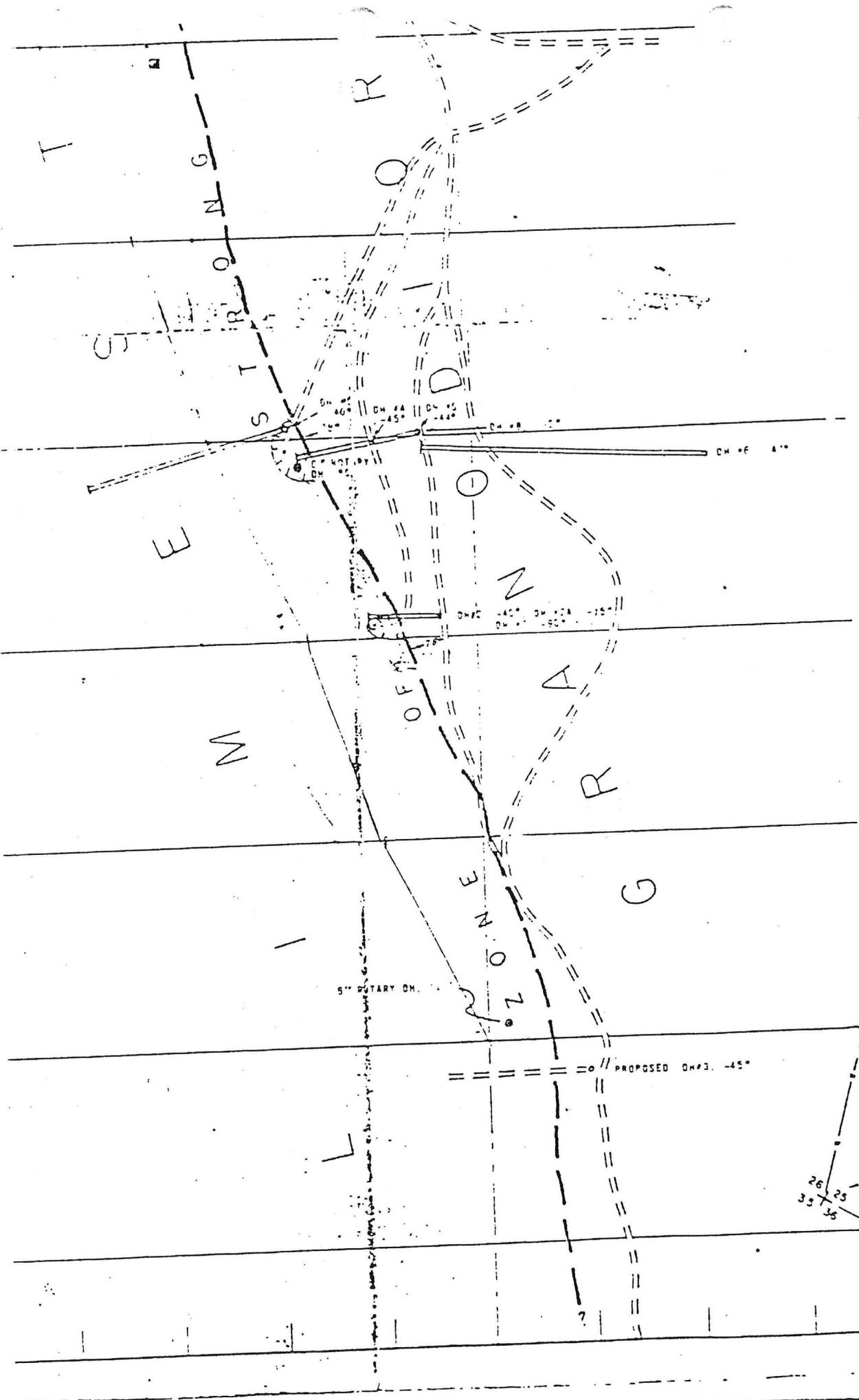
62'-87'	0.45
67'-72'	0.15
72'-77'	0.10
77'-82'	0.15
82'-86.5'	0.30
86.5'-93.5'	2.20
93.5'-103'	0.75
103'-108'	1.35
108'-112.5'	1.00
112.5'-120'	0.65
120'-127.5'	0.25

DH #7

139'-147'	0.85
147'-155'	0.30
155'-159'	0.35
167'-174'	0.30
174'-180'	0.15

NOTE: All above intervals
also assayed for Au and
all were 0.02 oz/T or less.





HUMP MINE

PIMA COUNTY

MG WR 3/9/84: Mr. George Lottridge reports that about four years ago he mined and stockpiled approximately 700 tons of Pb-Zn-Ag ore at the Black Beauty mine (Pima County) He did not ship or treat any of the ore.

John H. Jett, 4/9/85: Caller reported a Ms. Alexandria Ashleigh purchased the Black Beauty Mine, Pima County. (Hump Mine - file) and is now soliciting funds to operate the mine. Potential investor will come in office.

CJH WR 1/2/87: Visitor: Marvin Combs. Discussed AZ Dept. of Water Resources permits for water usage in a pilot mill be plans on building at his Aguinaldo Mine, Pima Co., Papago district.

RIH

AGUINALDO MINE

PIMA COUNTY

There is a little activity on the west side of the Sierrita Mountains mainly near the Aguinaldo mine. GWI QR 4-1-71

Aguinaldo Mine are reported bedded zone 3500' long. Reported to have shipped GOT Hi-grade to Asarco. GWI Report 5-20-71

Mine visit - Aguinaldo (Black Beauty) Mine - Emperor Mining Co. GWI WR 5-24-71

Ariz. Minng. Journal, 12/15/22, p. 9

MG WR 9/5/80: Sam Holliday, Consulting Geologist, 2601 W. Curtis Street, Tucson, Arizona 85705, phone 888-2247, informed that he has optioned the Aguinaldo Mine (now called the Black Beauty) from Marvin Combs. The property is in Sec. 26, T17S, R10E, in Pima County.

MG WR 2/26/81: Visited the Aguinaldo Mine, Papago mining district, Pima County. The property is inactive.

MG WR 2/27/81: Visited the Black Beauty Mine (separate report) in the Papago Mining district of Pima County.

RRB WR 8/28/81: George Lottridge, Phoenix, Arizona, reports that he will be opening up the Black Beauty claims, Sec. 26, T17S R10E, Stevens Mountain Quad, within the next 10 days. His backers are considering the possibility of building a custom mill at Arivaca. He also reported that Bill Lovell sold the Procidential to an unknown purchaser for \$½ million.

RRB WR 9/11/81: George Lottridge reports that he has \$750,000 to develop the Black Beauty Claims in Pima County. Says that he plans to mine by "open cut" and build a mill. He also says that an inventor will build a solar smelter at no cost to Mr. Lottridge if it doesn't prove practical.

RRB WR 9/16/83: It was reported that Cardinal Exploration is operating the Hump mine SW of Tucson. Merit Cleveland is a principal.

WILLIAM L. DUSENBERRY Ph.D.

CONSULTANT FOR THE PHYSICAL SCIENCES OF
ELECTRONICS - MINERALOGY - CHEMISTRY

Black Beauty
Pima Co.

7046 E. PARADISE DRIVE

602-943-2546

SCOTTSDALE, ARIZONA 85254

DECEMBER 28, 1981

THE BLACK BEAUTY MINE

AT THE REQUEST OF Ms. MERIT CLEVELAND OF THE MERIT MINING CORPORATION, I VISITED THE ABOVE PROPERTY YESTERDAY AND THE FOLLOWING COMMENTS ARE MY OWN PERSONAL EVALUATION OF THE PROPERTY.

SIX HOURS WERE SPENT ONLY ON CLAIMS THREE, FIVE, SIX, SEVEN AND TWELVE. THE DESCRIPTIONS OF THE PROPERTY ARE FOUND ELSEWHERE IN Ms. CLEVELAND'S RECORDS AND THEREFORE FOR BREVITY REASONS, I HAVE OMITTED THEM.

CLAIM FIVE HAS AN EXTENSIVE OVERBURDEN, HOWEVER, THIS PRESENTS NO PROBLEM WITH THE PROPER EQUIPMENT. THE ORE BODIES THAT HAVE PORTIONS SHOWING ON THE SURFACE INDICATE THAT CONSIDERABLE VALUES CAN BE EXTRACTED IN THIS AREA.

CLAIMS THREE, SIX, AND SEVEN INDICATE AN EXTENSIVE ORE BODY THAT CARRIES THRU THESE CLAIMS. THREE EXCAVATIONS IN THIS AREA SHOW A VERY LARGE VEIN OF SILVER BEARING ORE WITH ZINC, LEAD AND COPPER OF SECONDARY VALUES. THE EARLY MINERS DID NOT PURSUE THIS MINING POTENTIAL AS LACK OF MODERN EQUIPMENT IS QUITE EVIDENT. THIS PROPERTY COULD EASILY BE MINED VIA STRIP MINING METHOD. THE ORE BODY IS OVER 4500 FEET IN LENGTH AND THE HEIGHT VARIES FROM FIVE TO WELL OVER TWENTY FEET. THE DEPTH CAN BE DETERMINED TO BE WELL OVER TWO HUNDRED FEET. THIS IS DETERMINED BY THE OUTCROPPINGS AND THE PREVIOUS WORKINGS THAT ARE QUITE EVIDENT.

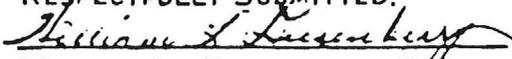
THE MOST SIGNIFICANT ORE DEPOSIT THAT IS VISIBLE LIES ON CLAIM SIX WHERE A LARGE STOPE IS LOCATED AND IS QUITE LADEN WITH HIGH VALUES IN SILVER. FURTHER GEOLOGIC EVALUATION SHOULD INCREASE THE AREA POTENTIAL THAT I FEEL THAT I AM VERY CONSERVATIVE IN MY DETERMINATIONS.

A REPRESENTATIVE SAMPLING OF THIS MAIN ORE BODY SHOW ASSAY VALUES OF \$284.00 PER TON OF ORE. SOME SAMPLES SHOW AS HIGH AS \$960.00 PER TON. LARGE AMOUNTS OF THE HIGHER GRADE ORE ARE QUITE EVIDENT. THESE SAMPLES ARE BASED AT A \$8.00 PER OUNCE SILVER PRICE.

ON CLAIM 12 THERE IS QUITE A LARGE ALLUVIAL DEPOSIT OF DECOMPOSED GRANITIC-DIORITE MINERALS NORMALLY DESCRIBED AS BRECCIA ALLUVIUM IN A GOSSAN STATE THAT ASSAYS AT \$11.50 PER TON OF ORE BASED ON A \$400.00 PER OUNCE PRICE. THIS OREBODY ENCOMPASSES WELL OVER 100,000 TONS.

I CONSIDER THIS PROPERTY TO BE A VERY WORTHWHILE MINING OPERATION.

RESPECTFULLY SUBMITTED.


WILLIAM L. DUSENBERRY, Ph.D.

**BLACK BEAUTY CLAIMS
SAMPLE DESCRIPTIONS WITH ASSAY RESULTS**

BB-1: A rock chip sample of a white felted mass of calc-silicates containing Gold: .004 oz.troy per ton & 3.60 troy ozs. Silver/ton.

BB-2: Sample from the dump of a small shaft on the side of the hill containing Gold: .006 troy oz./ton & 4.75 troy ozs. Silver/ton.

BB-3: Dump sample from nearby dump containing Gold: .004 troy oz./ton and 6.50 ozs.troy/ton of Silver.

BB-4: A rock chip sample of metasomatic iron oxides containing Gold: .005 oz. troy/ton & 5.35 tr.ozs./ton Silver.

BB-5: A 6 to 12 foot vein, within an oxidized zone. Visible chalcopyrite and tiny flakes of what may be ruby silver. Fractures are smeared with secondary copper carbonates. The sample assayed .070 troy oz. Gold/ton and 45.00 troy ozs. of Silver/ton.

BB-6: A chip sample across 15 feet of oxidized iron in the contact zone and assayed .016 tr.oz./ton Gold and 15.30 tr.ozs./ton Silver.

BB-7: Dump sample to the West of Claim #1 on the old "Yellow-Bird" mine, near a 40 foot deep shaft. The amount of material on dump indicates more extensive workings. A fine grained siliceous meta-sediment with yellow and black oxide staining. The sample assayed .013 tr.oz./ton Gold and .60 tr.oz./ton Silver.

BB-8: Dump Sample, same site, selected, black oxide stained material showing secondary copper carbonate staining. Assayed .117 tr.oz./ton Gold, and 6.65 tr.ozs./ton Silver.

BB-9: Dump sample from nearby shaft. Veins with red and black oxide crusts in quartz and often well crystallized as micro-druses. Assayed .011 oz.tr./ton Gold and .40 tr.oz./ton Silver.

BB-10: Rock chip. Recrystallized white siliceous limestone. Assay not done.

BB-11: Rock chip. As above, similar rock unit.

BB-12: Rock chip. Coarse grained, green intrusive, probably of the diorite clan.

BB-13: Rock chip from drill cuttings, similar dioritic material as BB-12.
No Assay made.

BB-14: Rock chip - in place from trench running N 17 deg.W, dip 67 deg.E, conformable to upended limestone beds, abundant iron and manganese oxides. The host rock is recrystallized limestone with oxides and smears of sericite on fractures. Assay not complete.

BB-15: Rock chip silicified grey limestone, minor brecciation, and intense cross fracturing. Assays not complete.

BB-16: Rock chip. Host rock is a recrystallized limestone with crudely crystalline quartz veins containing bornite, copper carbonates, siderite/ankerite and oxidized pyrite cubes. Zone is up to 4 feet wide with sericitized contacts trending N 10 deg.W with near verticle dips. Assayed .016 Gold and 3.25 oz. tr./ton Silver.

BB-17: Rock chip of siliceous limestone trending N 12 deg. W with near verticle dips, some black smears of iron oxides.

BB-18: Rock chip of quartzite, intensely cross-fractured.

BB-19: Rock chip. Grey, medium grained siliceous limestone, with pods of quartz, lined with iron/manganese oxides.

BB-20: Rock chip. Quartzite, intensely cross-fractured along contact with limestone.

BB-21: Soil sample of decomposed quartzite origin, with disseminated brownish "clots" of iron oxide.

BB-22: Rock chip. Contorted, silicified limestone along a quartzite contact.

BB-23: Residual Soil, derived from limestone.

BB-24: Rock chip of fissile white limestone.

BB-25: Rock chip, white, massive, but cross-fractured quartzite, often showing smears of black iron/manganese oxides.

BB-26: Rock chip from a 12 inch thick bed of iron/manganese oxides conformable to the upended bedding of the host limestone.

BB-27: Large dump sample of the above mix of iron and manganese oxides, typical of a large bed of this material. Assayed .005 tr.oz. Gold/ton and 3.70 tr.ozs. Silver per ton.

BB-28: Rock chip of Iron/manganese oxides in limestone. Assayed .018 Gold and 33.10 tr.ozs. Silver per ton.

BB-29: Rock chip. An oxide zone in the host limestone. Assay not complete.

BB-30: Dump sample of hematite excavated from a small test pit. Assay not ready.

BB-31: Rock chip from a fault or shear system, heavily coated with iron oxides. Assays not yet ready.

BB-32: Rock chip from a vein striking N 25 to 30 deg. W, dipping 30 deg. to the East, with a width of about 6 feet, cuts the regional 43 deg dip of the limestone. Composed mainly of massive white quartz with disseminated aggregates of Galena, often showing minor copper carbonates. Rock to the East of the vein shows abundant iron oxide content. Assayed .010 tr.oz./ton Gold and .55 tr.oz. per ton Silver.

BB-33: Rock chip. A buffy colored, altered limestone, with development of calc-silicate minerals. Quartz veining and thinly disseminated iron oxides. Assay not yet completed.

BB-34: Dump Sample. A mix of tactite and diorite from the contact zone, with smears of copper carbonates. Assay not yet completed.

BB-35: Dump sample. Tactite rock of dark calc-silicates, with abundant iron oxides. Assay not yet completed.

BB-36: Rock chip. Metasomatic vein or replacement lode of black specular hematite, conformable to the N 30 deg W strike and near vertical dip of the host limestone. Assay not yet completed.

BB-37: Rock chip. A "Felted" mass of white calc-silicates in a fine buffy matrix with thin smears of azurite or other copper-silver secondary mineralization. Assayed .008 tr.oz. Gold/ton and 4.55 tr.ozs. Silver per ton.

BB-38: Rock chip. A buffy, coarse grained tactite from a 5 foot chip across a shear zone. Assys. not available.

BB-39: Rock chip. A 5 foot continuous sample from above sample. Assays not yet completed.

BB-40: Rock chips. A 5 foot sample of recrystallized calcite and silicates with finely disseminated sulphides. Assay not completed.

BB-41: Three 6.5 foot continuous samples across a deposit of black iron oxide along a scarn - limestone contact. BB-41 Assayed .027 tr.oz./ton Gold and 3.80 tr.ozs./ton Silver.

BB-42: As above. Assayed .005 tr.oz./ton Gold and .70 tr.oz./ton Silver.

BB-43: As above. Assayed .007 tr.oz./ton Gold and .70 tr.oz./ton Silver.

BB-44: Dump sample. Showing copper staining in a fractured quartzite. Assayed .006 tr.oz./ton Gold and .90 tr.oz./ton Silver.

BB-45: Rock chip. 10lb sample adjacent to sample BB-32 on an 8 foot chip across a fissile white to green medium grained, and often 'felted' mass of altered calc-silicates. Assayed .009 tr.oz. Gold per ton and .15 tr.oz./ton Silver.

BB-46: Rock chips, a 10 lb. sample from the end face of old workings of heavy iron oxide in altered tactite of white 'felted' calc-silicates, with thinly disseminated bands of a sulphide across much of this material. Assayed a trace of Gold and .35 tr.oz./ton Silver.

BB-47: Rock chip. Of black iron and manganese oxides, with abundant calcite veining, striking N 45 to 50 deg W. Sample in 8 foot thick vein, but total width of zone is undetermined. Zone would appear to be at least 15 feet thick. Assayed .009 tr.oz./ton Gold and 1.20 tr.ozs./ton Silver.

BB-48: Dump sample of same material. Assayed Trace Gold and 2.10 tr.ozs. per ton Silver.

BB-49: Dump sample. Typical of a hematized bed at least 8 to 10 feet wide. Assayed a trace of Gold and 1.30 ozs.tr./ton Silver.

BB-50: Rock chip of siliceous limestone beds, east of a contact of dioritic rocks. Assys. incomplete.

BB-51: Rock chip from upended fissile gneisses, of a meta-sedimentary origin, similar to a distant rock display of a buffy color similar to the quartzite on the other side of the ridge. Assays incomplete.

BB-52: Soil samples derived from oxide coated quartzites. Assays incomplete.

NOTE: Samples were not less than 5 lbs., nor generally more than 10 lbs.

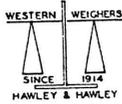
NOTE: No samples were taken from primary vein mineralization areas such as directly from the hematite vein, the Galena vein, or Tetrahedrites.

Most samples were taken from a few feet to 20 or more feet from the veins.

A broad analysis of the overall mineralization of this property was the object, not just samples from the primary veins, or high grade, as most of this work had been done previously.

P.G. Marshall,
Senior Geologist

Black Beauty
Pima Co.



WESTERN WEIGHERS
DIVISION OF
HAWLEY & HAWLEY, ASSAYERS & CHEMISTS INC.
P.O. BOX 5934 • PH. 622-4836
TUCSON, ARIZONA 85703

BRANCHES
DOUGLAS, ARIZONA
HAYDEN, ARIZONA
EL PASO, TEXAS

IDENTIFICATION			WEIGHTS					ANALYSIS					
CARRIER	NUMBER	SHIP. LOT	GROSS	TARE	NET WET	MOISTURE	NET DRY	GOLD OZ.S	SILVER OZ.S	LEAD %	COPPER %		
SP	463368		138620	58760	79860	2.4	77943		28.25	27.47	0.38		SHIPPER
								0.01	28.10	26.70	0.30		SMELTER
										Ump			UMPIRE
								NoPay	28.175		NoPay		SETTLEMENT
SMELTER LOT NO. 2019			DATE REC'D. 7/23/69		CERT BY <i>[Signature]</i>		REMARKS: WIND LOSSES, UNPLUGGED HOLES, GENERAL MOISTURE AND OTHER PERTINENT CONDITIONS: Lead Ore: Car in good condition. Clean & tight underneath. No visible leakage.						
CUST: .			ADD: .			CITY: .			REPRESENT \$ 15.00				
CC: .			ACC: MARVIN W. COMBS			DATE SPL. RECEIVED 8/1/69		DATE COMPLETED 8/11/69		EPO 2323		ANALYSIS \$ 15.50	
												\$ 30.50	

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Hump Mine Date Nov. 6, 1951 & Sept. 18, 1952.
(Former Names ----- Arizona Pride Mine & also Aguinaldo Mine)
District Papago (Sierrita) Mining Dist., Pima Co. Engineer Axel L. Johnson

Subject: Mine Report ----- Personal Inspection.

Location Secs. 25 & 26 -- T 17 S -- R 10 E

This property is located 40 miles south-west of Tucson, on the west side of the Sierrita Mts. Go out from Tucson on the Sells Highway for 24 miles to Three Points, then go south for 9 miles on the Sasabe Highway to the King's Ranch road, then go 7 1/2 miles east to the foothills of the Sierrita Mts. The road into the property needs slight ~~repairs~~ repairs for 7 miles, and extensive repairs for the last 1/2 miles.

Number of Claims 22 unpatented claims.

Owners The above property is owned by George Breidler and his mother. Address is c/o Chas. B. Russell, 218 N. 4th Ave., Tucson, Ariz.

Principal Minerals Manganese.

Men Employed No men are employed.

Production Rate No production.

Milling Facilities . No milling facilities on the property.

Ore Values (1) On # 8 Claim

(a) 1st sample--- Mang. 22.87 % --- Iron 23.50 %
(b) 2nd sample--- Mang. 15.50 % --- Iron 17.60 %
(c) Comp. sample- Silica 11.2 % --- Silver 2.3 oz.
Copper 0.06 %, Zinc 0.12 %, Lead trace

(2) On # 15 Claim

(a) Coarse rock dump --- Mang. 13.95 % --- Iron 17.30 %
(b) Fine Material dump-- Mang. 5.46 % --- Iron 5.90 %

Geology and Mineralization

(1) On # 8 Claim A manganese vein from 3 to 4 ft. wide is exposed on the hillside for several hundred feet (estimate 600 to 700 ft.) There has been no effort made to explore or develop this manganese vein deposit. I took samples at two separate locations on the outcrop, ~~and~~ and got the results as shown ~~x~~ above. They ran too low in Manganese and too high in Iron.

(2) On # 15 Claim This claim has some old Manganese workings, which were evidently worked during the first World War. The manganese vein was about 4 ft. wide, with footwall and hanging wall of limestone. There does not appear to be enough manganese ore remaining in this vein to justify resumption of mining-- even if the grade would be satisfactory. Practically all the ore in this deposit has been mined out. A sample of the rock dump of 200 or 300 tons of large boulders ~~xx~~ assayed as shown above. A sample of the dump composed entirely of fine materials wasted in previous mining operations assayed as shown above. It is too low a grade and too high in iron.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

FIELD ENGINEERS REPORT

page 2.

Mine Hump Mine Date Nov. 6, 1951 & Sept. 18, 1952.
(Former Names--- Arizona Pride Mine & also Aginaldo Mine)
District Papago (Sierrita) Mining Dist., Pima Co. Engineer Axel L. Johnson
Subject: Mine Report ----- Personal Inspection.

Present Operations No mining operations are being conducted at the present time on this property.

Old Workings

(1) On # 8 Claim ----- None.

(2) On #15 Claim --- One vertical shaft about 85 ft. deep.

One large open cut--- 4 to 6 ft. wide, and about 150 ft. long.

Proposed Plan Owners wish to sell or lease this property.

General Remarks

(1) Regarding # 8 Claim. The ore is too low in Manganese content for shipment to the Deming or Wenden manganese depots. The iron content also is much too high. I do not believe this ore could be concentrated satisfactorily by means of any concentrating plant that ~~can~~ could be set up at the site, as it is too high in iron. The iron and the manganese seem to be chemically combined in about equal proportions.

(2) Regarding #15 Claim Practically all the ore which was found in this deposit has been mined out. Remainder is too small a quantity to resume mining operations, and too low a grade manganese, with too high iron content.

AZ DEPARTMENT OF MINERAL RESOURCES

file: HUMP MINE Abstracted 7/80

Mineral Building, Fairgrounds

Phoenix, Arizona

1. Information from: Mine Visit
Address: _____
2. Mine: Black Beauty 3. No. of Claims - Patented _____
Unpatented Black Beauty No. 1-21
4. Location: Between the Aguinardo & Clark mines, east of Stevens Mtn., Pima Co.
5. Sec 26 & 35 Tp 17S Range 10E 6. Mining District Papago
7. Owner: Marvin Combs
8. Address: 918 W. Santa Maria, Tucson, AZ 85706; Phone 294-2890
9. Operating Co.: _____
10. Address: _____
11. President: _____ 12. Gen. Mgr.: _____
13. Principal Metals: Ag (?) 14. No. Employed: _____
15. Mill, Type & Capacity: _____
16. Present Operations: (a) Down (b) Assessment work (c) Exploration
(d) Production (e) Rate _____ tpd.
17. New Work Planned: _____

18. Misc. Notes: Two short exploration adits have been driven. One is straight in for about 10 feet in a westerly direction; the other, upper adit bears westerly for about 15 feet and turns northerly for about 10 feet.
These adits are driven in an andesite. I did not see any visible mineralization.

Date: 2-26-81

M. W. Creeley
(Signature) (Field Engineer)

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
MINE OWNER'S REPORT

Date July 24, 1940

Mine Aguinardo Group

Location 35 miles southeast of Tucson.

Mining District & County - Papago District.
Pima County

Former Name

Owner S. W. Purcell and Associates

Address 46 North Church Street
Tucson, Arizona

Operator S. W. Purcell and Associates

Address

President, Owning Co.

President, Operating Co.

Gen. Mgr.

Principal Minerals - Manganese

Mine Supt.

Production Rate

Mill Supt.

Mill: Type & Cap.

Men Employed

Power: Amt. & Type.

Operations: Present - Tunnels, shafts and opencuts.

Operations: Planned - Reduction Plant.

Number Claims, Title, etc. - Nine

Description: Topography & Geography - Similar to Bisbee and other districts in Arizona.

Mine Workings: Amt. & Condition - Tunnels, shafts and opencuts.

Geology & Mineralization - Eruptives and Sedimentations. Manganese, prevailing, carrying gold, silver and lead. Tremolite in large quantities carrying well in silver.

Ore: Positive & Probable, Ore Dumps, Tailings - Very extensive - unable to estimate:

Dimensions and Value of Ore body - 100 to 300 ft. wide. 1,000 to 4,000 ft. in length - two separate veins.

Mine, Mill Equipment & Flow-Sheet

Road Conditions, Route - Good highway within 7 miles of property. Good dirt road the rest of the way.

Water Supply - Large amount in old shaft.

Brief History - Worked many years for manganese, gold, silver, and lead. Considerable ore shipped.

Special Problems, Reports Filed - Treatment

Remarks - Excellent manganese property.

If property for sale: Price, terms and address to negotiate. - Yes. Terms and price to suit reliable parties. Address:
Judge F. W. Fickett, Tucson, Arizona.

(SIGNED) S. W. Purcell-Tucsonia Hotel, Tucson, Arizona.

Address--Judge F. W. Fickett, Tucson, Arizona.

PROFORMA
OF
MERIT MINES, INC.
PIMA COUNTY, ARIZONA

Hump Mine File - Pima Co.

CARDS

<i>MERIT MINES, INC</i>		
<i>MERIT CLEVELAND, PRES.</i>	<i>MERIT MINES</i>	
<i>DONALD SULLINS, SEC.</i>	<i>"</i>	<i>"</i>
<i>DONALD EVANS, TREA.</i>	<i>"</i>	<i>"</i>

PURPOSE

BUSINESS STRUCTURE

PROPERTIES

FINANCIAL DATA

FLOW CHART

EQUIPMENT & REFINERY

GEOLOGY

ASSAY REPORTS

MAPS

KEY PERSONNEL

GENERAL MINING PLAN

MERIT MINES, INC.

PURPOSE

Merit Mines is a Mining and Refining Company whose primary purpose is to explore and develop properties showing a high level of mineralization and to mine, process, refine and sell metals.

Merit Mines will operate the Black Beauty, a silver lode property, Southwest of Tucson, Arizona.

Other company divisions will include Merit Mining Equipment Leasing and Merit Milling and Refining Company.

Assay reports of the Black Beauty on the primary levels average 40 ounces of silver per ton.

Ore processing facilities planned for the Papago area include: complete mill, roaster-converter, electrowinning plant, cyanidation facility, pilot mill and laboratory.

There will also be facilities for employee housing, shops, storage facilities and on site administration offices.

The water supply is plentiful for mining purposes and an excellent well for the employees needs is to be restored.

Merit Mines plans other operations once the Black Beauty is in full operation.

BUSINESS STRUCTURE

A NEVADA CORPORATION

Articles

ARTICLES OF INCORPORATION

OF

MERIT MINES, INC.

We, the undersigned, have voluntarily associated ourselves for the purpose of forming a corporation under the laws of the State of Nevada relating to private corporations, and to that end do hereby adopt articles of incorporation as follows:

ARTICLE ONE

The name of the corporation is MERIT MINES, INC.

ARTICLE TWO

The name and resident agent is THE CORPORATION TRUST COMPANY OF NEVADA and is located at One East First Street, County of Washoe, City of Reno, State of Nevada 89501.

ARTICLE THREE

The nature of the business, or objects or purposes proposed to be transacted, promoted, or carried on by the corporation are as follows: to carry on the business of mining, milling, concentrating, converting, smelting, treating, refining, preparing for market, manufacturing, buying, selling, exchanging and otherwise producing and dealing in uranium, zinc, lead, gold, silver, copper, brass, iron, steel, coal, and in all kinds of ores, metals, and minerals, oils, petroleum, natural gas, hydrocarbons, acids and chemicals, and in the products and by-products of every kind and description and by whatsoever process, the same can be or may hereafter be produced; to purchase, lease, option, locate, or otherwise acquire, own, exchange, sell, or otherwise dispose of, pledge, mortgage, deed in trust, hypothecate, and deal in mines, mining claims, mineral lands, coal lands, oil lands, timber lands, water and water rights, and other property, both real and personal; and to carry on as principals, agents, commission merchants or consignees the business of mining, milling,

concentrating, converting, smelting, treating, refining, buying, selling, exchanging, manufacturing, and dealing in the above-specified products or any of them and of materials used in the manufacture of each, and any and all of such articles and to carry on as such principals, agents, commission merchants or consignees any other business which in the judgment of the board of directors of the corporation may be conveniently conducted in conjunction with any of the matter aforesaid.

ARTICLE FOUR

The corporation is authorized to issue only one class of shares, which shall be designated "common shares," having a total number of 200,000 shares. The shares of stock shall have a par value of \$1.00.

ARTICLE FIVE

The members of the governing board of the corporation shall be styled directors. The number of directors constituting the first board of directors is three (3), and the names and post office addresses of the first board of directors are:

<u>NAME</u>	<u>ADDRESS</u>
MERIT CLEVELAND	P. O. Box 757 San Marcos, California 92069
DONALD SULLINS	P. O. Box 757 San Marcos, California 92069
DONALD EVANS	223 West 2nd Avenue Mesa, Arizona 85201

ARTICLE SIX

The capital stock of the corporation, after the amount of the subscription price or par value has been paid in, shall not be subject to assessment to pay debts of the corporation, and no paid-up stock and no stock issued as fully paid up shall ever be assessable or assessed.

FLORIDA
CORPORATION
EG
ME...
PROPERTIES
FINANCIAL DATA

STATE OF NEVADA
DEPARTMENT OF STATE

CERTIFICATE OF CORPORATE STATUS

I, WM. D. SWACKHAMER, the duly elected, qualified and acting Secretary of State of the State of Nevada, do hereby certify that I am, by the laws of said State, the custodian of the records relating to corporations organized under the laws thereof; the revocation or suspension of their corporate charters, and their right to transact and carry on their corporate business; and am the proper officer to execute this certificate.

I further certify that, at the date of this certificate,

MERIT MINES, INC.

is a corporation duly organized and existing under and by virtue of the laws of the State of Nevada, having fully complied therewith; is entitled to exercise therein all the corporate powers and functions recited in its charter or articles of incorporation, and is in good standing in this State as a subsisting corporation.

IN WITNESS WHEREOF, I have hereunto set my hand

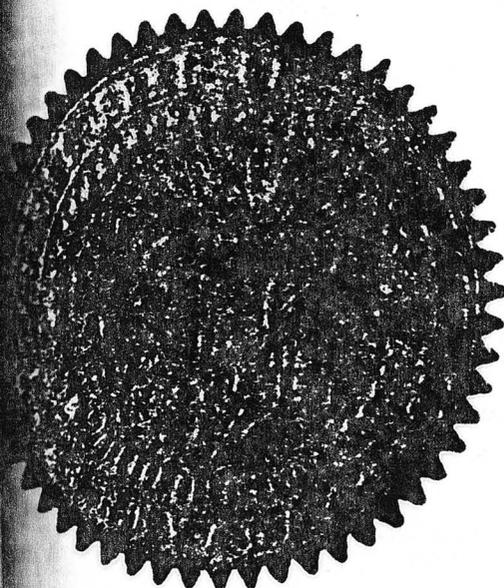
and affixed the Great Seal of the State at my office in

Carson City, Nevada, this..... 26thday of

MAY, A.D. 1982

Secretary of State

By..... Deputy



ARTICLE SEVEN

The name and post office address of each incorporator is:

ROGER H. NIELSEN

1520 State Street, Suite 250
San Diego, California 92101

ARTICLE EIGHT

The period of existence of this corporation shall be perpetual.

IN WITNESS WHEREOF, these articles of incorporation have been signed on January 7, 1982.

ROGER H. NIELSEN
Corporate Attorney

FILED
IN THE OFFICE OF THE
SECRETARY OF STATE OF THE
STATE OF NEVADA
January 12, 1982

No. 193-82

PROPERTIES

LOW UTARI

SCHEMATIC

PROFORMA

FINANCIAL DATA

RESOLUTION OF THE BOARD OF DIRECTORS OF
MERIT MINES, INC.
TO BORROW

At a special meeting of the Board of Directors of Merit Mines, Inc. held on April 26, 1982 at which a quorum was present, the following resolution was duly adopted:

Resolved that this corporation be authorized to borrow a sum not to exceed two hundred and fifty million (\$250,000,000.00) dollars.

Resolved further that said authorized officers be and are hereby authorized, directed and empowered, as security for any note or notes or any other indebtedness of this corporation arising pursuant to this resolution, to grant a security interest in properties owned and/or optioned by this corporation to lender.

Further resolved, that said officers may, and are hereby authorized to guarantee payment of notes upon such terms as may be agreed upon by them and the lender and to execute security agreements and other financial undertakings on behalf of the corporation.

I, Merit Cleveland, President and Chairman of the Board of Merit Mines, Inc., a Nevada Corporation, do hereby certify that the foregoing is in full, true and correct copy of the resolution of the Board of Directors of said Corporation, duly and regularly adopted at the said special meeting by the Board of Directors of said Corporation in all respects as required by law, and by the By-Laws of said Corporation, on the 26th day of April, 1982 at which the following members of the Board of Directors were present and voted in favor of the resolution:

Merit Cleveland, President
Sir Donald Sullins, Secretary
Donald Evans, Treasurer

In witness whereof, we have hereunto set our hands as officers of the Board of Directors of Merit Mines, Inc. this 26th day of April, 1982.

Merit Cleveland, President and
Chairman of the Board

Donald Evans, Treasurer

SUMMARY
BLACK BEAUTY MINE
PAPAGO MINING DISTRICT

The Black Beauty Mine is located in the Papago Mining District forty (40) miles southwest of Tucson, Arizona with ore reserves of more than 2,250,000 tons of ore averaging in excess of twenty (20) ounces per ton.

The mine is accessible and has ample water for all mining purposes. Climate conditions allow year round mining.

In addition to the silver ore values of the Black Beauty Mine, the mineralization includes copper, lead, zinc, barite, molybdenum, rhenium, and rare earth metals.

The initial operations are planned to refine the silver and concentrate the balance of the metals and stock pile them for future refining.

FLOW CHART

EQUIPMENT

CONTRACT

FOR

SILVER PURCHASES

GEOLOGY

MINING



ENGELHARD

ENGELHARD INDUSTRIES WEST, INC.
ENGELHARD MINERALS & CHEMICALS CORPORATION
5510 EAST LAPALMA AVENUE ANAHEIM, CALIFORNIA 92807 • (714) 779 7231 • TELE X 18 1555

SEPTEMBER 4, 1981

MS. MERIT CLEVELAND
MERIT MINES
P.O. BOX 1683
ESCONDIDO, CA. 920250290

DEAR MS. CLEVELAND,

AT THE REQUEST OF BILL SCHAFER, I AM PLEASED TO QUOTE YOU THE FOLLOWING TERMS FOR THE PURCHASE OF YOUR FINE GOLD AND FINE SILVER BULLION WHICH WOULD BE PROCESSED AT OUR ANAHEIM, CA. REFINERY.

MATERIAL: A) FINE SILVER BULLION
 B) FINE GOLD BULLION

QUALITY: A) ASSAYING AT 99.9% SILVER OR BETTER
 B) ASSAYING AT 99.9% GOLD OR BETTER

QUANTITY: A) IN QUANTITIES OF APPROXIMATELY 40,000 T.O.
 B) IN QUANTITIES OF APPROXIMATELY 400 T.O.

METAL ACCOUNTABILITY: A) SILVER - 99% OF THE ASSAYED CONTENT
 B) GOLD - 99% OF THE ASSAYED CONTENT

METAL PURCHASE: GOLD - THE LONDON PM FIX
 SILVER - THE ENGELHARD INDUSTRIES BULLION FIX

SETTLEMENT: A) FIVE (5) WORKING DAYS AFTER RECEIPT
 B) FIVE (5) WORKING DAYS AFTER RECEIPT

IF REPRESENTATION IS REQUESTED, SETTLEMENT WOULD BE FROM THE DATE OF SAMPLING.

THIS EXCLUDES ANY REFINERY SHUTDOWN PERIODS FOR HOLIDAYS

DELIVERY POINT: F.O.B. ENGELHARD INDUSTRIES WEST, INC. 5510 E. LA PALMA AVE., ANAHEIM CA. 92807 AND SUBJECT TO OUR STANDARD TERMS AND CONDITIONS

VERY TRULY YOURS,



JOHN LOTT
COMMERCIAL MANAGER
CC: BILL SCHAFER (MERIT MINES)
J. BURDSALL

LOS ANGELES (213) 583 1865 • REGIONAL SALES OFFICE SAN FRANCISCO (415) 782-9967

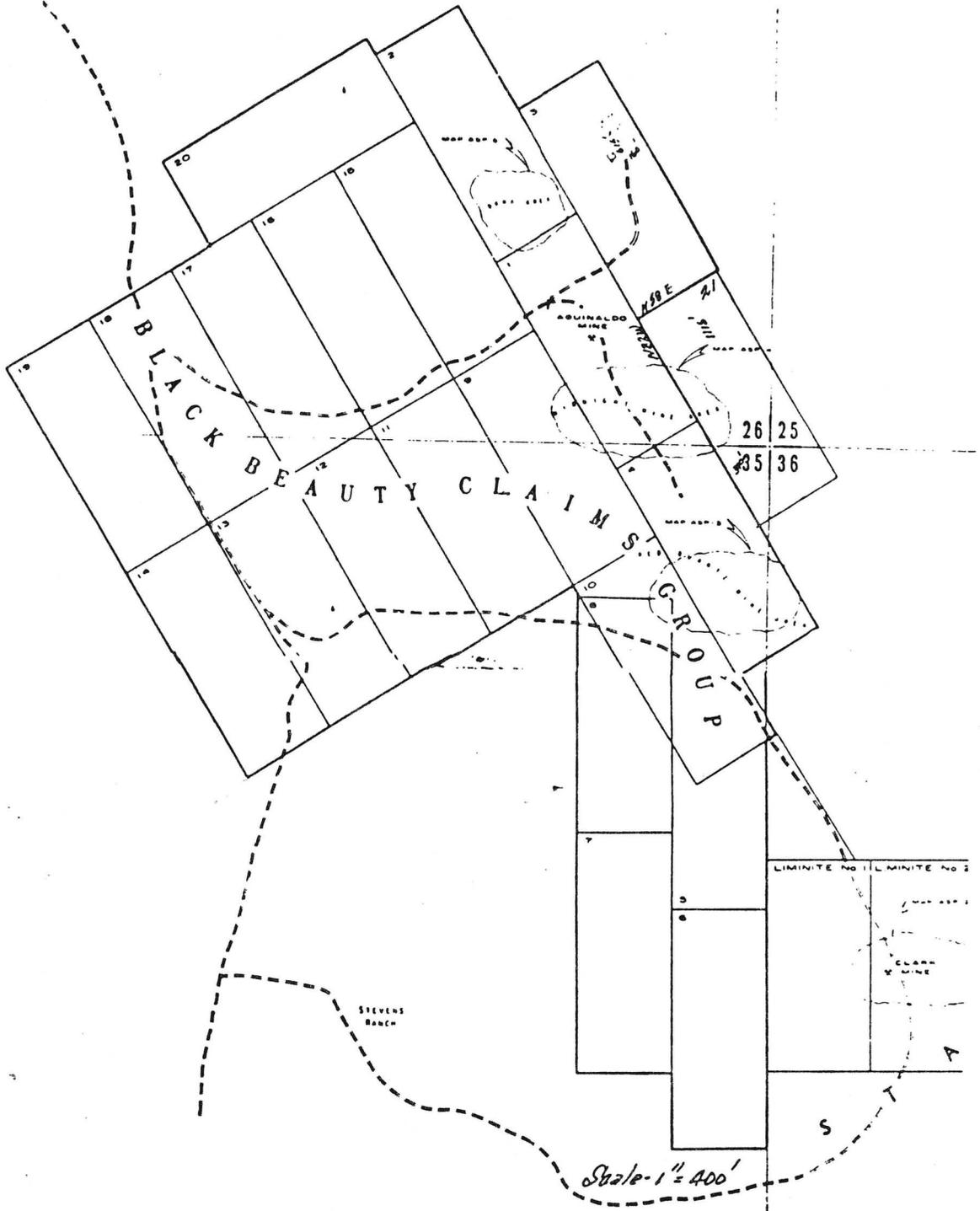
FLOW CHART

EQUIPMENT

BLACK BEAUTY

CLAIMS MAP

27 | 26
34 | 35



35 | 36

2 | 1

CLAIMS DATA

AND

ASSESSMENT FILING

918 N. Santa Maria

85706

STATE OF ARIZONA
COUNTY OF PIMA
Witness my hand and Official Seal

I hereby certify that the within instrument was filed for record in _____ County, State of Arizona
RICHARD J. KENNEDY
County Recorder

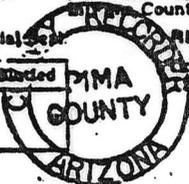
No. 96198

Book 6613 Page 407

Date: SEP 11 '81 - 9:00 AM

Request of: Marvin W. Combe

Indexed	Paged	Filed



By: Jane Burtchin
Deputy

Fees: 3.00 M

AFFIDAVIT OF VALUE OF LABOR PERFORMED AND IMPROVEMENTS MADE

STATE OF Arizona
Pima County.

Before me, the subscriber, personally appeared Marvin W. Combe

who being duly sworn, saith that at least One Hundred and no/100 Dollars' worth of work or improvements were performed or made upon each of the following claims:

- Black Beauty Droye - Serial # A-MC 68414 - AMC 68435
- P.P. # 1 Leds, Location Certificate recorded in the records of said County, Book 771 Page 177
- P.P. # 2+3 Leds, Location Certificate recorded in the records of said County, Book 2569 Page 1041, 105
- P.P. # 4 Leds, Location Certificate recorded in the records of said County, Book 2579 Page 145
- P.P. # 5-6 Leds, Location Certificate recorded in the records of said County, Book 7101 Page 541+522
- P.P. # 7+10 Leds, Location Certificate recorded in the records of said County, Book 2652 Page 293, 2132
- P.P. # 11, 12+13 Leds, Location Certificate recorded in the records of said County, Book 7071 Page 120, 1317
- P.P. # 14, 15+16 Leds, Location Certificate recorded in the records of said County, Book 7071 Page 151, 1617
- P.P. # 17, 18+19 Leds, Location Certificate recorded in the records of said County, Book 7071 Page 201, 21204
- P.P. # 20 Leds, Location Certificate recorded in the records of said County, Book 7071 Page 220
- P.P. # 21 Leds, Location Certificate recorded in the records of said County, Book 7797 Page 700

situated in Papago Mining District, County of Pima

State of Arizona, such expenditure made by or at the expense of

Marvin W. Combe claimant with the help of John Richard (7425) owner of said claim, for the year ending 12 o'clock meridian September 1st., 1981, and for the purpose of holding said claim. Such expenditure made between 1st day of September, 1981, and 1st day of September, 1981

RECEIVED
Subscribed and sworn to before me, this 11th day of Sept A.D., 1981

SEP 18 1981
10:00 AM



Marvin W. Combe
11th day of Sept A.D., 1981

Marvin W. Combe (Clayton)
NOTARY PUBLIC

My commission expires: 7-31-82

STATE OF ARIZONA
COUNTY OF PIMA
Witness my hand and Official Seal.

I hereby certify that the within instrument was filed for record in Pima County, State of Arizona

RICHARD J. KENNEDY
County Recorder

No. 101306
Book 6623 Page 568
Date: SEP 25 81 9 10 AM
Request of: Marvin W. Combs

Indexed	Paged	Blotted



Marvin W. Combs
Deputy

Fee: 3.02

Form 9-70

AND WHEN RECORDED MAKE THIS DEED AND, UNLESS OTHERWISE SHOWN BELOW, MAKE TAX STATEMENTS TO:

NAME _____
CITY _____
STATE _____

Title Order No. _____ Escrow No. _____

SPACE ABOVE THIS LINE FOR RECORDER'S USE

QUITCLAIM DEED

THE UNDERSIGNED GRANTOR(S) DECLARE(S)

DOCUMENTARY TRANSFER TAX is \$ _____

- computed on full value of property conveyed, or
- computed on full value less value of liens or encumbrances remaining at time of sale, and

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged,

hereby remise, release and forever quitclaim to **R. MERIT CLEVELAND**

the following described real property in the
County of **PIMA**

State of **ARIZONA**

**BLACK BEAUTY MINING CLAIMS (21) IN THE
PAPAGO MINING DISTRICT, Range 10 East,
Township 12 South, NW 1/4 of Section 27 T8S R8E M.**

Dated **SEPTEMBER 19, 1981**

Marvin W. Combs

STATE OF **Arizona**
COUNTY OF **Pima**

On **Sept 19, 1981** before me, the undersigned a Notary Public in and for said State, personally appeared **MARVIN W. COMBS**

known to me to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same.

WITNESS my hand and official seal.

Signature: *Walter Walton*

My Commission Expires Aug. 29, 1985

MAK TAX STATEMENTS TO _____ NAME ADDRESS ZIP



PROFORMA

1982 thru 1984

OPERATIONS

200 Ton Per Day - Flotation

1000 Ton Per Day - Leach Pad

2400 Ton Per Day - Flotation

MERIT MINES, INC.
200 TON PER DAY START-UP COSTS

Labor (3 month basis)	\$360,000.00
250 KW Diesel Generator (rental)	6,690.00
Diesel Feul	6,435.00
12 1/2 h.p. Kawasaki engine & Rake	6,175.00
Case 3 cu. yd. wheel loader with bucket	18,295.00
D7G Track-tractor with dozer & ripper	32,500.00
Jaw Crusher	25,500.00
Cone Crusher	28,000.00
Vibratory Crushing Grizzley	26,600.00
Air-Track with Compressor	40,000.00
2-man core drill unit	14,000.00
10 wheel dump truck	14,000.00
10,000 gallon Water Tank	3,000.00
Living Quarters	8,000.00
Sand Filters	3,500.00
Aluminum Filters	3,800.00
Tanks	2,875.00
Pumps	9,440.00
Electrical & Plumbing	18,776.00
Welder	3,000.00
Holding Tanks	21,300.00
Mobile Home for electronics	12,000.00
Heavy Duty Air Conditioner & Dehumidifier	11,500.00
Office Equipment	2,875.00
Office Supplies	3,500.00
First Aid Stations	3,771.00
Safety Equipment	8,885.00
Security System	2,500.00
Fencing	8,000.00
Provisions	4,000.00
Clothing & Tools	7,450.00
Miscellaneous Items	4,000.00
Construction Labor	15,000.00
Consulting	25,000.00
Engineering	6,000.00
Insurance, etc.	8,000.00
Pad & Miscellaneous	45,000.00
Chemicals	58,828.00

TOTAL COSTS

\$851,595.00

MERIT MINES, INC.
1000 TON PER DAY START-UP COSTS

Labor (3 month basis)	\$360,000.00
250 KW Diesel Generator (rental)	6,690.00
Diesel Fuel	6,435.00
1 1/2 h.p. Kawasaki engine & Rake	6,175.00
Case 3 cu.yd. wheel loader with bucket	18,295.00
D7G Track-tractor with dozer & ripper	32,500.00
Jaw Crusher	25,500.00
Vibratory Crushing Grizzly	26,600.00
Air-Track with Compressor	40,000.00
2-man core drill truck	14,000.00
10,000 gallon Water Tank	3,000.00
Living Quarters	8,000.00
Sand Filters	3,500.00
Aluminum Filters	3,800.00
Tanks	2,875.00
Pumps	9,440.00
Electrical & Plumbing	18,776.00
Welder	3,000.00
Holding Tanks	21,300.00
Mobile Home for electronics	12,000.00
Heavy Duty Air Conditioner & Dehumidifier	11,500.00
Office Equipment	2,875.00
Office Supplies	3,500.00
First Aid Stations	3,771.00
Safety Equipment	8,885.00
Security System	2,500.00
Fencing	8,000.00
Provisions	4,000.00
Clothing & Tools	7,450.00
Miscellaneous Items	4,000.00
Construction Labor	15,000.00
Consulting	25,000.00
Engineering	6,000.00
Insurance, etc.	8,000.00
Pad & Miscellaneous	45,000.00
Chemicals	135,530.00
Lab	68,000.00
Communications	4,800.00
Cone Crusher	28,000.00
10 wheel dump truck	14,000.00

(cont. from previous page)

Facilities (Buildings)	37,000.00
Precipitator	38,000.00
Stripper & Electrolytics	14,000.00
Explosives	4,370.00
Legal & Accounting	2,500.00
Slow Melt Furnance & Molds for Silver	4,800.00

TOTAL COSTS

4,800.00
\$1,101,767.00

MERIT MINES, INC.
2400 TON PER DAY START-UP COSTS

CONSTRUCTION AND MOVE ON	\$2,430,00.00
Building Construction, Initial Equipment, Licenses, Permits, Mill Equipment and Supplies, Electric and Phone Lines, Trailers for Offices Living Quarters, Payroll, Food, Housing, etc.	
SERVICES	\$ 87,000.00
Engineering, Blasting, Geophysical, Geochemical, Ore Dressing Analysis (Rock Mechanics), etc.	
ADMINISTRATIVE	\$ 427,960.00
Management, Accounting, Legal, Office Equipment and Supplies, Data Processing, Insurance, Security, Transportation, etc.	
OPERATING CAPITAL	\$1,055,040.00

MINERAL EXTRACTION AND REFINING

FLOW CHART

For the Black Beauty Mine

FLOW CHART

- A: COARSE ORE BIN w/8"x8" Station Grizzly 72 lb. Rail - 24' x 30'
- B: APRON FEEDER 32" x 16' 18' per min.
- C: 15° 32" x 16' x 6' Vibratory Grizzly
- D: UNIVERSAL 224B Jaw Crusher - 165 H.P. Diesel @ 275 RPM 3" Setting
- E: 24" (35° Idlers) 250-350 FPM 15° 78' in 2 steps Belt Conveyors
& G:
- F: 48" SWINGING ELECTROMAGNET
- H: 64" x 16' w/110 SPRAY NOZZLES 2-deck Universal 15° Screen - 3/4"
- I: 60" 300 H.P. ELECTRIC A-C Hydrocone Crusher 4" Fine Setting - 3/8" Product
- J: 24" 12° (35° Idlers) 250 FPM 36' Belt Conveyor
- K: 5 sets of 6-compartment 30" x 36" Denver Plunger Jigs
- L1: 2 - 10' x 15' PRECONDITIONING AGITATORS w/Axial Flow 45 H.P. each.
w/2 - 220 G.P.M. Denver Slurry Pumps 65 H.P. Total
- L2: 10' x 15' AXIAL FLOW CONDITIONING AGITATOR 45 H.P. (Copper)
- L3: 10' x 15' AXIAL FLOW CONDITIONING AGITATOR 45 H.P. (Lead-Zinc)
- L4: 10' x 10' AXIAL FLOW CONDITIONING AGITATOR 45 H.P. (Gold-Silver)
- L5: 9' x 10' AXIAL FLOW ALKALI CONDITIONING AGITATOR 40 H.P. (Gold-Silver)
- M1: 12' x 17' BALL MILL 1350 H.P. Electric 3/8" Feed -65 Mesh Product
- M2: 10' x 16' BALL MILL 1050 H.P. Electric -65 Mesh Feed -120 Mesh Product
- N1: 30" x 24" DENVER SPIRAL SCREEN 70 Mesh Screen - Oversize Flow Through
- N2: 30' x 24" DENVER SPIRAL SCREEN 120 Mesh Screen
- O1: 5" x 4" DENVER SRL - C Pump
- O2: 5" x 4" DENVER SRL - C Pump w/o3 Surge Pulp Accumulator

FLOW CHART (CONTINUED)

PI: 24" KREBS HYDRO-CYCLONE 45 - 60 H.P.

P2: 24" KREBS HYDROCYCLONE 45 - 60 H.P.

Q: 72" x 16' TROMEL SCREEN 100 Mesh 112 H.P.

RI: MILL AUTOMATIC REAGENT FEEDER

R2: CYANIDE AND CAUSTIC AUTOMATIC REAGENT FEEDER

R3: COPPER STRIPPING & CONDITIONING REAGENT FEEDER

S1: 10-CELL DENVER "SUB-A" 180 cu. ft. Flotation Machine (Free-Flow)

S2: 10-CELL DENVER "SUB-A" 180 cu ft. Flotation Machine (Cell to Cell)

S3: 10-CELL DENVER "SUB-A" 180 cu ft. Flotation Machine (Cell to Cell)

S4: 10-CELL DENVER "SUB-A" 100 cu. ft. Flotation Machine (Cell to Cell)

T: 6' x 7' CYANIDE MIX TANK

U: 10 - 15' CROSS-FLATS x 18' CYANIDE LEACH TANKS (Axial Flow Agitator)(Cell to Cell)
45' x 30' x 10' Decant-Settler Tank

V: FLOATING DECANT PUMP 50 G.P.M. 10 H.P. Diesel

WI: 2 BANKS OF 1.5 TON ACTIVATED CARBON GOLD PRECIPITATION COLUMNS

W2: 2 BANKS OF 3 TON SILVER PRECIPITATION COLUMNS

XI: 1200 lb. BACK-FLUSH TYPE SILICA-SAND FILTER

L6: SILVER AXIAL FLOW CONDITIONER AGITATOR 6' x 7' 30 H.P.

X2: 1 6' x 3-DISC DENVER FILTER (Pb) + 1 6' x 3 DISC DENVER FILTER (Zw)

X3: 6' x 6' x 4' COUNTER-CURRENT WASHING CLOTH-SAND FILTER

YI: 5-CELL 5 3/4" WIER DEPTH 60' x 20' SOLVENT EXTRACTION TANK; AGEOUS-ORGA
IC

FLOW CHART (CONTINUED)

Y2: 5-CELL 30' x 60' x 12' MIXER-SETTLER S-X TANK; ORGANIC-ACID STRIPPING
w/CONDITIONING (ELECTROLYTIC) & SCAVENGER CELL

Z: METHAROL HYDROXIDE HEATER-FEEDER 80 H.P. Electric w/20 H.P. 20 GPM Pump

AA: GOLD ELECTROLYTIC CELLS

AB: SILVER ELECTROLYTIC CELLS

AC: 60' x 25' CLARIFIER-THICKENERS CRB Type (3)

TECK RESOURCES (U.S.), INC.

INTER-OFFICE LETTER

DATE: May 26, 1982

COPIES TO:

TO: R.A. Jones

FROM: Peter Marshall

WHEN FEASIBLE, CONFINE LETTER
TO ONE SUBJECT

RE: Black Beauty Claims - 21 claims staked in S26/35; T17S; R10E
Pima County Arizona

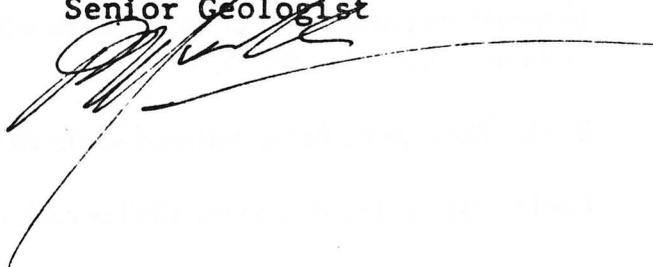
Silver and gold bearing metasomatic zones occur as large elongate bodies along multiple, sometimes sheared contacts between diorite intrusives, and a complex of sedimentary to meta-sedimentary rocks.

Preliminary geologic mapping and rock sampling over an area of 2500 feet by 1000 feet, covering the north-eastern portion of the claims, along with several samples off the mapped area, indicate the potential for large scale economic mineralization exists. A detailed, and extensive exploration program including geologic mapping and sampling of a 5 to 10 square mile area, based on a photo-geologic map is warranted.

Three days were spent on the property, sampling and mapping. A total of 52 rock chip, dump and soil samples were collected. Of these samples 22 were fire assayed at Jacob's Assay Office in Tucson, Arizona; the remaining were geochemically analyzed at Bondar-Clegg Labs. in North Vancouver, British Columbia.

A detailed description of each sample was made, and the sample site was plotted on a base map at a scale of 1"=100'. Additional geologic detail was also plotted using a Brunton and Topofil for survey control. Sample descriptions, assay reports, and a copy of the preliminary map will accompany this memo.

P.G. Marshall
Senior Geologist



**BLACK BEAUTY CLAIMS
SAMPLE DESCRIPTIONS WITH ASSAY RESULTS**

BB-1: A rock chip sample of a white felted mass of calc-silicates containing Gold: .004 oz.troy per ton & 3.60 troy ozs. Silver/ton.

BB-2: Sample from the dump of a small shaft on the side of the hill containing Gold: .006 troy oz./ton & 4.75 troy ozs. Silver/ton.

BB-3: Dump sample from nearby dump containing Gold: .004 troy oz./ton and 6.50 ozs.troy/ton of Silver.

BB-4: A rock chip sample of metasomatic iron oxides containing Gold: .005 oz. troy/ton & 5.35 tr.ozs./ton Silver.

BB-5: A 6 to 12 foot vein, within an oxidized zone. Visible chalcopyrite and tiny flakes of what may be ruby silver. Fractures are smeared with secondary copper carbonates. The sample assayed .070 troy oz. Gold/ton and 45.00 troy ozs. of Silver/ton.

BB-6: A chip sample across 15 feet of oxidized iron in the contact zone and assayed .016 tr.oz./ton Gold and 15.30 tr.ozs./ton Silver.

BB-7: Dump sample to the West of Claim #1 on the old "Yellow-Bird" mine, near a 40 foot deep shaft. The amount of material on dump indicates more extensive workings. A fine grained siliceous meta-sediment with yellow and black oxide staining. The sample assayed .013 tr.oz./ton Gold and .60 tr.oz./ton Silver.

BB-8: Dump Sample, same site, selected, black oxide stained material showing secondary copper carbonate staining. Assayed .117 tr.oz./ton Gold, and 6.65 tr.ozs./ton Silver.

BB-9: Dump sample from nearby shaft. Veins with red and black oxide crusts in quartz and often well crystallized as micro-druses. Assayed .011 oz.tr./ton Gold and .40 tr.oz./ton Silver.

BB-10: Rock chip. Recrystallized white siliceous limestone. Assay not done.

BB-11: Rock chip. As above, similar rock unit.

BB-12: Rock chip. Coarse grained, green intrusive, probably of the diorite clan.

BB-13: Rock chip from drill cuttings, similar dioritic material as BB-12.
No Assay made.

BB-14: Rock chip - in place from trench running N 17 deg.W, dip 67 deg.E, conformable to upended limestone beds, abundant iron and manganese oxides. The host rock is recrystallized limestone with oxides and smears of sericite on fractures. Assay not complete.

BB-15: Rock chip silicified grey limestone, minor brecciation, and intense cross fracturing. Assays not complete.

BB-16: Rock chip. Host rock is a recrystallized limestone with crudely crystalline quartz veins containing bornite, copper carbonates, siderite/ankerite and oxidized pyrite cubes. Zone is up to 4 feet wide with sericitized contacts trending N 10 deg.W with near verticle dips. Assayed .016 Gold and 3.25 oz. tr./ton Silver.

BB-17: Rock chip of siliceous limestone trending N 12 deg. W with near verticle dips, some black smears of iron oxides.

BB-18: Rock chip of quartzite, intensely cross-fractured.

BB-19: Rock chip. Grey, medium grained siliceous limestone, with pods of quartz, lined with iron/manganese oxides.

BB-20: Rock chip. Quartzite, intensely cross-fractured along contact with limestone.

BB-21: Soil sample of decomposed quartzite origin, with disseminated brownish "clots" of iron oxide.

BB-22; Rock chip. Contorted, silicified limestone along a quartzite contact.

BB-23: Residual Soil, derived from limestone.

BB-24: Rock chip of fissile white limestone.

BB-25: Rock chip, white, massive, but cross-fractured quartzite, often showing smears of black iron/manganese oxides.

BB-26: Rock chip from a 12 inch thick bed of iron/manganese oxides conformable to the upended bedding of the host limestone.

BB-27: Large dump sample of the above mix of iron and manganese oxides, typical of a large bed of this material. Assayed .005 tr.oz. Gold/ton and 3.70 tr.ozs. Silver per ton.

BB-28: Rock chip of Iron/manganese oxides in limestone. Assayed .018 Gold and 33.10 tr.ozs. Silver per ton.

BB-29: Rock chip. An oxide zone in the host limestone. Assay not complete.

BB-30: Dump sample of hematite excavated from a small test pit. Assay not ready.

BB-31: Rock chip from a fault or shear system, heavily coated with iron oxides. Assays not yet ready.

BB-32: Rock chip from a vein striking N 25 to 30 deg. W, dipping 30 deg. to the East, with a width of about 6 feet, cuts the regional 43 deg dip of the limestone. Composed mainly of massive white quartz with disseminated aggregates of Galena, often showing minor copper carbonates. Rock to the East of the vein shows abundant iron oxide content. Assayed .010 tr.oz./ton Gold and .55 tr.oz. per ton Silver.

BB-33: Rock chip. A buffy colored, altered limestone, with development of calc-silicate minerals. Quartz veining and thinly disseminated iron oxides. Assay not yet completed.

BB-34: Dump Sample. A mix of tactite and diorite from the contact zone, with smears of copper carbonates. Assay not yet completed.

BB-35: Dump sample. Tactite rock of dark calc-silicates, with abundant iron oxides. Assay not yet completed.

BB-36: Rock chip. Metasomatic vein or replacement lode of black specular hematite, conformable to the N 30 deg W strike and near vertical dip of the host limestone. Assay not yet completed.

BB-37: Rock chip. A "Felted" mass of white calc-silicates in a fine buffy matrix with thin smears of azurite or other copper-silver secondary mineralization. Assayed .008 tr.oz. Gold/ton and 4.55 tr.ozs. Silver per ton.

BB-38: Rock chip. A buffy, coarse grained tactite from a 5 foot chip across a shear zone. Assys. not available.

BB-39: Rock chip. A 5 foot continuous sample from above sample. Assays not yet completed.

BB-40: Rock chips. A 5 foot sample of recrystallized calcite and silicates with finely disseminated sulphides. Assay not completed.

ECONOMIC MINERALOGICAL
EXAMINATION

GEOLOGY REPORT
OF
PETER MARSHALL
TECH RESOURCES

GEOLOGY

DRILLING LOG
OF
HENDRICKS EXPLORATION
TUCSON, ARIZONA

BB-41: Three 6.5 foot continuous samples across a deposit of black iron oxide along a scarn - limestone contact. BB-41 Assayed .027 tr.oz./ton Gold and 3.80 tr.ozs./ton Silver.

BB-42: As above. Assayed .005 tr.oz./ton Gold and .70 tr.oz./ton Silver.

BB-43: As above. Assayed .007 tr.oz./ton Gold and .70 tr.oz./ton Silver.

BB-44: Dump sample. Showing copper staining in a fractured quartzite. Assayed .006 tr.oz./ton Gold and .90 tr.oz./ton Silver.

BB-45: Rock chip. 10lb sample adjacent to sample BB-32 on an 8 foot chip across a fissile white to green medium grained, and often 'felted' mass of altered calc-silicates. Assayed .009 tr.oz. Gold per ton and .15 tr.oz./ton Silver.

BB-46: Rock chips, a 10 lb. sample from the end face of old workings of heavy iron oxide in altered tactite of white 'felted' calc-silicates, with thinly disseminated bands of a sulphide across much of this material. Assayed a trace of Gold and .35 tr.oz./ton Silver.

BB-47: Rock chip. Of black iron and manganese oxides, with abundant calcite veining, striking N 45 to 50 deg W. Sample in 8 foot thick vein, but total width of zone is undetermined. Zone would appear to be at least 15 feet thick. Assayed .009 tr.oz./ton Gold and 1.20 tr.ozs./ton Silver.

BB-48: Dump sample of same material. Assayed Trace Gold and 2.10 tr.ozs. per ton Silver.

BB-49: Dump sample. Typical of a hematized bed at least 8 to 10 feet wide. Assayed a trace of Gold and 1.30 ozs.tr./ton Silver.

BB-50: Rock chip of siliceous limestone beds, east of a contact of dioritic rocks. Assys. incomplete.

BB-51: Rock chip from upended fissile gneisses, of a meta-sedimentary origin, similar to a distant rock display of a buffy color similar to the quartzite on the other side of the ridge. Assays incomplete.

BB-52: Soil samples derived from oxide coated quartzites. Assays incomplete.

NOTE: Samples were not less than 5 lbs., nor generally more than 10 lbs.

NOTE: No samples were taken from primary vein mineralization areas such as directly from the hematite vein, the Galena vein, or Tetrahedrites.

Most samples were taken from a few feet to 20 or more feet from the veins.

A broad analysis of the overall mineralization of this property was the object, not just samples from the primary veins, or high grade, as most of this work had been done previously.

P.G. Marshall,
Senior Geologist
TECK RESOURCES (U.S.), INC.

ASSAYS & SCHEMATIC GEOLOGIC SECTION
 DRILL HOLES 2, 2A, & 7

AGUINALDO AREA, PIMA COUNTY, ARIZONA

for
 DREYFUS-NOKOTA-BRIDGER-BRUCI

by
 HEINRICHS GEODEXPLORATION COMPANY
 P. O. Box 5984, Tucson, Az 85703
 Job number 982-74 September 1974

Ag Assays in
 oz/ton

DH #2

45'-49'	4.80	} 14.25 oz T
49'-54'	38.50	
54'-61'	3.88	
61'-70'	1.15	

DH #2A

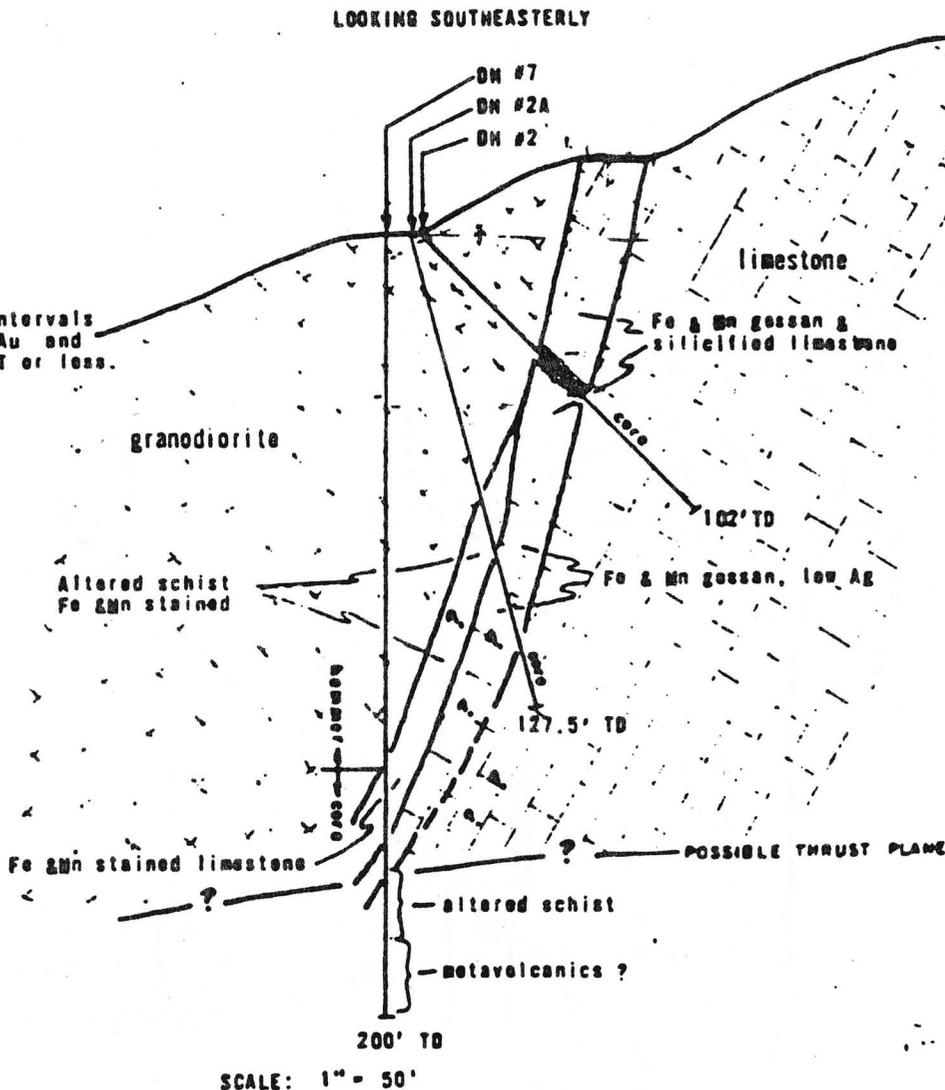
62'-67'	0.45
67'-72'	0.15
72'-77'	0.10
77'-82'	0.15
82'-86.5'	0.30
86.5'-93.5'	2.20
93.5'-103'	0.75
103'-108'	1.35
108'-112.5'	1.00
112.5'-120'	0.85
120'-127.5'	0.25

DH #7

138'-147'	0.85
147'-155'	0.30
155'-159'	0.35
167'-174'	0.30
174'-180'	0.15

NOTE: All above intervals
 also assayed for Au and
 all were 0.02 oz/T or less.

— > 4 oz/T Ag



8-21-73

GEOCHEMICAL ANALYSIS

Date Received 7-12-73Location Palo Alto Ranch Qd. 445 Stevens Mtn.
Prospect, ArizonaEm. Spec. 8-1-73 X-Ray 8-6-73

Chem. _____

Geologist JDF

Pulp No.	SAMPLE NUMBER	Mo P.P.M.		Pb P.P.M.		Zn P.P.M.		Cu P.P.M.		Ag OZ/TON		Au OZ/TON		Bi ppm		Sb
	T. R. S. IDENT.															
6204	17-10-26-1aF <i>fault-controlled contact mineralization</i>			X		X		X		X						X
		ES	6	2100		2530		1.13%		13.2			ES	56		960
6205	b <i>marble</i>			X		X		X								
		ES	3	1740		665		345	ES	.33			ES	< 3		
6206	c <i>vein-1'</i>		X	X		X		X		X						
			53	1.0%		> 4.8%		1420		1.75			ES	34		
6207	2 <i>shear zone</i>		X	X		X		X		X						
			112	3600		2810		4870		1.8%			ES	45		
6208	3 <i>quartz vein zone</i>			X		X		X								
		ES	19	405 HOB		575		298	ES	.08			ES	< 3		
6209	4a <i>quartz vein zone</i>			X		X		X		X						
		C	60	3.4%		2290		7215		5.04			ES	< 3		
6210	b <i>quartz vein zone</i>			X		X		X								
		ES	4	5500		690		285	ES	.21			ES	12		
6211	5a <i>quartz vein zone</i>			X		X		X		X						X
		C	100	4000		760		695		5.04			ES	17		170

ERETS PHOTO

Shows Area Ore Bodies

GEOCHEMICAL ANALYSIS

Date Received 7-12-73

Location Palo Alto Ranch Qd. 445 Stevens Mtn. Prospect, Ariz.

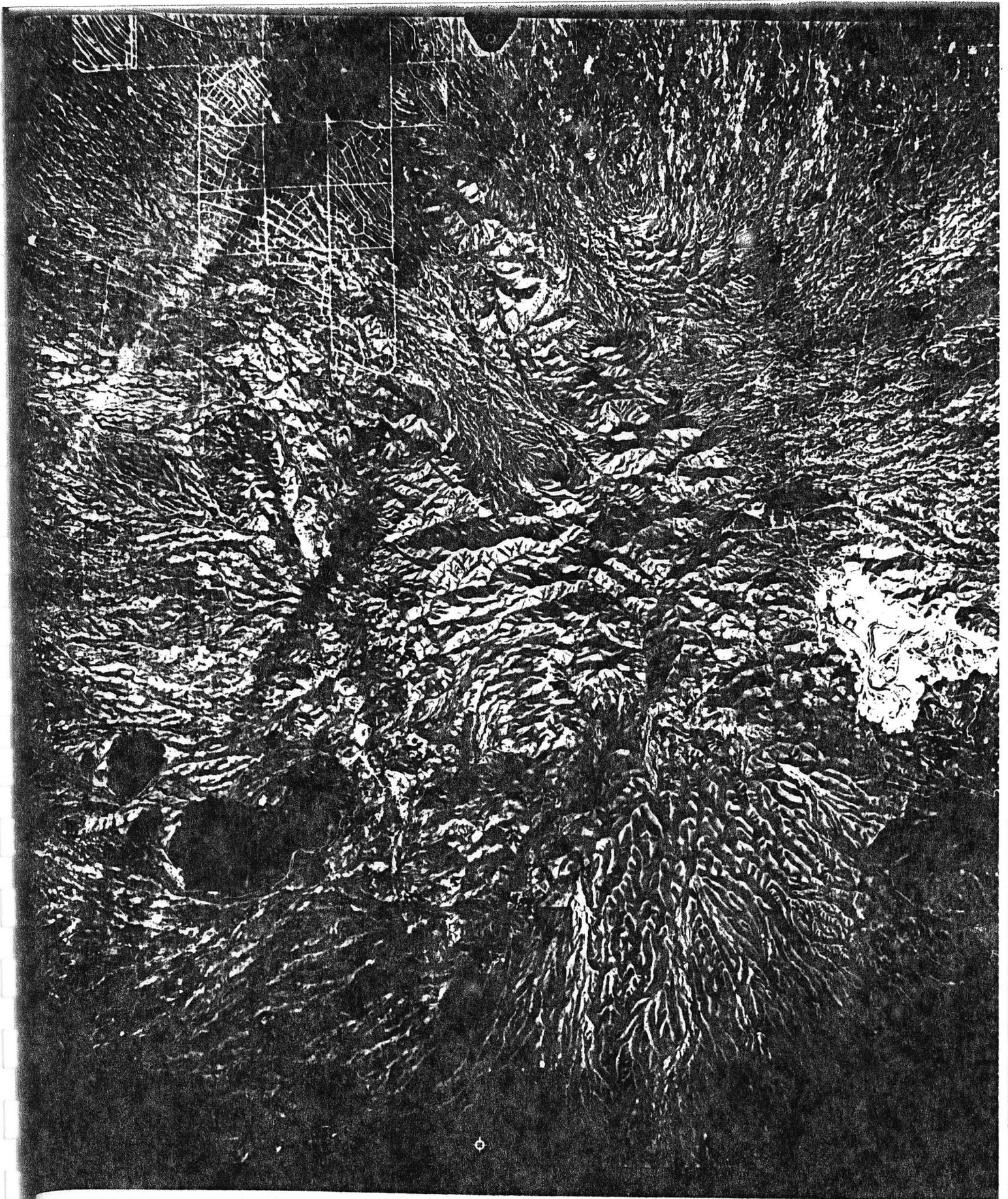
Em. Spec. X-Ray

Chem.

Geologist JDF

Pulp No.	SAMPLE NUMBER T. R. S. IDENT.	Mo P.P.M.		Pb P.P.M.		Zn P.P.M.		Cu P.P.M.		Ag OZ/TON		Au OZ/TON		Bi ppm		Sb	
6212	17-10-26-6F <i>contact rock with 1-2" gta veining</i>		X		X		X		X								
			56		1760		1280		2.9%	ES	.38			ES	18		
6213	7a <i>Metals - high grade</i>		X		X		X		X		X						X
			140 1117		4.3% ###		> 3.2%		980		3.1			ES	< 3		
6214	b <i>similar</i>				X		X		X		X						X
		C	80		3.9%		> 2.7%		4960		4.5			ES	< 3		1.9%
6215	27-1a <i>5" vein</i>				X		X		X		X						X
		ES	9		2550		1110		2.4%		15.8			AA	200		558
6216	b <i>garnet mica, Jantaria situation</i>				X		X		X								X
		ES	15		2600		1620		420	ES	.34			ES	< 3		1054
6217	c <i>high graded vein material - dump</i>				X		X		X								
		X	40		130		325		2990	ES	.06			AA	130		
6218	2a <i>high graded garnet monazite</i>				X		X		X								
		ES	11		80		62		950	ES	.06			ES	6		
6219	b <i>vein material</i>				X		X		X								

ES 32 70 105 5785 ES 0.07 ES 20



MAJOR MINING COMPANIES
IN THE AREA

In Andesitic-Porphyry Granatics underlying 'Gossan Belt', Uranophane in large quantities has indicated its' presence. $\text{CaO} \cdot 2\text{UO}_3 \cdot 2\text{SiO}_2 \cdot 7\text{H}_2\text{O}$. Yellow. H.= 2.0-3.0. G.=3.81-3.9. Massive and fibrous like asbestos and may occur as coatings.

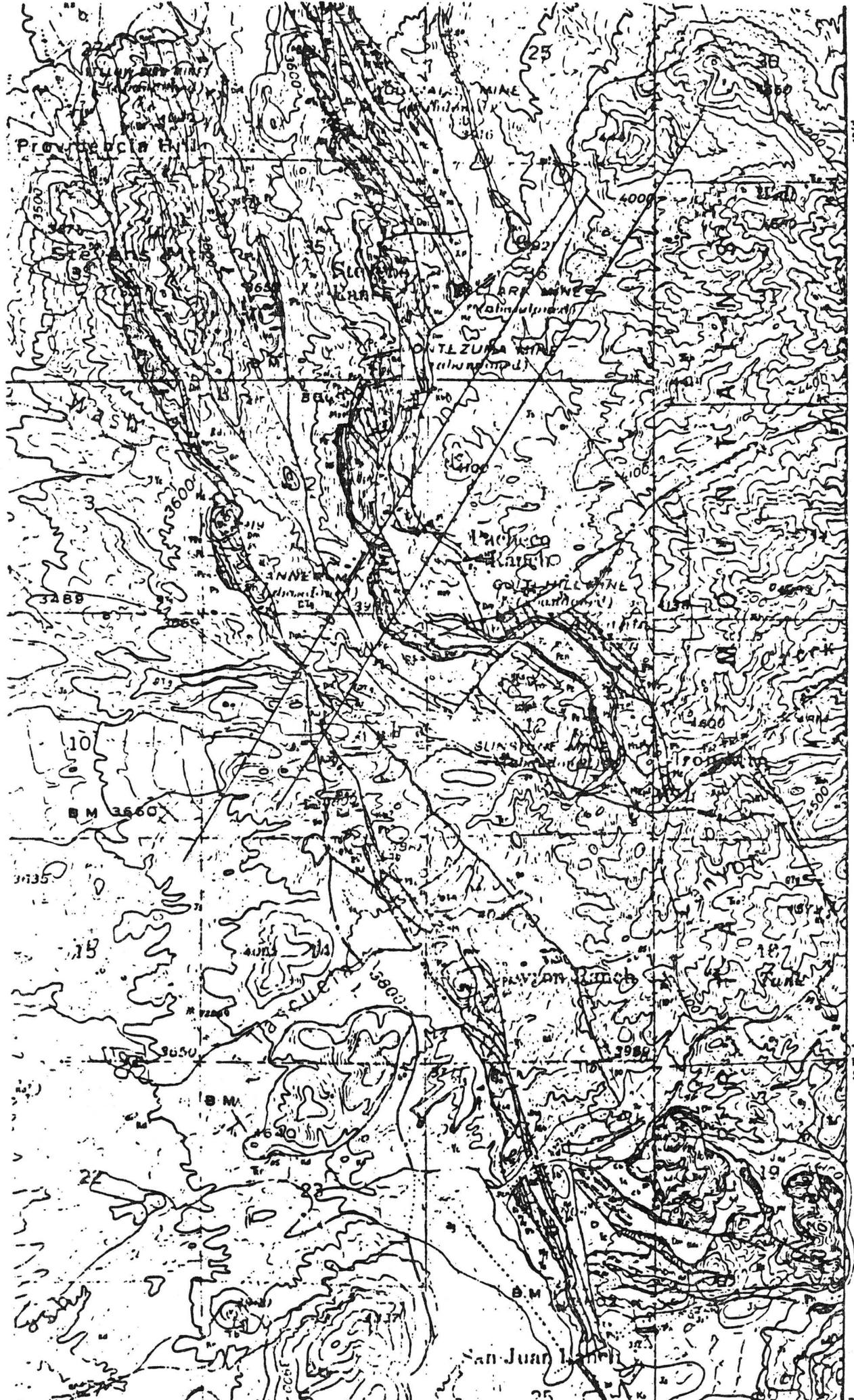
ERETS MAPS proving massive sulfides are available.

Drilling 61 different properties within 45 miles of the northwestern border of the Papago Reservation, primarily in the Papago Mining District near the Silver Bell Mine and along the Avra Valley have been completed within the last 10 years by the following companies.

- (A) Hecla (now Noranda)
- (B) Callahan Mining Co
- (C) Noranda
- (D) Mountain States Exploration
- (E) Neumont Mining Co
- (F) Cominco, Ltd.
- (G) Cities Services Corp.
- (H) Inspiration Consolidated
- (I) Kennecott Copper Corp
- (J) Anaconda Wire and Cable Co
- (K) Phelps Dodge Corp
- (L) Dome Mines, Ltd
- (M) McFarr Geophysics Corp
- (N) Tennico Exploration
- (O) Ranchers Development Corp

STRUCTURE MAP

Note Heavy Path of Ore As In Erets Photo
(Indicated by Yellow Marker)



31° 55'

108° 18' W

NEWS ARTICLES

DESCRIPTION OF MAP UNITS

[Quaternary units probably thicken west of area; bedded units thicken south and east of area; and Mesozoic-Paleozoic units are tectonically and metamorphically thinned]

- | | |
|-----|--|
| Qg | GRAVEL AND SAND (HOLOCENE AND PLEISTOCENE)--All of flood plains, terraces, and pediments; includes some colluvium and soils |
| QTg | GRAVEL (PLEISTOCENE AND PLEISTOCENE?)--Alluvium; generally better consolidated and better sorted than are those of younger deposits (Qg) |
| Tb | BASALT OR ANDESITE (MIOCENE?)--Medium to dark-gray flows and pyroclastic rocks, and small intrusive bodies; probably correlative with volcanic rocks of Cerro Colorado, 8 miles to the southeast and dated at 23 million years (P. E. Damon, commun., 1969) |
| Trs | RUBY STAR GRANODIORITE (PALEOCENE)--Light- to pinkish-brownish-gray medium-grained biotite granodiorite includes granodiorite porphyry and quartz monzonite. Dated at 58.7, 59, and 61.6 million years (Damon, 1973); relations to dacitic rocks (TKd) unknown |
| TKd | DACITIC ROCKS (PALEOCENE OR UPPER CRETACEOUS)--Light- to medium-gray or light-yellow-gray, slightly altered dacitic tuff breccia; some intercalated sandstone and conglomerate derived from dacitic volcanic rocks. Relations with Red Boy Rhyolite (Kr) unknown |
| Kr | RED BOY RHYOLITE (UPPER CRETACEOUS)--Rhyolitic tuffs, and welded tuff; may include some intrusive bodies; probably correlative with volcanic rocks dated about 72 million years (Drewes, 1971) |
| Ks | RHYOLITE OF STEVENS MOUNTAIN (UPPER CRETACEOUS?)--Pinkish- to pale-reddish-gray porphyritic rhyolite stocks(?) and dikes; may include rocks of slightly younger ages |
| Kdi | DIORITE (UPPER CRETACEOUS?)--Dark-gray medium-grained small intrusive masses, includes some aplite. Probably of same age as Demetrie Volcanics |
| Kd | DEMETRIE VOLCANICS (UPPER CRETACEOUS)--Andesitic to dacitic breccias and few flows, strongly epidotized and chloritized |
| Kc | CONGLOMERATE (UPPER CRETACEOUS?)--Volcanic cobbles in conglomerate |
| Kb | BISBEE FORMATION (LOWER CRETACEOUS)--Phyllitic sandstone, arkosic sandstone, and conglomerate; includes some red beds and limestone lentils metamorphosed |

Mzp	FORMATION OF PACHECO RANCH (MESOZOIC)--Light-gray metamorphosed volcanic and sedimentary rock; may be correlative with rocks as young as the Bishop Formation (Lower Cretaceous) or as old as the Sierra Hills Volcanics (Jurassic and Triassic)
Mzpc	Conglomerate--Phyllitic tuffaceous conglomerate; locally includes stretched-pebble conglomerate
Mzpt	Tuff and sandstone--Phyllitic tuff and tuffaceous sandstone
Mzpa	Andesite--Dark-gray vesicular and amygdular
Mzpr	Rhyolite--Phyllitic rhyolitic volcanic rocks; includes some welded tuff; may include some intrusive rocks
Js	QUARTZ MONZONITE OF SIERRITA MOUNTAINS (JURASSIC OR TRIASSIC) Pinkish-gray coarse-grained quartz monzonite; may include some granite; correlative with Sierra Granite of Lacy (1959), as used by Cooper (1973). Potassium-argon age on biotite 145 ± 5 million years (R. F. Marvin, H. H. Mehnert, and Violet Mehnert, written commun.; 1973)
Jrh	MONZONITE OF HARRIS RANCH (JURASSIC OR TRIASSIC) Light-gray fine-grained monzonite and quartz monzonite as used by Cooper (1973)
Rr	RODOLFO FORMATION (TRIASSIC)--Red mudstone, siltstone, and some intercalated and basal conglomerate; includes some andesitic volcanic rocks; pebbles in some conglomerate beds stretched.
a	Top of andesitic rocks
Ro	OX FRAME VOLCANICS (TRIASSIC)--Rhyolitic flows, tuff breccia, and welded tuff; intensely indurated and typically strongly laminated
Pcn	CONCHA LIMESTONE (LOWER PERMIAN)--Dark-gray cherty limestone; metamorphosed
Ps	SCHERRER FORMATION (LOWER PERMIAN)--Light-pinkish-gray fine-grained quartzite containing a locally preserved thin medial gray dolomite and basal reddish-gray siltstone; metamorphosed
Pe	EPITAPH DOLOMITE (LOWER PERMIAN)--Dark-brownish-gray sparsely cherty dolomite and dolomitic limestone; metamorphosed
Ppe	EARP FORMATION (LOWER PERMIAN AND UPPER PENNSYLVANIAN)--Reddish-gray siltstone, marlstone, and limestone; metamorphosed
Ph	HORQUILLA LIMESTONE (PENNSYLVANIAN)--Thin-bedded gray sparsely cherty limestone; some intercalated reddish-gray siltstone; metamorphosed
He	ESCABROSA LIMESTONE (MISSISSIPPIAN)--Thick-bedded light- to dark-gray crinoidal cherty limestone

NEWS ARTICLES

Of Mining Districts

Exploration drilling in Cenozoic sediments has also been performed in several other areas. Portions of other southern Arizona valleys have been drilled to test for Date Creek basin analogs, generally with discouraging results. Some low-grade resources have been located in Miocene-age bedded dolomites in the New River area of Maricopa County.

Considerable exploration is underway on the Colorado Plateau for buried breccia pipes similar to the Orphan lode. Although many pipes exist in the Grand Canyon-Arizona strip country, it is likely that many are buried under surficial cover rocks, and require advanced geophysical techniques for target discovery. Energy Fuels Nuclear, Inc. of Denver has recently announced the discovery of a previously unknown ore-bearing pipe along Hack Canyon, north of the Grand Canyon, which could yield 500,000 tons of ore, and perhaps half the U_3O_8 content of the Orphan lode.

Drilling has continued in the Sierra Ancha region to further test the Dripping Spring Quartzite. New potential ore deposits are being explored in the Workman Creek area in the central part of the district, and around the old Red Bluff mine in the southern part of the district. The old Lucky Boy mine in the southern Pinal Mountains produced some uranium in the 1950s from the Dripping Spring Quartzite. The mine has been reopened and several shipments of brine concentrate have been made since 1977.

Shipments of yellow cake (uranium oxide) were initiated in April 1980 by Anamax from their Twin Buttes open pit copper mine in the Pima Mining district of the Sierrita Mountains. They anticipate shipping approximately 120,000 pounds of concentrate, extracted from a secondary leach circuit, in the first year. This is an amount equivalent to the total production thus far obtained from the entire Sierra Ancha district. Phelps Dodge Corporation anticipates some leach solution recovery from their copper mines at Bisbee and Morenci.

Some drilling has been done to test for targets in Precambrian granites in the Redington Pass area of the Rincon Mountains, in the northern Whetstone Mountains, and in Jurassic granite in the southern Santa Rita Mountains. These occurrences are usually associated with shear zones or hydrothermally altered areas.

The Department of Energy, through its subcontractors, has expended considerable exploration time in Arizona during the past decade. DOE's National Uranium Resources Evaluation program (NURE) is administered by Bendix Field Engineering Corporation, which is now preparing folios of investigation for parts of Arizona and New Mexico, including the Kingman, Prescott, Marble Canyon, Williams, Shiprock, Gallup, Flagstaff, St. Johns, Mesa, and Grand Canyon 1° x 2° (NTMS) quadrangles. In addition, NURE fieldwork on the Nogales, Douglas, Clifton and Silver City quads is nearing completion as of December 1980. The NURE folios include the evaluation of all major geologic environments in the quadrangles for uranium potential, and provide many detailed petrographic, chemical and gamma ray spectrometric analyses of major rock units of the quadrangles.

A variety of other projects in Arizona has been funded by DOE: Deep drilling in the Date Creek basin region; detailed hydrogeochemical sampling around Artillery Peak, Mohave County and the Cerbat Mountains; and detailed studies of certain geologic environments, such as older Precambrian conglomerates and metamorphic core complexes. The hydrogeochemical work (HSSR program of Bendix) will appear in summary form within the NURE folios. The detailed studies ("World Class" program of Bendix) will be issued as individual open-file reports upon completion. Questions regarding the availability of any of these reports may be addressed to the Bendix Library, P.O. Box 1569, Grand Junction, CO 81501.

This report is a summary of a Department of Energy-funded compilation of uranium occurrences and producers in Arizona; it was prepared by Robert B. Scarborough and Peter L. Kresan.

SELECTED REFERENCES

- Bollin, E. M. and Kerr, P. F., 1958, Uranium mineralization near Cameron, Arizona: *New Mexico Geol. Soc. Guidebook #9*, p. 164-168.
- Chenoweth, W. L., 1980, Historical review of uranium-vanadium production in NW Carrizo Mountains, Apache County, Arizona: U.S. Dept. of Energy, Open-file Report TM-209, 19 p.
- Chenoweth, W. L. and Malan, R., 1973, The uranium deposits of NE Arizona: *New Mexico Geol. Soc. Guidebook #24—Monument Valley region*, p. 139-149.
- Craig, L. C. and others, 1955, Stratigraphy of Morrison and related formations, Colorado Plateau region: *U.S. Geol. Survey Bull.* 1009-E.
- Finnell, T. L., 1957, Structural control of uranium ore at Monument No. 2 mine, Apache County, Arizona: *Econ. Geology*, 52 (1), p. 25-35.
- Görnitz, V. and Kerr, P. F., 1970, Uranium mineralization, Orphan mine, Grand Canyon, Arizona: *Econ. Geology*, 65, (7), p. 751-768.
- Kofford, M., 1969, The Orphan mine: *Four Corners Geol. Soc. Guidebook #5—Grand Canyon region*, p. 190-194.
- Ottou, J., 1977, Geology of uraniferous Tertiary rocks, Date Creek basin, west-central Arizona: *U.S. Geol. Survey Circ.* 753, p. 35-36.
- Repenning, C. A. and others, 1969, Stratigraphy of Chinle and Moenkopi Formations, Arizona, New Mexico, Utah: *U.S. Geol. Survey Prof. Paper* 521-B, 34 p.
- Scarborough, R. B. and Wilt, J. C., 1979, Uranium favorability of Cenozoic sedimentary rocks, Basin and Range province of Arizona: *U.S. Geol. Survey Open-file Report* 79-1429.
- Williams, F. J., 1957, Structural control of uranium deposits, Sierra Ancha region, Gila County, Arizona: *U.S. Atomic Energy Comm. RME-3152*, 117 p. ✕

LOCAL EVENTS

Tucson Gem and Mineral Show: **Tucson Gem and Mineral Society**, Tucson, AZ, February 13-15, 1981.

Geoscience Daze—9th Annual Student Presentations: **Department of Geosciences**, University of Arizona, Tucson, AZ (Contact: Mike Williams), March 4-6, 1981.

Symposium on tectonics and ore deposits: **Arizona Geological Society and University of Arizona**, Tucson, AZ, March 19-20, 1981.

NATIONAL/REGIONAL EVENTS

Geological Society of America—Annual Meetings:
Cordilleran Section, Hermosillo, MX, March 23-29, 1981.
Rocky Mountain Section, Rapid City, SD, April 16-17, 1981.

Cerro Prieto Geothermal Field of Baja California, Mexico—Symposium: **Univ. of California, Earth Sciences Div.**, Berkeley, CA, March 24-27, 1981.

American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists:
Rocky Mountain Section, Albuquerque, NM, April 12-15, 1981.
Annual Meeting, San Francisco, CA, May 31-June 3, 1981.

Advances in Geotechnical Earthquake Engineering and Soil Dynamics—Meeting: **University of Missouri**, Rolla, MO, April 26-May 2, 1981.

Geology of Industrial Minerals—Forum: **New Mexico Bureau of Mines**, Albuquerque, NM, May 13-15, 1981.

GRADUATE RESEARCH ASSISTANT

The recipient of the Research Assistantship awarded by the Bureau of Geology and Mineral Technology for 1980-81 is Steven Lingrey, a PhD candidate in the Geosciences Department at the University of Arizona. Mr. Lingrey will be mapping and interpreting the structural geology of the northeastern Rincon Mountains in Pima and Cochise Counties, Arizona.

Mr. Lingrey received a MS degree in geology at the University of Southern California and has been a student at the University of Arizona since August 1977. His major advisor is Dr. George Davis.

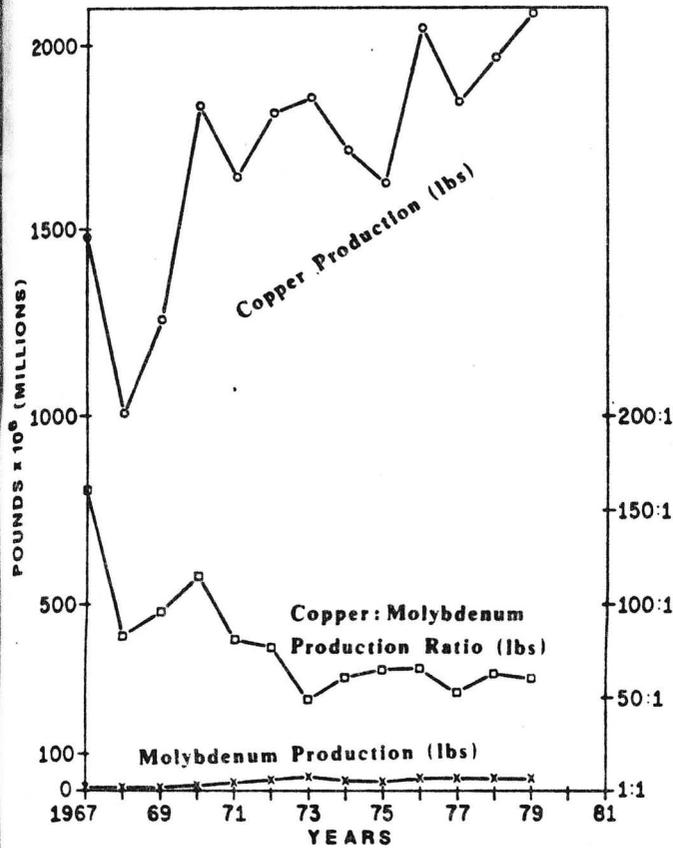


Figure 2, Moly: 1967-1979 copper production, molybdenum production and copper-molybdenum production ratio. Source: BGMT file data.

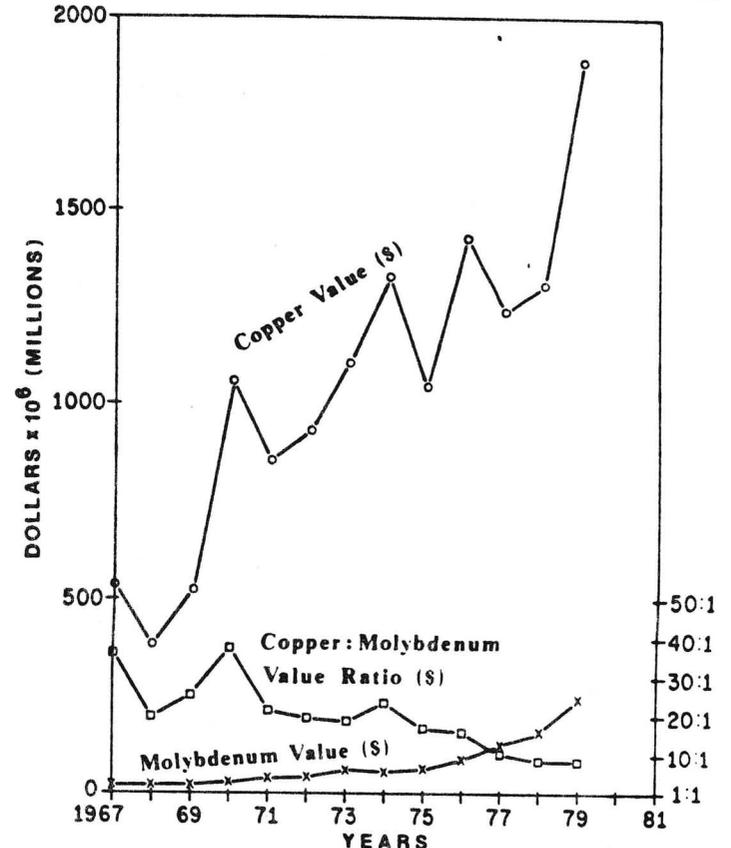


Figure 3, Moly: 1967-1979 copper value (absolute dollars), molybdenum value (absolute dollars) and copper-molybdenum value ratio. Source: BGMT file data.

San Manuel mine was developed with the aid of an 80 million-dollar government advance against future copper deliveries, and was originally discovered during a U.S. Bureau of Mines exploration drilling prompted by World War II copper needs. The Sierrita mine in the Pima mining district was developed with the aid of a 38-million dollar loan from G.S.A. (U.S. General Services Administration) in the late 1960s. Without government loans, 60% of Arizona's historical molybdenum production would have been lost.

In the last several years, however, the molybdenum market has turned decidedly bullish and is having considerably more economic impact on Arizona's copper industry than in years past. Figures 1-3 chart molybdenum's increasing economic clout. Since 1970, yearly copper and molybdenum metal production have about doubled (Figure 2). However, during the same period, yearly value of molybdenum production has increased eight times as compared to a twofold increase for copper (Figure 3). From 1967 to 1973, the ratio of copper to molybdenum production in pounds steadily declined as more molybdenum recovery plants came into operation and has leveled off at about 60:1 since 1973.

TABLE 2. MOLY: WESTERN WORLD MOLYBDENUM SUPPLY/DEMAND (million lb MO)

	1973	1974	1975	1976	1977	1978	1979**
Demand*	181	207	168	177	182	198	200
Production							
Primary	81	88	89	92	100	106	105
Byproduct	77	73	74	79	83	88	90
Total	158	161	163	171	183	194	195
Excess (Deficit)	(23)	(46)	(5)	(6)	1	(4)	(5)
GSA Releases	7	36	3	1	Stockpile Depleted		
Industry Stock Changes	-16	-10	-2	-5	1	-4	-5

*Indicate net East-West trade
**Estimated

SOURCE OF DATA. MOSAIC: THE JOURNAL OF MOLYBDENUM TECHNOLOGY, V. 4, N. 2.

In contrast, since 1974, the molybdenum-copper dollar ratio for Arizona has steadily declined from 33:1 to 8.1 in 1979. If the trend on Figure 3 continued into the future, Arizona, dollar-wise, would become a molybdenum state after 1981. However, Arizona will maintain its reputation as the 'copper' state well into the foreseeable future for reasons outlined in the next section.

Figure 1 clearly shows that molybdenum's new economic muscle in Arizona is related to a dramatic price rise since 1974. Compared to copper, the price rise is precipitous, with the moly copper price ratio increasing from about 3:1 in 1974 to over 11:1 by May 1980. Two reasons explain the massive moly price hike. The first is related to the U.S. government stockpile of 80 million pounds of molybdenum which was largely depleted by the end of 1974 (Table 2). Throughout the early 1970s, demand consistently outstripped production. Much of the extra demand, however, was absorbed by periodic releases from the U.S. government stockpile. These releases clearly had a price-dampening effect, as indicated by the nearly constant molybdenum price through 1974. When the stockpile was depleted, the price damper was removed. This depletion, combined with an increasing demand for molybdenum metal, shot the price of moly into the economic stratosphere. Demand for molybdenum was so heavy in 1979 that spot prices for moly consistently surpassed the 20 dollar mark and in June 1979 soared to 34 dollars per pound. Thus, molybdenum has more clout than ever at Arizona's copper mines.

In contrast, the release of the U.S. government copper stockpile by 1973, together with foreign competition and increased mining costs, severely depressed the domestic copper market. By mid 1978, U.S. copper producers and, interestingly enough, their labor unions were calling for import restrictions on widely-available, cheap foreign copper (see Fieldnotes, v. 8, n. 1 & 2). Depletion of

Empire Mines Ltd. ¹⁹²⁷ Ships Silver Ore

USGS Bull. 725
Ariz. Mining Journal, 12/15/22

TUCSON, Ariz.—Empire Mines Ltd. announced it has shipped the first car load of silver ore to the ~~Black Beauty claim~~ Henry Yen, Empire president, said the ore came from the ~~Black Beauty claim~~ which are in the Papago Mining district, southwest of Tucson.

The claims, which include 40 acres of state land, lie about 10 miles southwest of the ~~Black Beauty claim~~ copper project.

Yen said the first phase drilling was completed in December, and low grade ore was intercepted in two areas, the Dana and the Midnight, within the upper 100 feet of the hole.

The first hole drilled yielded high grade ore, Yen said, which was in the Midnight area. This was encountered while preparing off-set drill sites and access roads for second phase drilling.

In February equipment and a crew were moved into the area which mined silver ore which contained good lead values.

Yen said the first shipment contained 70 tons, and a second shipment is being readied right now. He said mining will continue as long as high grade shipping ore persists.

In late spring the second phase drilling program will be started. Yen said the objective is to block out a minimum of one million tons of shallow ore along a mineralized zone which has been measured and prospected for 2,000 feet with results to ~~show a~~

Values in silver up to 75 ounces per ton and lead up to 25 per cent were encountered in this area, Yen said. "The mining is all open pit and grades of ore not high enough to ship are being stockpiled for the mill now contemplated for the property," he said.

Marvin Combs of Tucson was original owner of the property which was recently acquired by Empire Mines.

The Clark group of 10 claims lies north of the Olympia, partly on the same limestone ridge. Most of the work on this group, however, has been done to the east of the ridge and close to the granite. Here a little isolated hill (Pl. XVIII) composed mainly of limestone contains bunches of vein quartz and more or less thoroughly silicified limestone. No regular or persistent vein was recognized, but a few tons of partly oxidized silver ore has been shipped from scattered shallow pits and trenches. Supergene enrichment has probably been active here, and the appearance of the surface is not indicative of the presence of large or deep ore bodies. The Clark No. 2 and Clark No. 3 claims lie west of the Clark No. 1, on the same limestone ridge as the Olympia. They show a few small, irregular streaks of copper-stained, oxidized silver ore in silicified limestone, but the metallization has apparently been feeble, and the prospects for finding an ore body of considerable size can not be considered encouraging.

1927

follow continuously any one fissure. The veins also are displaced by numerous cross faults of small throw. The ore, which was treated in a small mill, now dismantled, appears from material on the dump to have consisted of quartz with partly oxidized pyrite, galena, sphalerite, chalcocite, and some chalcocite, probably derived from chalcocite. It was valuable chiefly for its silver content. The Banner and McKinley claims are said to be owned by the Lehigh Valley Bank, of South Bethlehem, Pa.

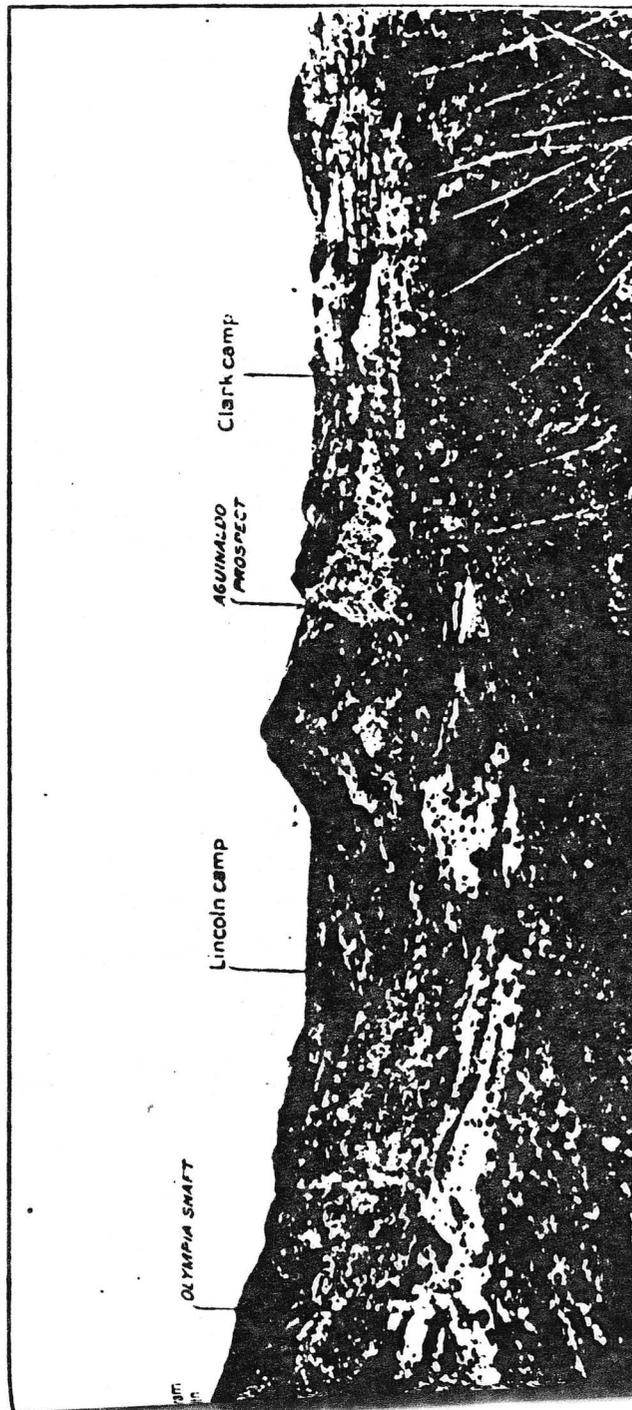
North of the Banner is the Olympia shaft (Pl. XVIII), apparently about 200 feet deep. This is on the Olympia group, which adjoins the Banner on the north and is reported to be owned by the Olympia Mining Co., of Chicago. No work was in progress at the time of visit. The Olympia is on the same belt of partly silicified limestone as the Banner and McKinley mines, which here determines the crest of a rather prominent ridge. No persistent vein could be seen, but the limestone has been irregularly fissured, contains bunchy quartz veins, and is itself more or less silicified.

The Clark group of 10 claims lies north of the Olympia, partly on the same limestone ridge. Most of the work on this group, however, has been done to the east of the ridge and close to the granite. Here a little hill (Pl. XVIII) composed mainly of limestone contains veins of quartz and more or less thoroughly silicified limestone. No regular or persistent vein was recognized, but a few tons of partly oxidized silver ore has been shipped from scattered shallow pits and trenches. Supergene enrichment has probably been active here, and the appearance of the surface is not indicative of the presence of large or deep ore bodies. The Clark No. 2 and Clark No. 3 claims lie west of the Clark No. 1, on the same limestone ridge as the Olympia. They show a few small, irregular streaks of copper-stained, oxidized silver ore in silicified limestone, but the metallization has apparently been feeble, and the prospects for finding an ore body of considerable size can not be considered encouraging.

North of the Clark group is the Aginaldo group of nine claims, owned by S. W. & E. M. Purcell. Most of the work on these claims has been done at a point about 2 miles north-northwest of the Sunshine camp, on the same limestone ridge on which are the Banner and Olympia mines. The beds strike northwest and dip 85° NE. They are in part fractured and silicified and crop out boldly. Near the Aginaldo workings the limestone has been intruded by a decomposed diorite which projects to the northwest from the main granite mass previously described. Near this tongue, which is regarded as a calcic border variety of the granite, the limestone shows contact metamorphism. It contains layers or streaks of tremo-

BULLETIN 725 PLATE XVIII

U. S. GEOLOGICAL SURVEY



GENERAL VIEW TO THE NORTHWEST IN THE FOOTHILL BELT OF THE SIERRITA MOUNTAINS, PAPAGO DISTRICT, ARIZ.

in the foreground is on granite and descends to a little valley beyond which is the limestone containing the Olympia and Aginaldo prospects. Through a gap in this ridge may be seen Lincoln camp, and beyond it, to the left, is the schist mass of Hiram Mountain.

In this same valley, perhaps half a mile north of the Cunningham group and nearly west of the Aguinaldo workings, is Lincoln camp and the Yellow Bird shaft, about 150 feet deep. The Lincoln or Yellow Bird group comprises 15 claims and a mill site and is owned by S. W. & E. M. Purcell. The shaft is in one of the numerous limestone members within the prevalent slaty rocks and is a few feet west of a belt of schistose rhyolite. The beds strike N. 5° W. and dip about 85° W. The Yellow Bird is reported to have made some shipments of argentiferous galena and cerusite. The best ore seen to have been soft, earthy yellowish material, partly cerusite, found in crevices in the fractured limestone.

From half a mile to a mile west of the Yellow Bird shaft, well up on the east slope of the ridge of Hiram Mountain, at an elevation of about 4,200 feet, are the workings on the Providencia claim of the Yellow Bird group. This deposit is of different character from any of those previously described. The ridge is composed mainly of blue-gray slaty schists which are mainly squeezed sedimentary rocks and which in general strike about N. 20° W. and dip 75°-80° W. The Providencia is on a bed of quartzite, 4 to 5 feet thick, that has been shattered and has the resulting irregular network of cracks filled with argentiferous chalcocite. The chalcocite, as seen in the open cut and in the small tunnels run into the deposit, has been partly altered to covellite and malachite. Some ore is reported to have been shipped from the Providencia, but all the work done is close to the surface. Presumably the chalcocite will give place at depth to chalcopyrite or bornite, but it is not possible to predict the depth at which the change will occur. The Providencia deposit is not large but appears to be more promising and better worth additional exploration than some of the silver-lead deposits in the limestone beds previously described.

About half a mile west of the Hiram Mountain ridge, on the edge of Altas Valley, is the Lanby group of claims, in pre-Cambrian granite. No persistent vein was seen, but the granite contains some small irregular figures that contain partly oxidized chalcopyrite and pyrite with some free gold.

Close to the road, a mile or two north of Lincoln camp, is an inclined shaft on a quartz lode in slate. This, I was informed, is on the Critia group. The dump shows much quartz, stained in part with carbonates of copper, but no ore.

A deposit of fluorite at the north end of the Sierrita Mountains, on the Neptune group, was not visited.

South of the section of the range examined, on its western slope, are the San Juan, McIntyre, and other groups of claims, which were not visited. Some silver ore is reported to have been shipped from

It must of course be recognized that any conclusion as to the future of the Papago district that can be drawn from so brief an examination as that made in 1920 is tentative and may be changed by future development. The general impression gained, however, is that the metallization has not been strong and that large deposits of ore probably do not exist, although additional prospecting may disclose bodies of comparatively small size. Good ore has undoubtedly been found at many places, but it has come from relatively small deposits and from shallow workings. It is highly probable that the small quantity of silver ore shipped or milled is material that has been enriched by the chemical action of descending solutions and is not representative of what may fairly be expected at depths of several hundred feet.

ORE DEPOSITS OF THE PIMA DISTRICT.

At the north end of the Pima district, about 18 miles from Tucson, is the Mineral Hill mine (Pl. XIX, 4), which belongs to the Mineral Hill Consolidated Copper Co., of Pittsburgh, Pa. This company, incorporated in 1904, is the successor to the Azurite Copper & Gold Mining Co. It owns or controls between 50 and 60 claims in the vicinity of Mineral Hill, including the Azurite, Plumed Knight, and Sunrise groups.

The mine now in operation is developed through a vertical shaft about 700 feet deep, with the principal levels at 500, 600, and 700 feet below the collar. No ore has been shipped from these workings, and the efforts of the company are confined entirely to prospecting and to blocking out such ore as has been found. Formerly, however, considerable oxidized copper ore was shipped from the now abandoned Azurite workings, in the upper part of the Mineral Hill deposit. The Azurite company is reported to have had two 30-ton water-jacket copper furnaces in operation prior to 1904 and to have produced ore to the value of over \$500,000. In 1916 the Pima district is credited with the production of 6,683,094 pounds of copper, of which "most" is stated to have come from the Azurite workings of the Mineral Hill Consolidated Copper Co.¹

About a quarter of a mile east-southeast of the Mineral Hill shaft is the Plumed Knight mine, formerly owned by the Pioneer Mining & Smelting Co. but now belonging to the Mineral Hill company. The workings of this mine are reported to be 350 feet deep and produced considerable oxidized copper ore above the 150-foot level, especially between 1907 and 1918.

The general geologic features in the vicinity of Mineral Hill are very roughly indicated in the accompanying diagrammatic sketch.

been increased in efficiency to a marked degree within the last few years. The cost of a well and pumping plant is considerable, and to the man without means it is almost as impossible to reclaim the desert land with a well and pump as it is to build dams across the streams, nevertheless there is a great deal of development of this kind and will continue to be. As reservoirs are built and hydro-electric power developed, this power becomes available for pumping and is the cheapest power which can be had for operating the pumps. It may thus be seen that the building of reservoirs, the development of gravity irrigation projects, will be the greatest factors in the development of lands by wells and pumps and in consequence will increase our available area of agricultural lands.

These factors may be discouraging to the homeseeker, but it is only right that he should understand fully the situation and should not have illusions of obtaining from the government or from the state a home under those same favorable conditions which the homeseekers had who settled the plains of Kansas or the prairies of the Dakotas during the past generation. To the homeseeker who has capital to live upon while he acquires title, who has a vision of the possibilities of the future, and can select land which some day will be in the path of some big irrigation project, there are still opportunities, but to the poor man who must produce a living from the land upon which he locates, the desert with all its charms is forbidding.

MINERAL WEALTH OF PAPAGO AND PIMA DISTRICTS DESCRIBED

Large bodies of lead-silver, copper and other ores, which are very accessible, characterize the Pima and Papago districts of the Sierrita mountains, a short distance from Tucson, according to a bulletin recently issued by the United States geological survey. The article, relating in detail the position and nature of orebodies in the Sierrita district, southwest of Tucson, was prepared as the result of a special survey conducted by F. L. Ransome.

Frequent cuts of the districts described are contained in the pamphlet. The Papago district is 3 miles southwest of Tucson, the Ajo and Sasabe roads being followed to reach this area. At King's ranch, on the Sasabe road, a branch road turns to the east and ascends the gentle slope of the foothill belt into the Papago mining district.

Long recognized as the location of valuable orebodies, hitherto comparatively undeveloped, although well explored, the Pima and Papago districts are believed to have been given recognition by the geological survey which may play an important part in their future development. At the geological survey gave sufficient recognition to the district this year assign a special engineering party to conduct an investigation and prepare a fully illustrated and charted pamphlet of 16 pages is held to be significant.

The Sierrita range is fully charted in the pamphlet, which declares its topography includes the following types of rock: Cambrian granite, limestone, granite, Mesozoic sediment and volcanic rocks, Mesozoic limestone, quarternary valley deposits.

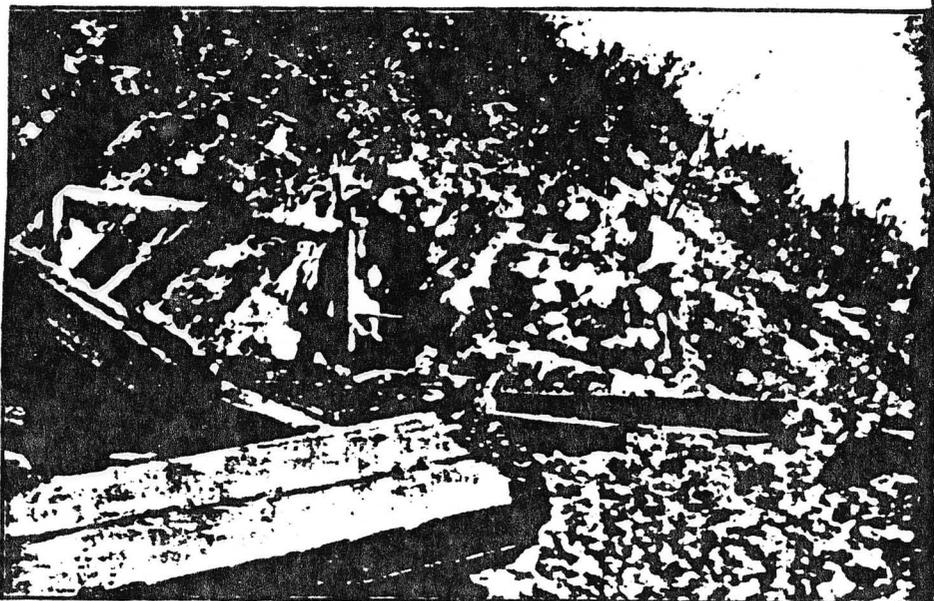
The Pima district, says the survey, is reached by a good road that runs southward from Tucson to Mineral hill and to Twin Buttes. Here a branch railway line

connects the districts. The following general information regarding the Sierrita range opens the report:

"The Sierrita mountains constitute one of the smaller of the nearly meridional mountain ranges of southern Arizona. They separate the Santa Cruz valley on the east from Altar valley on the west. The range has a length between 13 and 14 miles and a width roughly estimated at four miles. The height of the dominating summit, Samaniego peak, has, so far as known, not been accurately determined. Apparently no part of the range rises more than 2,000 or 3,000 feet above the upper margin of the flanking than 6,500 feet above sea level. Its slopes carry little or no timber, and in compari-

vision between the valleys of the Santa Cruz and Altar watersheds, is described as follows:

"The Sierrita mountains consist essentially of an intrusive granite core flanked by more or less metamorphosed rocks of sedimentary and eruptive origin. The flanking rocks are notably different in character on the two sides of the range. On the east are rather massive gray limestones, with quartzites, shales and andesite volcanic rocks. These rocks, folded and faulted, have been invaded by granite, and in places show pronounced contact metamorphism. On the west the rocks are prevalently schistose, have been more closely compressed, and have been affected by metamorphism of regional



Parcell Property in Southern Pima County

son with the Santa Rita mountains to the east or the Baboquivari range to the west, the Sierrita mountains are of minor topographical importance and are scenically unimpressive.

On the west side of the Sierrita mountains, mainly in a rather definite belt of foothills, is a group of prospects within what is known locally as the Papago district, although they appear to be included within what has also been called the Sierritas district. On the east side of the range lies the Pima district, within which are a number of mines that have produced considerable quantities of copper, zinc and lead-silver ores. These mines fall into three areal groups—those near Twin Buttes, on the south; those near Mineral hill, on the north, and those near the abandoned Olive camp, between Twin Buttes and Mineral hill. The ores near Mineral hill and Twin Buttes occur in typical contact deposits; those at Olive camp in narrow fissures. The Pima district was organized in 1877."

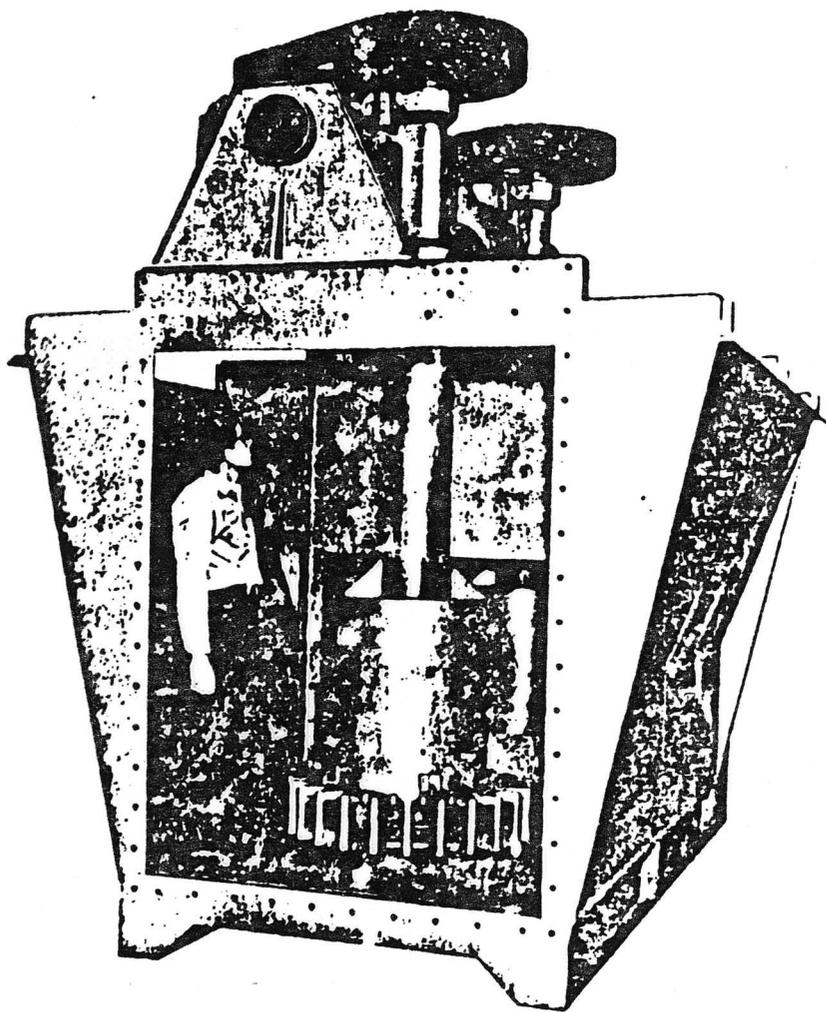
Special recognition is given by the writer of the pamphlet to the courtesies shown him in Tucson by Judge S. W. Purcell, Dean G. M. Butler and John Carter Anderson, who, he states, gave him substantial aid in acquiring the information of which his article is composed.

The general geological composition and form of the Sierritas, which form the di-

character in contrast with the more intense but local contact action on the east. These schists are varied in character and include rocks that were at one time conglomerate, sandstone, shale, limestone, rhyolite, and tuff. They appear to be older than the beds to the east, but fossils were found in them, and consequently their age is uncertain.

"The crest and higher slopes of the range were not closely examined, but the views and the material in the stream beds indicate that the entire western slope, from the crest down to the foothills, is underlain by a rather fine-grained biotite granite which, as a rule, is more or less decomposed and weathers to comparatively smooth brown surfaces with few rugged outcrops. The rock resembles quartz monzonite, but thin sections show that it is composed chiefly of alkali feldspar and quartz, with subordinate plagioclase and a little biotite. It is probably to be classed as a granite.

"As shown by stream boulders on the east side of the range, that slope also is composed largely of a similar fine-grained granite rock. A specimen from one of these boulders near Magee's ranch appears to be a rock very close to the dividing line between granite and quartz monzonite. Thin sections show it to contain a slightly more abundant plagioclase than the specimens examined from the west



300 cubic foot 600H Denver flotation cell

grow even further. If the brand new 30,000 tpd mill at San Manuel in 1956 needed 480 flotation cells for rougher flotation (four sections, with six banks of machines, each containing 20 cells of 48 inch Agitairs, with a 357 tph output per section), the 1973 mill at Gibraltar, with a 20% greater capacity, employs in the same circuit only forty-eight 300 cubic foot 600H Denver flotation cells (three sections, with one bank of 16 flotation cells).

Other modern plants, such as Lornex, with a 38,000 ton daily capacity inaugurated in 1972, use four banks of eight 300 cubic foot Denver 600H for rougher flotation, and another four section of 10-cell identical machines for scavenging. Island Copper, with 33,000 tons daily capacity and 21 minutes of rougher flotation and scavenging time, uses for this purpose 10 banks of 14 cell 300 cubic foot machines.

Such a drastic increase in the size of flotation cells along with a substantial decrease in the number of processing sections in the mill are plainly justified by substantial savings in equipment costs, construction and foundation costs, as well as in piping, electrical and control equipment and instrumentation. Also operational costs can be reduced somewhat. Shoemaker and Taylor,⁴¹ for instance, claim that in a 20,000 tpd flotation plant by only using the largest available equipment as compared with conventional plants, some 16 percent of costs could be saved on account of equipment and construction savings, while another 16 percent could be saved if some other modern features of design were incorporated. Here is the breakdown of their costs:⁴¹

TABLE 5.2
COMPARATIVE COSTS FOR A 20,000 TPD
COPPER CONCENTRATOR
(expressed in millions of dollars)

	<i>Conventional</i>	<i>Large Equipment</i>	<i>1970 Design</i>
Yard & Nonprocess	4.8	4.8	4.8
Coarse Ore	4.0	4.0	3.7
Fine Ore	5.1	4.6	3.8
Concentrator	15.5	11.1	7.2
Process Water	0.3	0.3	0.3
Reclaim Water	0.7	0.7	0.7
Tailings Disposal	0.6	0.6	0.6
Total Project	\$31.0	\$26.1	\$21.0

TABLE 6.2

RHENIUM CONTENT OF PORPHYRY COPPERS

(expressed in ppm on 100% MoS₂)

North America		South America	
McGill	1,600	Chuquicamata	230
San Manuel	1,000	El Teniente	440
Chino	800	El Salvador	570
Cities Service	600	Andina	380
Twin Buttes	600	La Disputada	350
Puma	600	Toquepala	325
Mission	600	Argentinian porph.	170
Bagdad	200	<i>Communist World</i>	
Paperanza	200	Kounrad	510
	180	Almalyk	290
Mineral Park	60	Kadzharan	300
Island Copper	2,000	Aigedzor	1,000
Brenda	80	Dastakert	80
Cananea	700	Medet	125

However, at the present time only 35,000 tons of molybdenite containing some 37,500 pounds of rhenium are being recovered from porphyry coppers per year. Since the market for rhenium is still very limited — mostly because of the insecurity of supplies — only some molybdenite concentrates, particularly those with a high rhenium content, are being processed for rhenium recovery. The largest rhenium producer in the world is the United States with an estimated output of 6,000 pounds per year, based mainly on Kennecott production in Utah and in Cleveland. The second world producer is considered to be the Soviet Union, which established its production at Balkhash in 1948. The estimated output from primary sources is about 1,400 pounds per year, but this figure may be considerably higher if some other additional sources are considered. The Russians have done very extensive research in rhenium chemistry and metallurgy and apparently possess quite an advanced technology.

Canada will very soon be a very prominent rhenium producer or exporter due to its unique high-grade orebody at Island Copper. Although at this writing no specific arrangements for rhenium recovery from molybdenite are known, they must be coming very soon simply

TABLE 6.3

RHENIUM RESOURCES AND PRODUCTION FROM PORPHYRY COPPERS

Areas	Resources			Production		
	Molybdenite Reserves - tons	Average R _e Content Percent *	Rhenium Content - pounds	Molybdenite Production - tons	Potential R _e Production - pounds	Actual Production - pounds
United States	1,700,000	0.04	1,360,000	17,000	22,200	5,900
Canada	350,000	0.05	350,000	6,800	6,800	2,000**
Chile	2,150,000	0.04	1,720,000	7,000	5,600	1,500***
Latin America	850,000	0.03	510,000	750	225	-
Soviet Union	180,000	0.04	144,000	3,000	2,400	1,400
Others	270,000	0.03	162,000	450	250	-
	5,500,000	0.038	4,246,000	35,000	37,500	10,800

* Calculated on 100% MoS₂
 ** Not actually recovered, but will be very soon
 *** Recovered from Chilean molybdenite concentrates, but not necessarily in Chile.

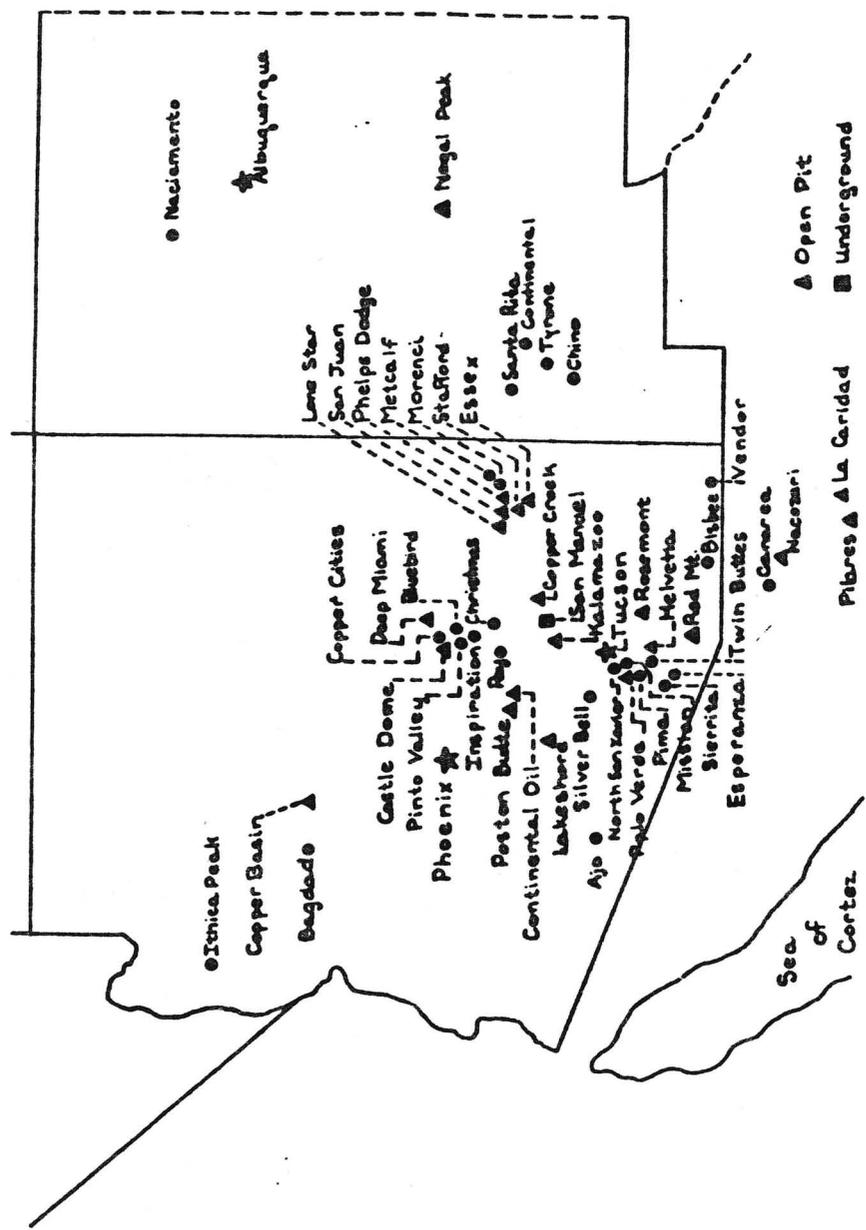


Fig. 3.4 Southwestern Copper Porphyries (reproduced from World Mining).

Manuel copper reserves were greatly expanded by the purchase of the Kalamazoo property (for \$27 million), which constitutes a fault displacement segment of the San Manuel orebody. This acquisition triggered a new expansion of operations to 62,500 tpd. milling capacity and an annual output of copper which will reach 180,000 tons in 1974 at a cost of \$250 million. Thus San Manuel will undisputably become the largest copper producer in Arizona.

The Morenci property of Phelps Dodge in Arizona and Butte of Anaconda in Montana still continue to be very important North American deposits although their copper grades are considerably lower. These old mining districts have passed through all phases of modern mining and milling and still vigorously produce copper from constantly discovered new reserves. At Metcalf, across the canyon and a few miles north of the Morenci pit, Phelps Dodge is developing a new mine²⁴ where another 350 million tons of ore have been found. Through 1972 some 46 million tons of overburden have been removed, and a 30,000 tpd. mining production will soon be on stream.

The early seventies were characterized by new copper ventures in Arizona, which reflect the American decision to rely more on its own production of the red metal in view of the changing world situation in the supply of this metal. The most important producers to inaugurate large new mills are Duval, with its extremely lean ore at Sierrita, and Anaconda at Twin Buttes, both in Arizona. Sierrita became economically feasible because of her large size and important molybdenum by-product recovery. Twin Buttes is now a joint venture with AMAX (after it acquired Banner) known under the name of Anamax. Both operations are based on very large ore reserves.

Among the properties now in active preparation for production are Pinto Valley, a large 40,000 tpd. milling operation owned by Cities Services, Lakeshore, a 9,000 tpd. Hecla operation, and the already mentioned Metcalf property of Phelps Dodge — all in Arizona.

The other area of great importance is the Pima-Mission-San Javier complex belonging to Cyprus, ASARCO and AMAX (former Banner interests). This alluvial-covered area contains probably as much as one billion tons of 0.5 percent copper ore, plus some molybdenite values. Portions of it have already been actively mined (Pima, Mission), with the exception of San Javier which has undergone only superficial stripping for oxide values.

The North American porphyry coppers extend from Arizona and Nevada farther to the north and northwest, into Utah, Idaho and

cent copper ore. There is little doubt that this region may show additional copper porphyries.

United States Porphyries

Further to the north of the Mexican border lies a cluster of southwestern American copper porphyries, in the states of Arizona, New Mexico and Nevada. This can be considered the most important concentration of copper porphyries in the world, and an almost complete list of them and their geographical locations are given respectively in Table 3.2 and Fig. 3.4. Only the Chilean porphyries exceed in copper reserves those of the American Southwest, but then while the Chilean copperbelt spreads over more than 1,000 miles, southwest American coppers are found within a perimeter of 400 miles.

The North American copper porphyries are also the best studied and described orebodies. A few years ago an excellent summary of information available up to the mid-sixties was published by the University of Arizona in its "Geology of the Porphyry Copper Deposits of Southwestern North America."¹² Then, of course, there is the more updated study of Lowell and Guilbert published recently.¹³

As Table 3.2 shows, the largest known copper porphyry deposit in the United States should still be considered the Kennecott Company's Bingham Canyon Mine in the state of Utah. Although the official ore reserves are not available, from recent expansion of operations it is obvious that this large copper producer has at least a few decades to go, and at the present rate of 35 million tons of ore per year and 260,000 tpy. copper output, this means that the orebody is in the plus one billion ton range as far as the mineralized area is concerned, and probably as much as 10 million tons of metallic copper as far as production will go.*

The other two large mineralized areas on which official reports exist are Safford and San Manuel, both in Arizona. Safford is a very large and very low-grade region whose reserves are close to two billion tons, but assaying only 0.4 percent copper. This low-grade is still a limiting factor in future production plans. But the other, San Manuel deposit belonging to Magma Copper has been in production since 1956, and in its time was some kind of technological breakthrough for low-grade copper ores assaying only 0.6 percent copper. The San

* The only official statement about Kennecott Copper Corporation ore reserves is that in 1971 the operating properties (in Utah, Ray, Chino and McGill) had 3 billion tons in proven ore reserves which contained 18,000,000 tons of recoverable copper.¹⁴

TABLE 3.2
DIRECTORY OF WORLD PORPHYRY COPPERS (CONTINUED)

NAME & LOCATION	PROPERTY OF	OPENED	ESTIMATED RESERVES		
			Ore 10 ⁶	Cu 10 ⁴	Mo tons
NORTH AMERICA					
1. Bingham, Utah	Kennecott	1906	> 1,000***	10,000,000	750,000
2. San Manuel, Arizona	Magma Copper	1956	1,000	7,500,000	150,000
3. Morenci, Arizona	Phelps Dodge	1942	> 500***	4,400,000	35,000
4. Butte, Montana	Anaconda	1964	> 500***	4,000,000	—
5. Twin Buttes, Arizona	Anaconda-AMAX	1970	800	5,900,000	135,000
6. Sierrita, Arizona	Duval (Pennzoil)	1970	414	1,500,000	150,000
7. Pima, Arizona	Cyprus Mines	1957	200	1,100,000	26,000
8. New Cornelia, Ariz.	Phelps Dodge	1917	< 500	3,750,000	—
9. Ray, Arizona	Kennecott	1955	< 500***	4,000,000	50,000
10. Chino, New Mexico	Kennecott	1908	< 500***	4,500,000	40,000
11. McGill, Nevada	Kennecott	1969	< 500***	4,600,000	30,000
12. Inspiration, Arizona	Phelps Dodge	1915	< 500	4,000,000	—
13. Mission, Arizona	Inspiration	1961	> 500***	3,500,000	100,000
14. Copper Queen, Arizona	ASARCO	1885	> 100	500,000	—
15. Mineral Park, Arizona	Phelps Dodge	1964	> 100	500,000	40,000
16. Esperanza, Arizona	Duval (Pennzoil)	1958	> 100	500,000	28,000
17. Miami, Arizona	Cities Service	1954	> 100	600,000	5,000
18. Silver Bell, Arizona	ASARCO	1954	> 100	450,000	—
19. Bagdad, Arizona	Cyprus Mines	1940	265	2,120,000	50,000
20. Christmas, Arizona	Inspiration	1962	65	325,000	—
21. Battle Mountain, Ariz.	Duval (Pennzoil)	1967	55	500,000	—
22. Yerington, Nevada	Anaconda	1953	448	3,200,000	—
23. Lakeshore, Arizona	Cities Service	••	350	1,400,000	35,000
24. Pinto Valley, Ariz.	Kennecott	••	2,000	8,000,000	—
25. Safford, Arizona	Continental Oil	••	500	2,500,000	—
26. Florence, Arizona	Phelps Dodge	••	350	2,700,000	—
27. Metcalf, Arizona	Banner-AMAX	••	363	2,360,000	—
28. Helvetia, Arizona	Banner-AMAX	••	95	700,000	—
29. Palo Verde, Arizona	Banner-AMAX	••	—	—	—
TOTAL UNITED STATES			13,000	86,000,000	1,700,000

• exploration stage

•• in development stage

*** Rough estimates

250 tpd plant and used for leaching, while the calcines, high in iron, will be pelletized and used for copper cementation.

Helps Dodge, in addition to its old operation at Morenci, which has a 120,000 tpy copper output, is now developing a new property at Metcalf, only a few miles to the north of the Morenci pit. This will be developed by 1975 into a 30,000 tpd milling operation with a 50,000 tpy copper output at a cost of about \$180 million. This is a significant addition to the company's copper output, particularly taking into consideration that the expansion of the Tyrone operation in New Mexico was only finished in 1972, which raised the daily capacity of that plant from 30,000 tpd to 48,000 tpd and the copper output from 60,000 tpy to 100,000 tpy. With its properties at New Cornelia and Copper Queen still active and with the development of Safford, a large, 250,000 million ton 0.9% Cu orebody (not to be confused with Kennecott's low-grade property of the same name), this company is developing into one of the largest copper producers in the United States. Its present copper production capacity is already 330,000 tpy, and with new investments may soon reach 400,000 tpy, only one step behind Kennecott, so far the largest copper producer in the United States.

Inspiration, with its subsidiary at Christmas, continues to be the most integrated plant in Arizona. It uses three flowsheets for the treatment of its ores, including flotation and hydrometallurgical methods, recovers by-product molybdenite and processes its copper to refined and mercantile products such as rods. It also custom-smelts concentrates from other properties, for which reason it is actively engaged in pollution control studies.

A very interesting development has occurred at Bagdad which for many years operated a small but very efficient operation northwest of Phoenix. This company, which just recently introduced a unique process for high-purity copper production from cement copper (by using hydrogen precipitation) and which was one of the first to introduce ion exchange techniques for dump leaching practices, has now established that it is sitting on a 265 million ton orebody and wants to expand operations from a 6,000 tpd scale to 30,000 tpd. For this it needed about \$100 million. The problem of financing was solved by merging with Cyprus, which already owns 50.01% of Pima and has some other mining interests.

In conclusion, it can be said that the southwestern American copper porphyries are fulfilling their goal of basic suppliers for American copper needs. Their capacity is rapidly expanding, and from the present

level of 1,650,000 tons per year will reach 2,000,000 tpy by 1975 or 1976. Simultaneously a great deal of research and development work is being done for the solution of pollution problems, particularly through emission controls and the development of new processes. These problems, related to strict government regulations, at one time slowed down the development of new projects, but firm copper prices, greater demand for the red metal in this country and particularly foreign investment conditions and strategic considerations are gradually and confidently reversing this trend.

Chilean Production

In copper porphyries, Chilean copper output is next in importance to that of the United States as Table 4.3 shows. In recent years the Chilean copper industry has lived with a very difficult and complex situation caused by an extensive program for her expansion, political take over of this industry by Marxists during the short-lived Allende government, and an almost economic bankruptcy in which Chile found herself as a result of experimentation with "the road down to socialism."

While it is too early at the time of this writing (October 1973) to predict how fast the new approach of the military Junta will affect the recovery of the Chilean copper industry, it should be stressed that Chile has one of the most developed and solid raw materials bases, a relatively new and modern industrial structure, and uses one of the most advanced technologies in copper production in the world. All these factors are important prerequisites for a solid advance and future increase of Chilean copper output.

It should be stressed again that Chile is in possession of the world's largest copper reserves, some 90 million tons of metallic copper at this counting. This is almost one quarter of the world total, and incidentally these reserves have a great potential for growth. Secondly, Chilean copper ores are rich not only in copper but in molybdenum content as well. At the greatest Chilean copper deposits the ore mined always contains at least 1.7 percent copper and occasionally surpasses two percent. This is about 3 to 4 times more than in comparable deposits in the United States, Canada and Russia. Moreover, molybdenum by-product content in Chilean ore ranges anywhere from 0.03 to 0.05 percent Mo, which is at least two to three times above the average in other countries. Thus, the quality and quantity of Chilean copper ores are obviously a prime attraction to any investor.

Chileans have always realized that their copper potential was not

ASSAYS

BLACK BEAUTY

30 So. Main St.
P. O. Box 1889



Jacobs Assay Office

PHONE MA 2-0812

Registered Assayers

85702 Tucson, Arizona

July 15th, 1966

Sample Submitted by Mr.

M. W. Combs

Sample Marked	GOLD Ozs. per ton ore	GOLD Value per ton ore *	SILVER Ozs. per ton ore	COPPER Percent Wet Assay	LEAD Percent Wet Assay	Per Cent Wet Assay	Per Cent Wet Assay	Per Cent Wet Assay
40	<i>0.03</i>	<i>1.05</i>	<i>160⁵⁷/₁₀</i>	<i>2.0%</i>	<i>0.1%</i>	<i>12.0%</i>	<i>1.0%</i>	<i>1.0%</i>
41	<i>0.03</i>	<i>1.05</i>	<i>65⁴/₁₀</i>	<i>1.0%</i>	<i>0.1%</i>	<i>1.0%</i>	<i>1.0%</i>	<i>1.0%</i>
<i>[Handwritten notes and scribbles across the table rows]</i>								

Gold Figured \$35.00 per oz. Troy

as \$ *5.00* +

Very respectfully,

Ben P. Jacobs

Jacobs Assay Office

Registered Assayers



Tucson, Arizona, 24 Dec. 1979

Sample Submitted by Mr. M. W. Combs

Sample Marked	GOLD		SILVER		COPPER Per cent Wet Assay	LEAD Per cent Wet Assay	Per cent Wet Assay	Per cent Wet Assay	Per cent Wet Assay
	Ozs. per ton ore	Value per ton ore*	Ozs. per ton ore	Ozs. per ton ore					
#1.0	0.040	16 ⁰⁰	64.85						
#1.8	0.040	16 ⁰⁰	40.90						

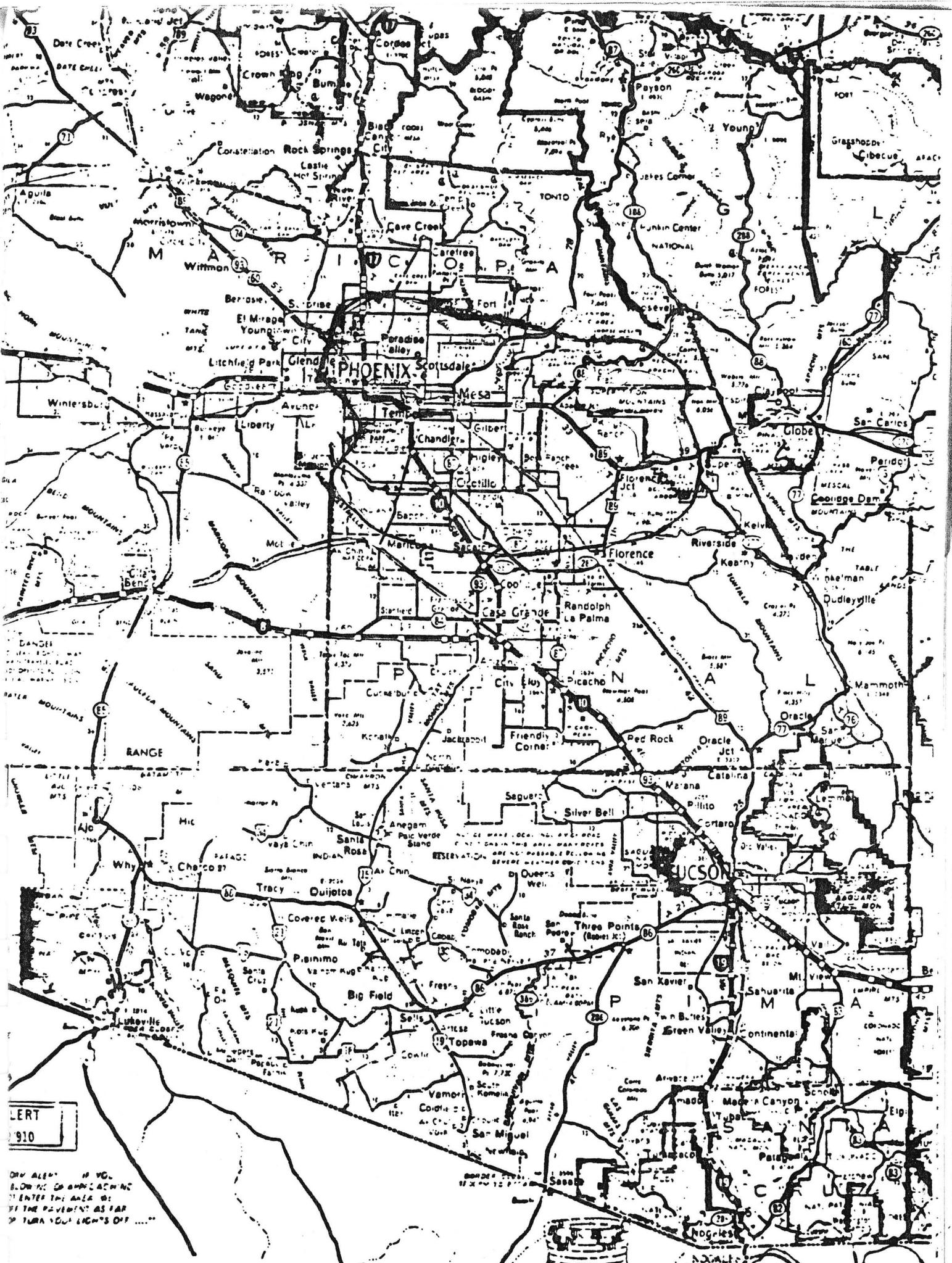
*Gold Figured ^{400.00}~~200.00~~ per oz. Troy
Charges \$ 12⁰⁰

Very respectfully,
M. W. Jacobs

MAPS

ARIZONA MAP

Showing property sites



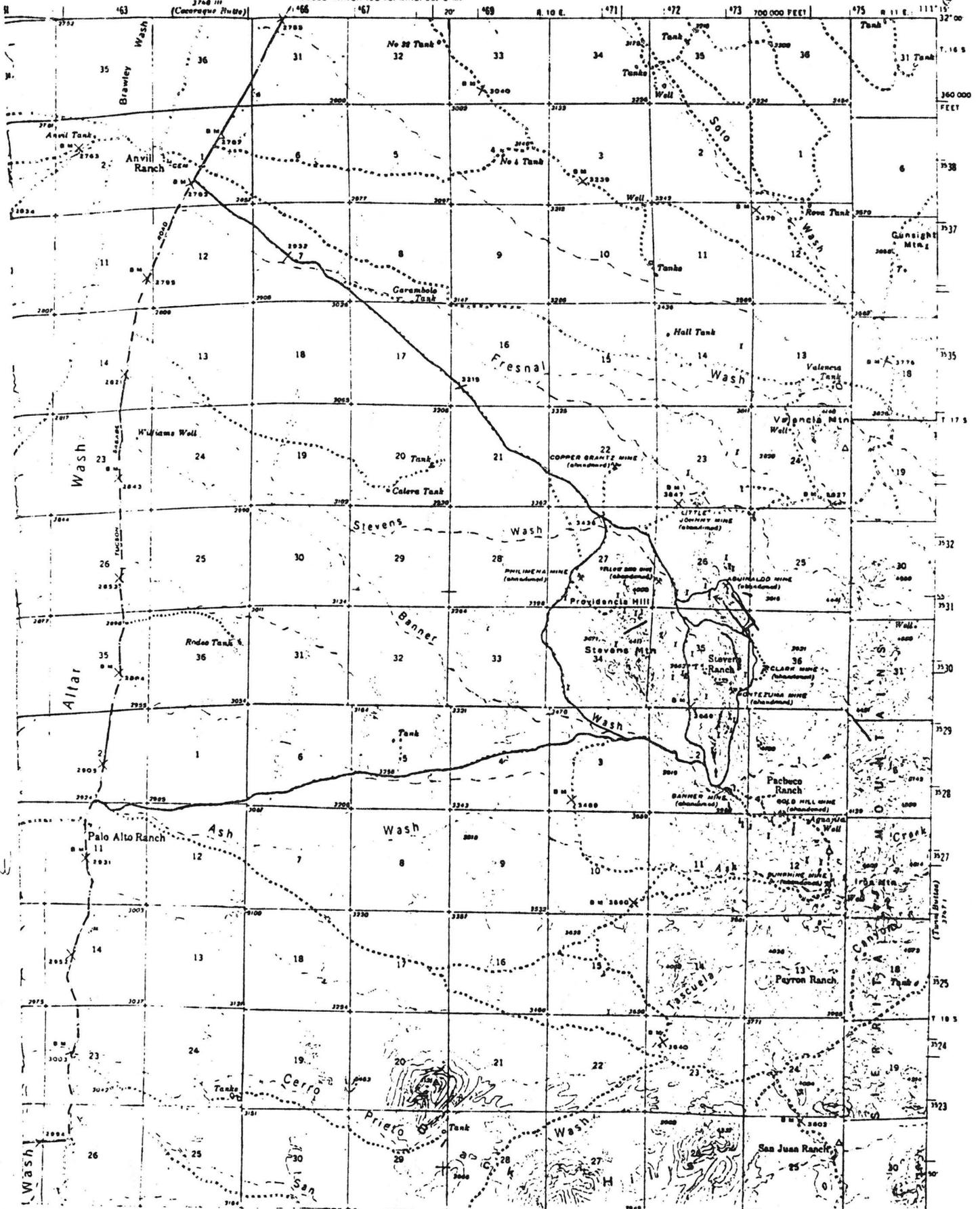
LITHO COLORED WALL MAP 47"x54". Price 65.75
 by ADOT 20c So. 17th Ave

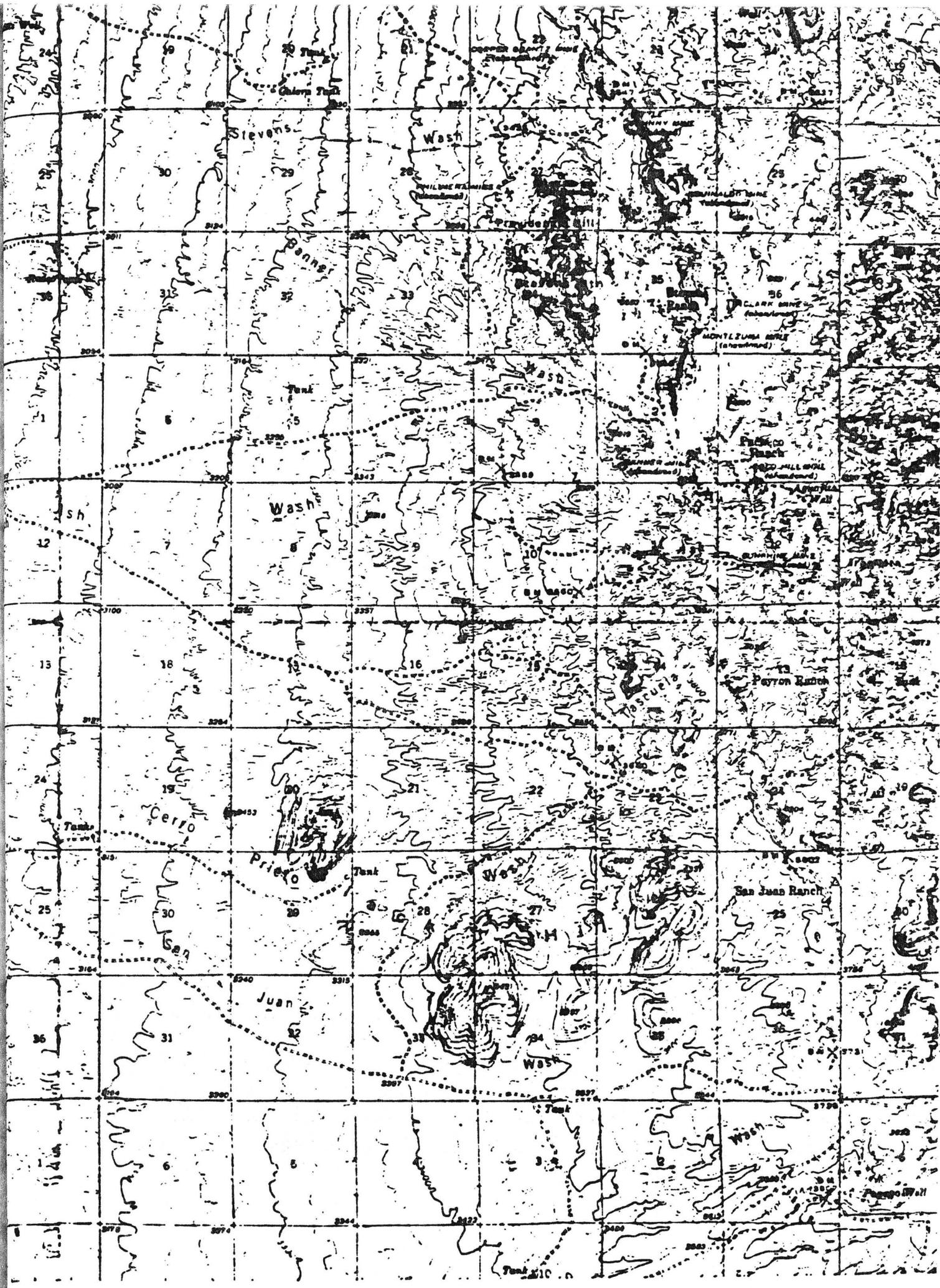
ALERT
 1910

DRY AREA - IF YOU
 SLOWLY OR SLOWLY
 ENTER THE AREA DO
 NOT TURN YOUR LIGHTS OFF

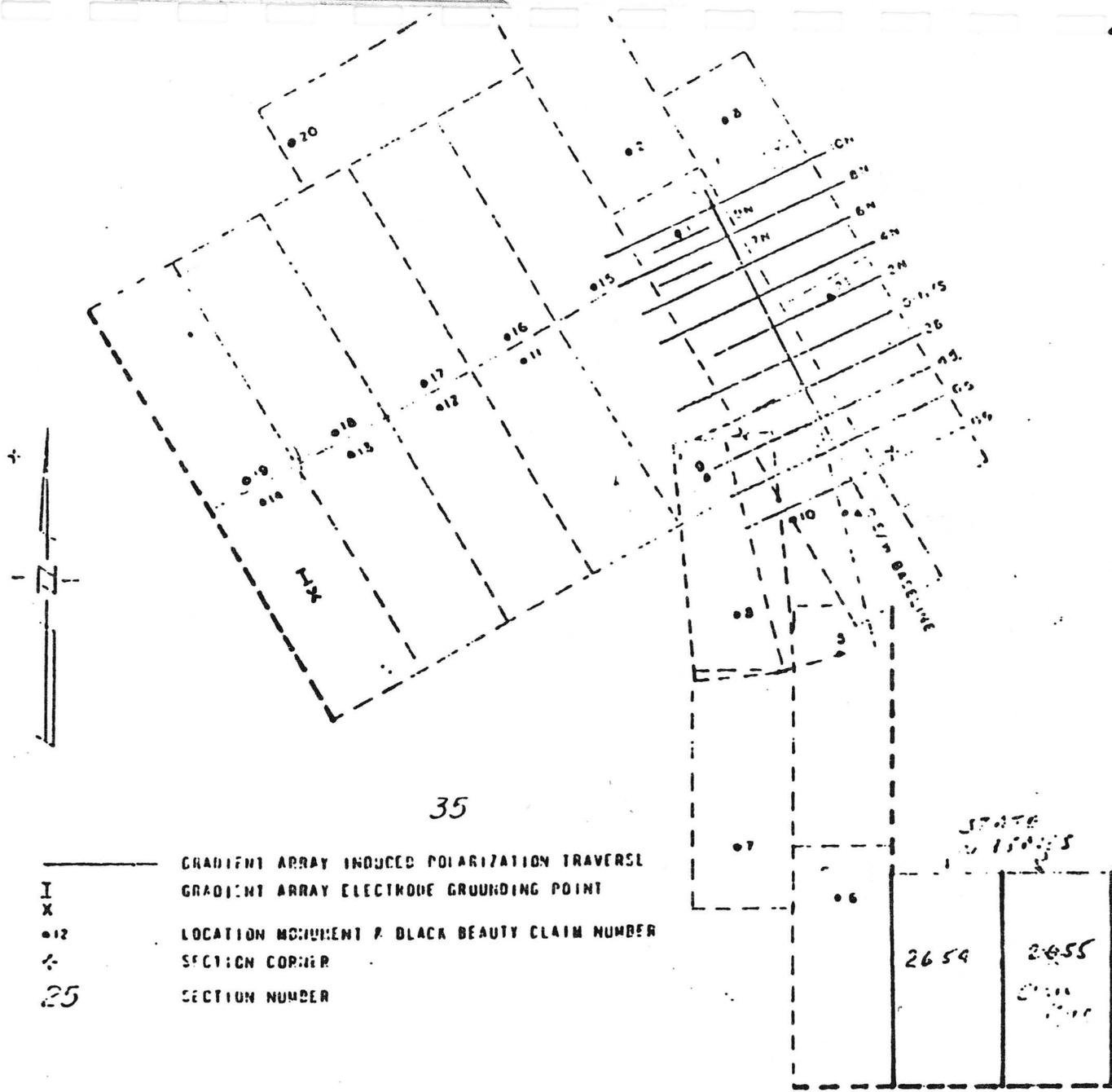
ARIZONA
(PIMA COUNTY)
PALO ALTO RANCH QUADRANGLE
15-MINUTE SERIES

TUCSON 30 MI.
RODLES RANCH 1/2 SEC. ARIZ. 881 6 MI.

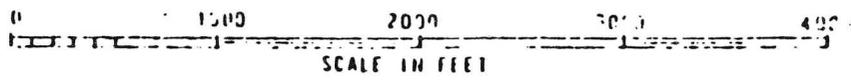




KEY PERSONNEL



- GRADIENT ARRAY INDUCED POLARIZATION TRAVERSE
- GRADIENT ARRAY ELECTRODE GROUNDING POINT
- 12 LOCATION MONUMENT & BLACK BEAUTY CLAIM NUMBER
- ⊕ SECTION CORNER
- 25 SECTION NUMBER



STATE OF MISSISSIPPI	
2654	2655

MERIT CLEVELAND

MERIT CLEVELAND, President of Merit Mines, Inc. and Chairman of the Board of Directors, has excelled in the fields of architecture, business consulting and management training. She has also served on the Board of Directors of a number of Corporations including three mining companies: Iron Horse Mining Corp., Azo Mined Products, and Transenergy Corp., all of Arizona.

Marketing has been a strong point with Ms. Cleveland who has successfully negotiated product sales to foreign countries and the military.

Leadership as a business woman has also been demonstrated in work with non-profit organizations. Having served on the Board of Directors of a number of national organizations, she is currently Treasurer of the Board of Directors of Youth Energy Network, a National Organization for outstanding young people based in San Diego County, California.

RICHARD WELLS

RICHARD WELLS, Vice President of Operations and Vice President of the Board of Directors, has operated mining installations in Ohio, Florida, Arizona and four African countries. His earlier years as a General Contractor served him well in assisting Phelps Dodge in the building of the homes in the abandoned mining areas of Morenci, Arizona. He was one of the Americans who worked in Ghana to build up the country when Shirley Temple Black was Ambassador. In the four African countries he crushed rock to build over 800 miles of railroads. Mr. Wells is also the owner and executive officer of Wellco Equipment Sales and Leasing Co., Sand & Sand Town of Arizona, Sand & Sand Town of Ohio, Sand and Sand Town of Florida, Sand & Sand Town International and various limestone and granite quarries.

SIR DONALD E. SULLINS

SIR DONALD E. SULLINS, Secretary of the Board of Directors, is the President and major stock holder of Sullins Electronics, a California based Corporation that manufactures edge card connectors. Sir Donald Sullins' climb to a prominent place in the connector industry is a true Horatio Alger story...Sir Don started his operation in a shed in San Marcos less than ten years ago and now operates from a 35,000 sq. ft. facility and has made a habit of doubling or nearly doubling his production each year. The ingenuity and foresight that has proved successful at Sullins Electronics is a welcome addition to the Merit Mines, Inc. Board of Directors. Sir Don was knighted by the Knights of Malta for his outstanding humanitarian efforts and now serves the organization as an Ambassador at Large.

DONALD E. EVANS

DONALD E. EVANS, Vice President of Finance and Treasurer of the Board of Directors, has a degree in business, is Treasurer of Citation International Consultants and has served on the Board of Directors of Palmer Research & Development Corp., and has worked in the mining and mineral recovery field for nearly 20 years together with the field of construction. Mr Evans carries a MSHA Instructor certification. Mr. Evans' keen perception and careful attention to detail makes him an outstanding choice for corporate financial officer. He is currently in management with Bigelow Construction Co. and has worked with Exxon, Azo Mined Products Co., Inc. and Transenergy Associates.

STEPHEN B. PALMER

STEPHEN B. PALMER, Vice President of Research & Development and Vice President of the Board of Directors, is the Chief Executive Officer of Citation International Consultants, and has since its incorporation in Arizona in 1974. Mr Palmer has worked on such projects as the "Recycling of Copper Scrap by Electrowinning," for clients in Zambia; "Gulf of California Study Project" for Thor International Energy and Thor Refining Corp.; "Removal of Gold from Brine by Electro-Harmonics" for 3A R & D, and Fora Oil Corp.; "Nuclear-Geothermics" for Transenergy Corp.; "How to Operate a Small Precious Metals Mine in the Southwest" for Span-A-Roma, Inc.; "Precious Metals Removal by Cyanidation followed by Electrolytic Refining" for IFEX International in Mexico. Non-metal projects included other than Oil has been "Removal of 100 million tons of Diatomaceous Earth in 20 years" for Azo Mined Products Co., Inc.

Publications include: Geothermal World Directory of 1972, Geothermal Energy Magazine, pg. 21, December 1973, and Gold Recovery, published by Merit Books of California, September 1980.

Mr. Plamer also carries an MSHA Instructor certification.

DAVID A. CHAPPIE, PH.D.

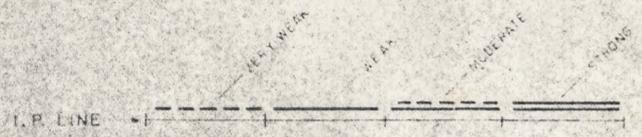
DAVID A. CHAPPIE, PH.D., Operations Coordinator, was selected for his unique ability to assess details without losing the visionary scope of administration. Dr. Chappie earned a doctorate in Leadership and Human Behavior from United States International University (1972). Dr. Chappie has extensive experience in management, private and public sectors. He owned and operated a successful travel business and has had fifteen years of management experience in education. Currently Dr. Chappie serves as the Dean of Students at Palomar Community College in San Marcos, California. He is the administrator in charge of all student services. He has shown ingenuity, perception and flexibility in managing a staff that was hired and trained to meet the needs of a diverse student body which grew from 8,000 to 21,000 during his term of 8 years at the college. Sound management of a multi-million dollar budget has by necessity been a critical issue upon which his success has been based.

TOM McCRITE

TOM McCRITE, Heavy Equipment Maintenance, has been in heavy equipment repair for almost 25 years. He has owned, operated and repaired loaders, on and off road trucks, crawlers, graders, drill rigs, and crushers. As Field Service Representative for Empire Machinery, the Arizona Caterpillar dealer, Mr. McCrite serviced customer equipment all over the state including supervising the restoration of heavy equipment that has been idle for 2 years at the Christmas Mine. He is MSHA certified in Mining Safety with heavy equipment. He resigned from Empire to buy a land tillage company, but negotiations to purchase were cancelled. Mr McCrite spent six months as a spread mechanic for Tierra West Contractors maintaining 28 pieces of caterpillar equipment, and is currently Field Service Representative for the Caterpillar dealer for the State of Oklahoma.



RELATIVE ANOMALY STRENGTH



X PROSPECT



PIMA COUNTY, ARIZONA

 HEINRICH'S GEOEXPLORATION CO. <small>PHYSICAL PROPERTY</small>	
WEST SIERRITA AREA INDUCED POLARIZATION LOCATION & INTERPRETATION PLAN FOR	
MOUNTAIN COPPER COMPANY	
Scale 1" = 1000'	Date DEC 1966

APPARENT RESISTIVITY CONTOURS
 INDUCED POLARIZATION SURVEY
 of
 AGUINALDO AREA
 PIMA COUNTY, ARIZONA
 for
 NOKOTA-BRIDGER-BRUCE
 by
 HEINRICHS GEOEXPLORATION COMPANY
 Job number 902-74 September 1974



Sending Dipole grounded at 30W
 and 30E on Line 0-N/S.
 Frequencies: 0.3 & 3.0 Hz
 Contour interval logarithmic
 Plot points (at receiving dipole
 midpoint).
 • 100' dipoles.
 x 33 1/2' dipoles (not contoured)

