**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.

03/20/90

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: OKLAHOMA GROUP

ALTERNATE NAMES:
VAUGHN PROPERTY
TROXEL MINING PROPERTY
GREENHAW GROUP
ALTO GROUP

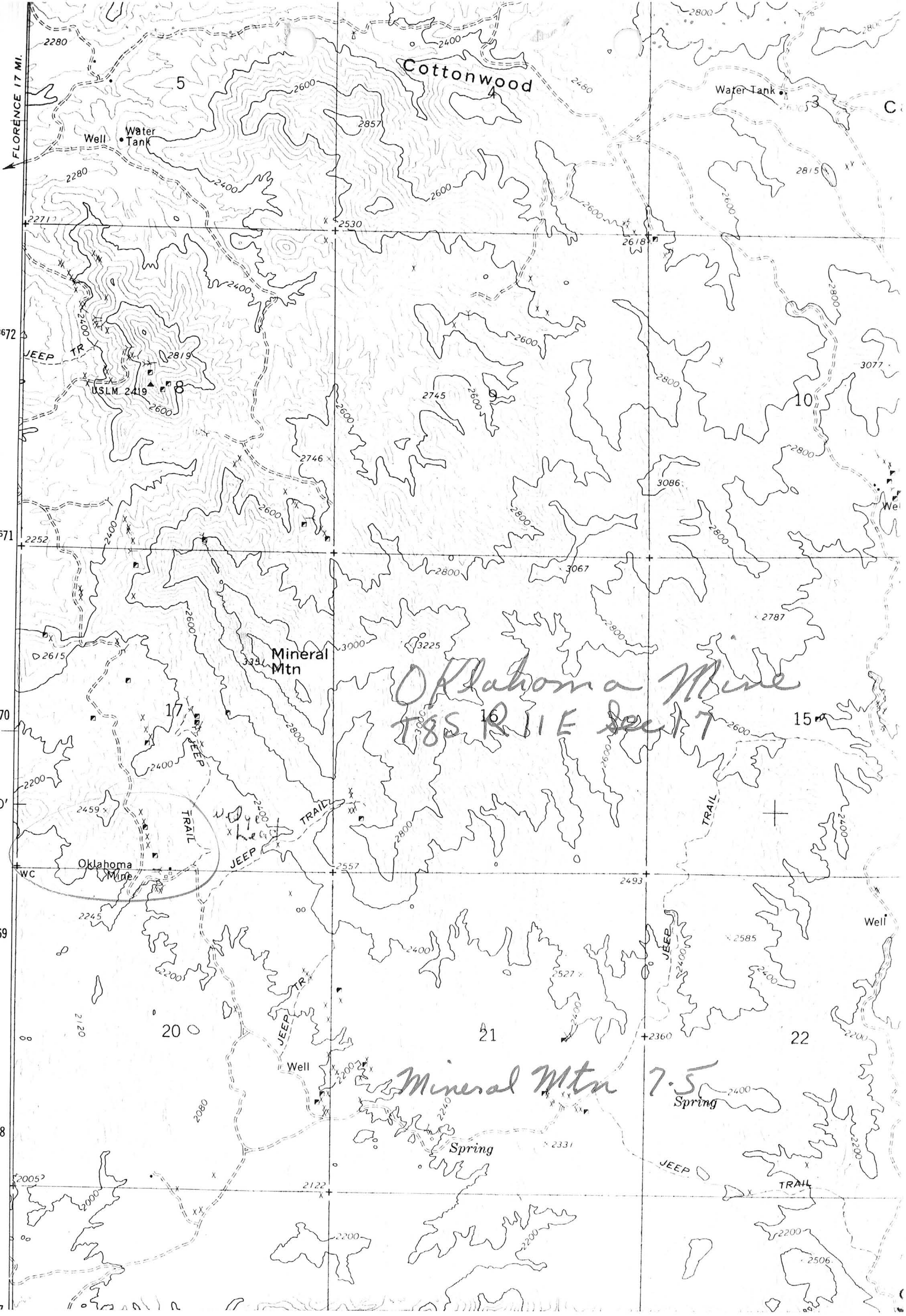
PINAL COUNTY MILS NUMBER: 111

LOCATION: TOWNSHIP 3 S RANGE 11 E SECTION 17 QUARTER SW
LATITUDE: N 33DEG 09MIN 50SEC LONGITUDE: W 111DEG 14MIN 35SEC
TOPO MAP NAME: MINERAL MTN - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:
LEAD
ZINC
COPPER
GOLD
SILVER

BIBLIOGRAPHY:
ADMMR U FILE, PB 5+6+7+8+9
ADMMR OKLAHOMA GROUP FILE
SCHMIDT, EBERHARD, GEOL. OF MINERAL MTN AREA
PINAL CO. MS THESIS, GEO FILE
ADMMR COLVOCORESSES FILE-MINERAL HILL
USGS OPEN FILE RPT 78-468; 1978



Oklahoma Mine
T8S R11E ~~Sec 17~~

w Dye Lead

Mineral Mtn 7.5

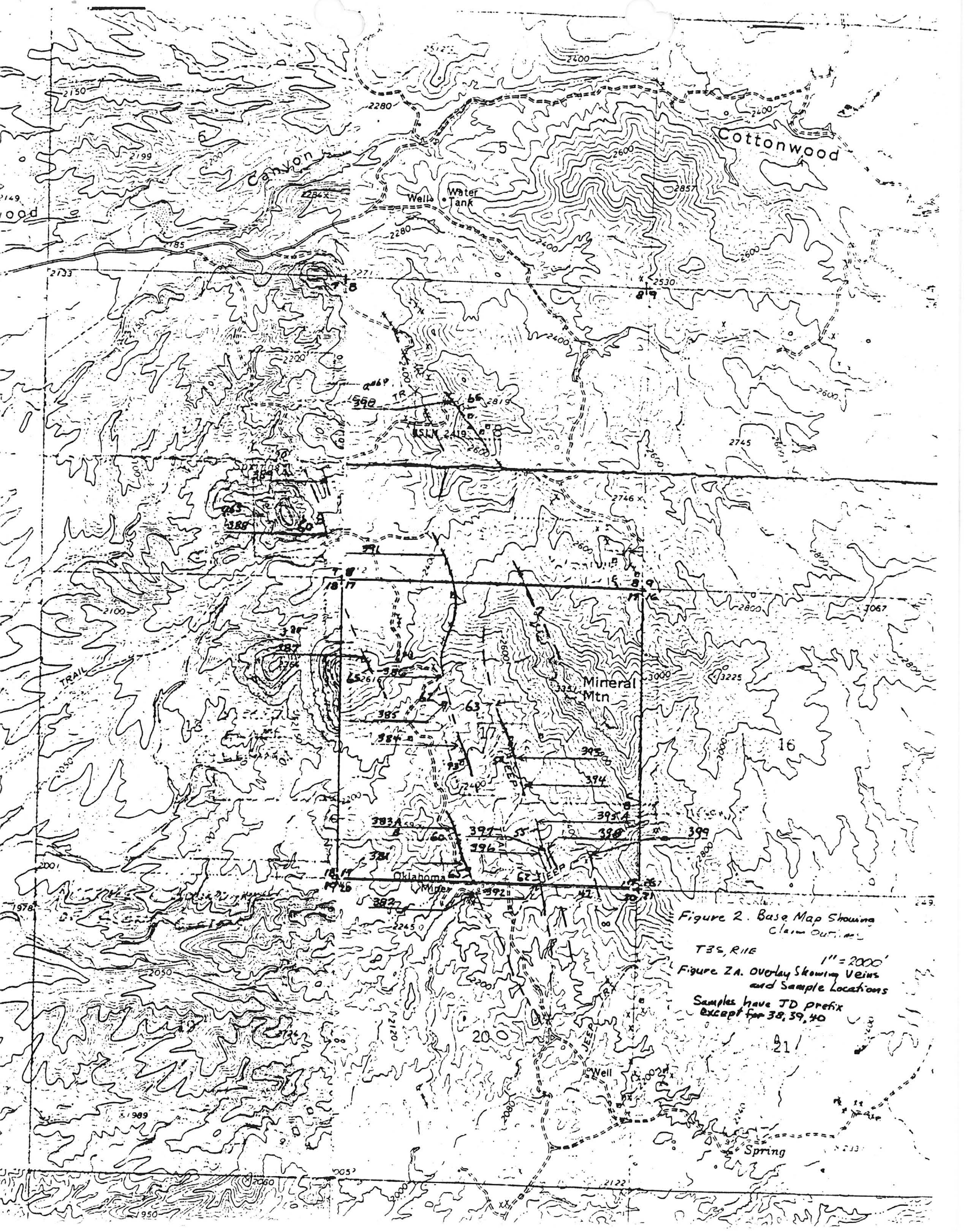


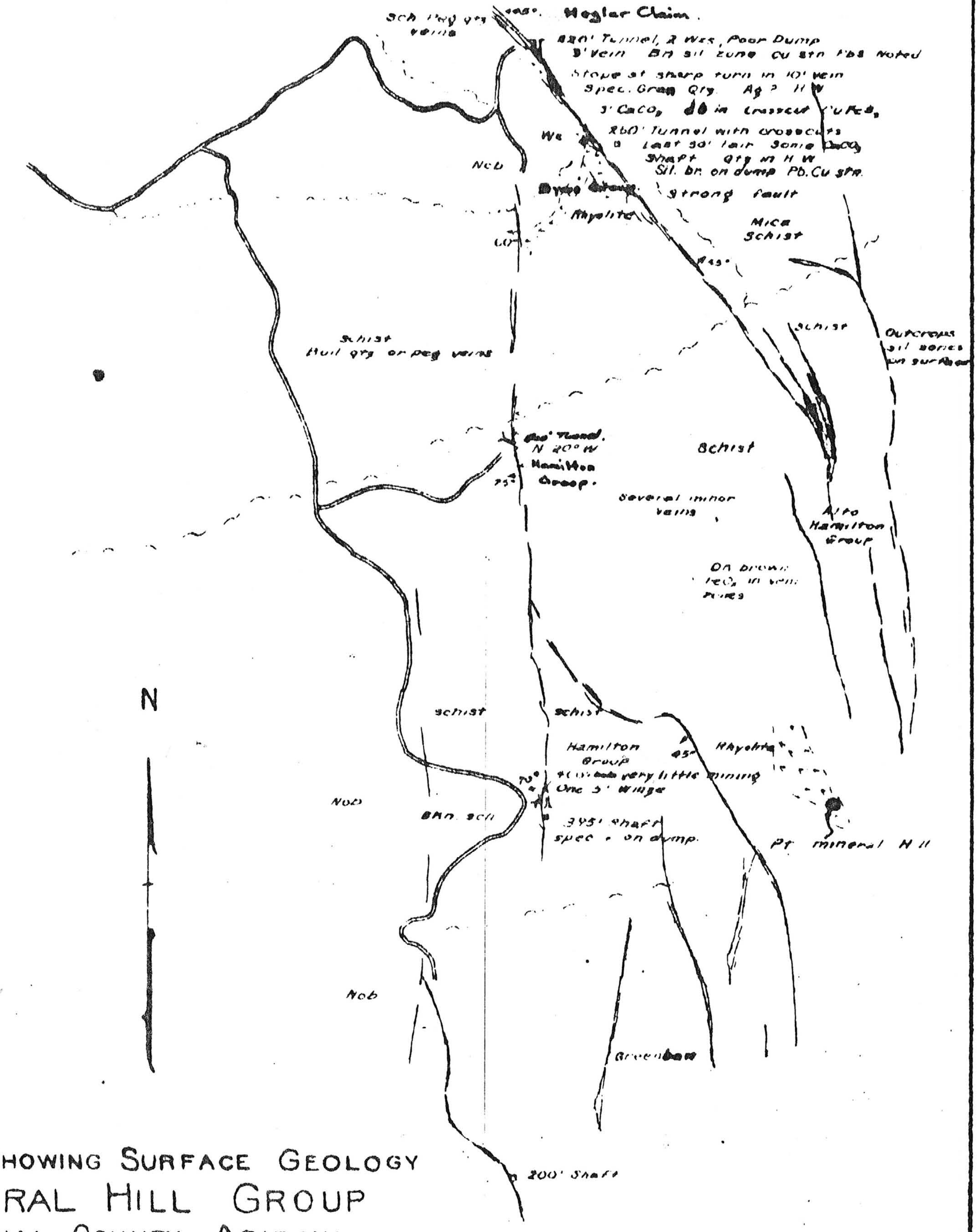
Figure 2. Base Map Showing Claim Outlines

T3S, R11E

1" = 2000'

Figure 2A. Overlay Showing Veins and Sample Locations

Samples have JD prefix except for 38, 39, 40



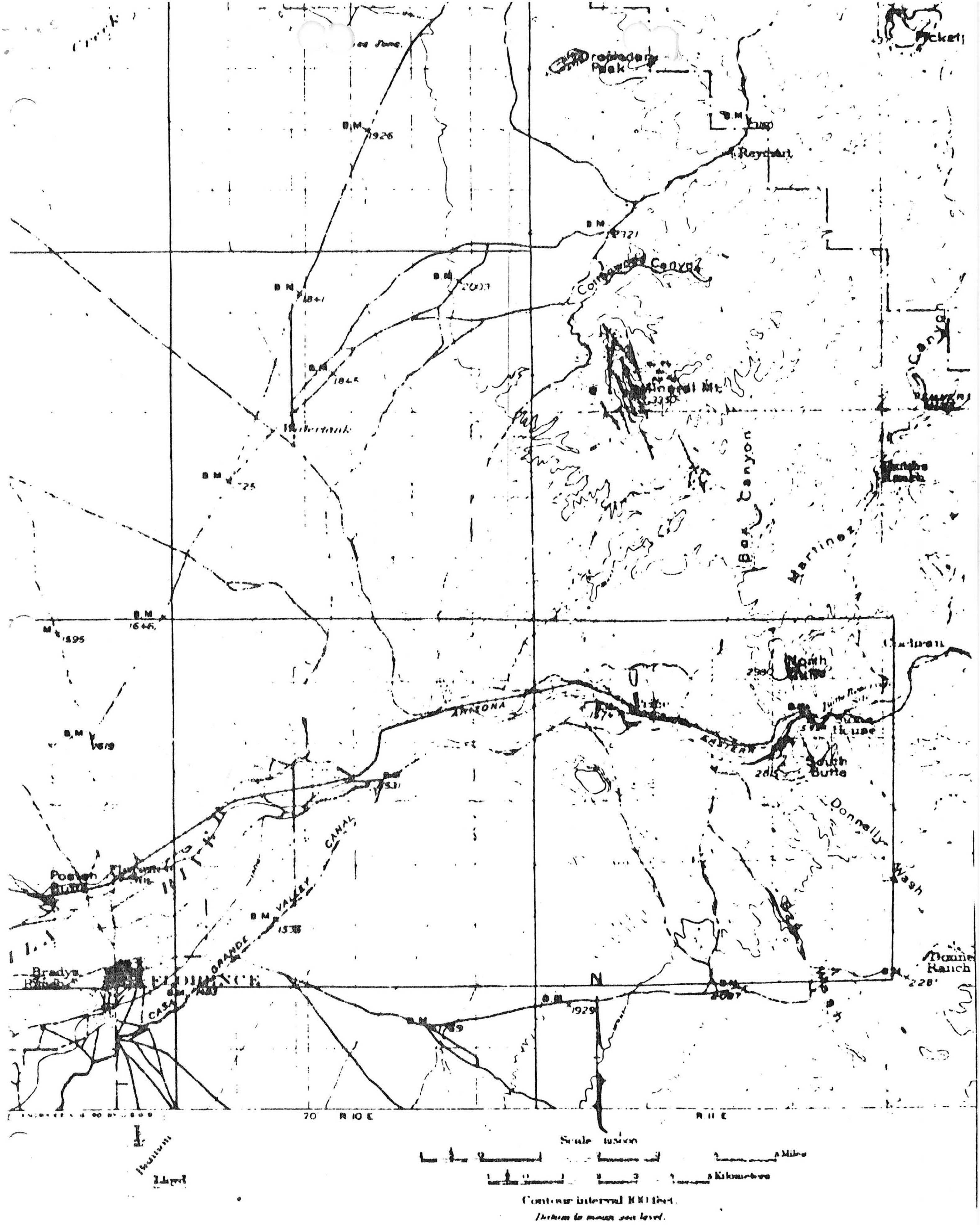
## AP SHOWING SURFACE GEOLOGY

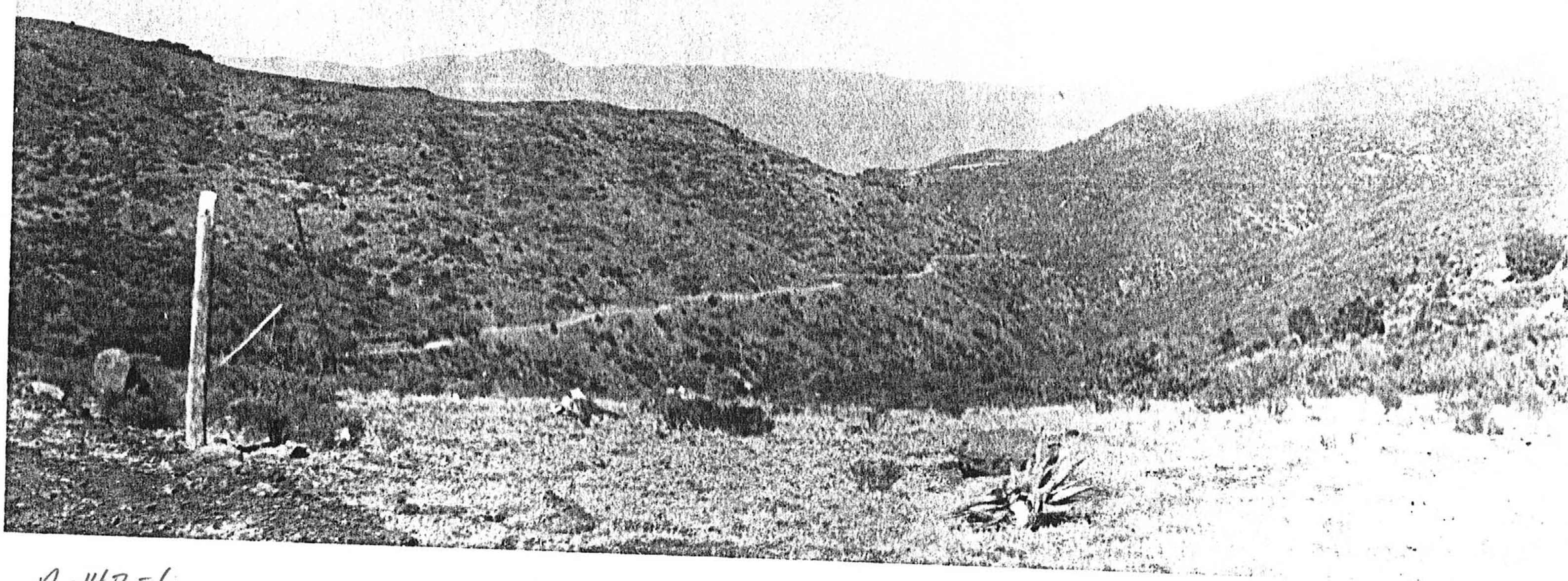
# MINERAL HILL GROUP

## PINAL COUNTY, ARIZONA

Scale 1" = 1000'

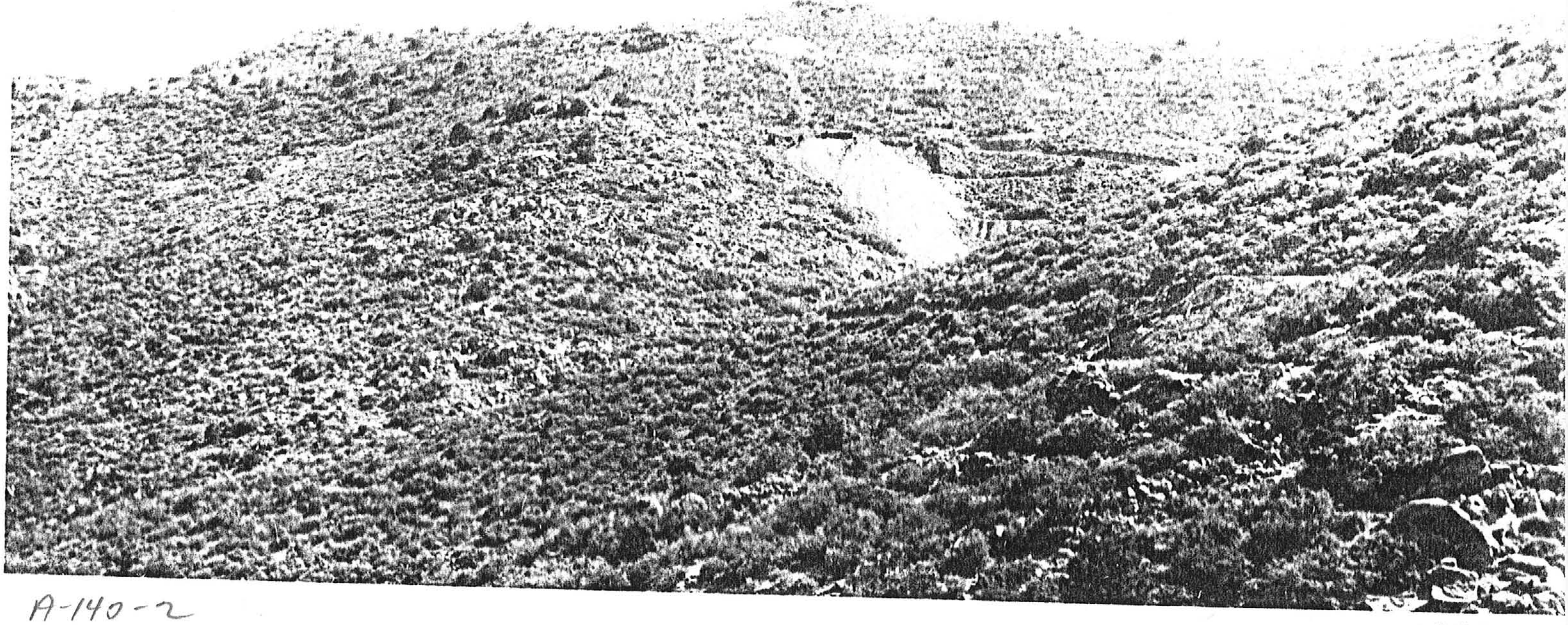
E F. Reed May, 1947


Dromedary Peak
Pickett
B.M. 1926
B.M.
Raymart
B.M. 1721
Cottonwood Canyon
B.M. 2003
B.M. 1841
B.M. 1845
Mineral Mt.
3350
Box Canyon
Martinez
B.M. 25
B.M. 1646
1595
B.M. 1519
North Butte
2990
South Butte
2815
Arizona
Eastern
Donnelly Wash
B.M. 1531
Poston Butte
Florence
Bradys
B.M. 1538
Casa Grande Valley Canal
B.M. 1929
B.M. 2087
Donnelly Ranch
2281
B.M. 59
Gila
70
R 10 E
R 11 E
Scale
Miles
Kilometres
Contour interval 100 feet.
Datum is mean sea level.



A-140-1

1950



A-140-2

1950

OKLAHOMA MINE 6-14-39 PINAL COUNTY
now TROXEL MINING PROPERTY MINERAL HILL DIST.
Ag,Pb,Au,Cu

SEE COLVO [illegible] NJN 33

RLY

See: GW WR 3-17-74
" " 3/4/76

THIS FILE WAS STOLEN SEVERAL
years AGO (1975?)

see: Geology of the Mineral Mt. Quadrangle, Pinal Co.
Thesis by Schmidt, and 2 maps in map file upstairs. 11/86

---

TROXEL MINING PROPERTY (file) 6-15-39 PINAL COUNTY
MINERAL MTN.

RLY

Ag-Pb-Au-Cu

---

OKLAHOMA COPPER COMPANY'S 12-11-06 PINAL COUNTY
PROPERTY MINERAL HILL DIST.

TROXEL MINING PROPERTY

PRINTED: 04/29/2002

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: OKLAHOMA GROUP

ALTERNATE NAMES:
- VAUGHN PROPERTY
- TROXEL MINING PROPERTY
- GREENHAW GROUP
- ALTO GROUP

PINAL COUNTY MILS NUMBER: 111

LOCATION: TOWNSHIP 3 S RANGE 11 E SECTION 17 QUARTER SW
LATITUDE: N 33DEG 09MIN 50SEC LONGITUDE: W 111DEG 14MIN 35SEC
TOPO MAP NAME: MINERAL MTN - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:
- LEAD
- ZINC
- COPPER SULFIDE
- GOLD
- SILVER
- COPPER OXIDE

BIBLIOGRAPHY:
- ADMMR U FILE, PB 5+6+7+8+9
- ADMMR OKLAHOMA GROUP FILE
- SCHMIDT, EBERHARD, GEOL. OF MINERAL MTN AREA
  PINAL CO. MS THESIS, GEO FILE
- ADMMR COLVOCORESSES FILE-MINERAL HILL
- USGS OPEN FILE RPT 78-468; 1978

# ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

## VERBAL INFORMATION SUMMARY

1. Mine File: OKLAHOMA

2. Mine name(s) if different form above:

3. County: PINAL

4. Information from: Ruth Flax

Company:

Address: 4115 E. Greenway
Phoenix, AZ 85032

Phone: 493-1746

5. Summary of information received, comments etc.:

Ms. Ruth Flax visited and reported that Minesearch of Alburquerque, New Mexico no longer is leasing the Oklahoma Group of patented mining claims. She has received data that was developed during theri lease of the property. She would like to lease the property to a mining or exploration group. She may be intereted in joint venturing the property with a small operator who would put it into production.

She has all the old reports that are missing form our file and has promised to photo copy them or bring in originals for us to copy along with the new data.

Nyal J. Niemuth, Mining Engineer January 17, 1992

Nyal J. Niemuth

OKLAHOMA GROUP PINAL COUNTY

KAP WR 6/3/88: James DeLong, Jr (card) Geological Consultant and Koichi Nishioki, Manager, Acquisitions and Joint Ventures, Nippon Mining of Nevada (card) were in for information on the Oklahoma Group (file) Pinal County. That property and the nearby area was recommended to Nippon by one of their prospectors, Don Valin, who had spent considerable time researching our files for targets. They plan at least one day initial reconnaissance visit and some sampling at the property in the company of the property owner.

------------------

P+

OKLAHOMA (f)

CONVERSION OF CHEMEX ASSAY RESULTS TO OUNCES PER TON EQUIVALENT

| SAMPLE DESCRIPTION | Au ppb | Au oz./ton | Ag ppm | Ag oz./ton | Cu ppm | Cu % |
|---|---|---|---|---|---|---|
| JD-381 | 820 | 0.0239 | 2.2 | 0.0641 | 2500 | 0.25 |
| JD-382 | 570 | 0.0166 | 3.7 | 0.1079 | 4000 | 0.4 |
| JD-383A | 700 | 0.0205 | 4.8 | 0.1399 | 1930 | 0.193 |
| JD-383B | 40 | 0.0012 | 25 | 0.7289 | 80 | 0.008 |
| JD-384 | 125 | 0.0036 | 5 | 0.1457 | 890 | 0.089 |
| JD-385 | 740 | 0.0216 | 7.8 | 0.2274 | 830 | 0.083 |
| JD-386 | 1430 | 0.0416 | 4.9 | 0.1428 | 3100 | 0.31 |
| JD-387 | 3800 | 0.1108 | 8 | 0.2332 | 253 | 0.025 |
| JD-388 | 4650 | 0.1355 | 14.8 | 0.4315 | 1280 | 0.128 |
| JD-389 | 1900 | 0.0554 | 29 | 0.8455 | 6500 | 0.65 |
| JD-390 | 60 | 0.0017 | 4.5 | 0.1311 | 245 | 0.024 |
| JD-391 | 1940 | 0.0566 | 11.3 | 0.3294 | 3500 | 0.35 |
| JD-392 | 5400 | 0.1574 | 7.1 | 0.2069 | 970 | 0.097 |
| JD-393 | 1480 | 0.0431 | 4.9 | 0.1428 | 158 | 0.016 |
| JD-394 | 3100 | 0.0904 | 13.2 | 0.3848 | 155 | 0.015 |
| JD-395A | 4650 | 0.1356 | 8.7 | 0.2536 | 10000 | 1 |
| JD-395B | 1400 | 0.0408 | 3.9 | 0.1137 | 228 | 0.022 |
| JD-395C | 1050 | 0.0306 | 4.6 | 0.1341 | 205 | 0.02 |
| JD-396 | 250 | 0.0073 | 1.2 | 0.0035 | 930 | 0.093 |
| JD-397 | 170 | 0.0049 | 3.8 | 0.1108 | 415 | 0.041 |
| JD-398 | 2000 | 0.0583 | 4.1 | 0.1195 | 630 | 0.063 |
| JD-399 | 405 | 0.0118 | 2.3 | 0.067 | 463 | 0.046 |
|  | CHEMEX RESULTS | CONVER OZ./TON | CHEMEX RESULTS | CONVER OZ./TON | CHEMEX RESULTS | CONVER PERCENT |

**Chemex Labs Inc.**
Analytical Chemists * Geochemists * Registered Assayers
994 WEST GLENDALE AVE., SUITE 7, SPARKS,
NEVADA, U.S.A. 89431
PHONE (702) 356-5395

To : NIPPON MINING OF NEVADA LTD.

1280 TERMINAL WAY, SUITE 29
RENO, NEVADA
89502

Project : RECON
Comments: CC: J.DELONG

Page No. : 1
Tot. Pages: 2
Date : 16-JUN-88
Invoice # : I-8816528
P.O. # :

# CERTIFICATE OF ANALYSIS A8816528

| SAMPLE DESCRIPTION | PREP CODE | | Au ppb FA+AA | Ag ppm Aqua R | Cu ppm |
|---|---|---|---|---|---|
| JD-361 | 205 | -- | 3000 | ------ | ------ |
| JD-362A | 205 | -- | 110 | ------ | ------ |
| D-362B | 205 | -- | 75 | ------ | ------ |
| D-362C | 205 | -- | 300 | ------ | ------ |
| JD-363A | 205 | -- | 100 | ------ | ------ |
| JD-363B | 205 | -- | 245 | ------ | ------ |
| JD-363C | 205 | -- | 35 | ------ | ------ |
| JD-364 | 205 | -- | 65 | ------ | ------ |
| JD-365 | 205 | -- | 570 | ------ | ------ |
| JD-366A | 205 | -- | >10000 | ------ | ------ |
| JD-366B | 205 | -- | 3200 | ------ | ------ |
| JD-366C | 205 | -- | 5650 | ------ | ------ |
| JD-367 | 205 | -- | 7800 | ------ | ------ |
| JD-368A | 205 | -- | 1680 | ------ | ------ |
| JD-368B | 205 | -- | 1900 | ------ | ------ |
| JD-369A | 205 | -- | 725 | ------ | ------ |
| JD-369B | 205 | -- | 2380 | ------ | ------ |
| JD-370 | 205 | -- | 30 | ------ | ------ |
| JD-371 | 205 | -- | 160 | ------ | ------ |
| JD-381 | 205 | -- | 820 | 2.2 | 2500 |
| JD-382 | 205 | -- | 570 | 3.7 | 4000 |
| JD-383A | 205 | -- | 700 | 4.8 | 1930 |
| JD-383B | 205 | -- | 40 | 25.0 | 80 |
| D-384 | 205 | -- | 125 | 5.0 | 890 |
| D-385 | 205 | -- | 740 | 7.8 | 830 |
| JD-386 | 205 | -- | 1430 | 4.9 | 3100 |
| JD-387 | 205 | -- | 3800 | 8.0 | 253 |
| JD-388 | 205 | -- | 4650 | 14.8 | 1280 |
| JD-389 | 205 | -- | 1900 | 29.0 | 6500 |
| JD-390 | 205 | -- | 60 | 4.5 | 245 |
| JD-391 | 205 | -- | 1940 | 11.3 | 3500 |
| JD-392 | 205 | -- | 5400 | 7.1 | 970 |
| JD-393 | 205 | -- | 1480 | 4.9 | 158 |
| JD-394 | 205 | -- | 3100 | 13.2 | 155 |
| JD-395A | 205 | -- | 4650 | 8.7 | >10000 |
| JD-395B | 205 | -- | 1400 | 3.9 | 228 |
| JD-395C | 205 | -- | 1050 | 4.6 | 205 |
| JD-396 | 205 | -- | 250 | 1.2 | 930 |
| JD-397 | 205 | -- | 170 | 3.8 | 415 |
| JD-398 | 205 | -- | 2000 | 4.1 | 630 |

CERTIFICATION : Hart Bichler

**Chemex Labs Inc.**
Analytical Chemists * Geochemists * Registered Assayers
994 WEST GLENDALE AVE., SUITE 7, SPARKS,
NEVADA, U.S.A. 89431
PHONE (702) 356-5395

To : NIPPON MINING OF NEVADA LTD.
1280 TERMINAL WAY, SUITE 29
RENO, NEVADA
89502
Project : RECON
Comments: CC: J.DELONG

Page No. : 2
Tot. Pages: 2
Date : 16-JUN-88
Invoice # : I-8816528
P.O. # :

# CERTIFICATE OF ANALYSIS A8816528

| SAMPLE DESCRIPTION | PREP CODE | | Au ppb FA+AA | Ag ppm Aqua R | Cu ppm | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JD-399 | 205 | -- | 405 | 2.3 | 463 | | | | | | | |

CERTIFICATION : Hart Bichler

Attachment 4.

PROSPECT or AREA
OKLAHOMA (ALANCO, LTD.)

SAMPLE RECORD
PAGE 1 OF 1

STATE AZ COUNTY PINAL AMS SHEET ____ MTN. RANGE(±) ____ WORK BY J.D, K.N.

| SAMPLE NUMBER | TOPO QUAD | SEC | TWP | RNG | DATE | DESCRIPTION | SAMPLE TYPE | LABORATORY ANALYSIS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | ppb Au | ppm Ag | As | Sb | | |
| JD-381 | MINERAL MTN. 7.5' | 17 | 3S | 11E | 6-2-88 | Oklahoma mine. Pit along strike of vein 100 feet east of main shaft. Vein is 6 to 8 ft. wide, N05W, 65SW. Mainly quartz-specular hematite matrix with pale brown altered Pinal schist country rock. Good breccia textures. Quartz crystal-lined vugs common. Argillic alt. in footwall probably from post-vein fault. | Rock chip | | | | | | |
| JD-382 | " | 20 | " | " | " | South of Oklahoma shaft in gully with two adits heading southward. Vein is weaker here. Sample from eastern adit where vein is 1 foot wide with 3 to 4 feet of argillic alt. and iron stain: may be post-vein fault thinning on a local basis. | " | | | | | | |
| JD-383A | " | 17 | " | " | " | North of Oklahoma on same vein exposed in a cross-cutting trench. Vein is 12 feet wide, siliceous-specular hematite silicified breccia, N10W, 60SW. Fault slicks with dip slip common. On hanging wall is 5 foot wide coarse grained dark gray calcite vein with fragments of the quartz vein. Weathers dull gray. | " | | | | | | |
| JD-383B | " | " | " | " | " | Sample of the calcite vein described above. | " | | | | | | |
| JD-384 | " | " | " | " | " | Another vein that projects through east of the Oklahoma vein. 3 to 4 feet wide, N04W, 73SW, possibly wider. Abundant chrysocolla on dump. | " | | | | | | |
| JD-385 | " | " | " | " | " | Probable northward continuation of last vein. Deep inclined shaft on vein 2 to 3 feet wide, N10W, 62SW. Very siliceous vein breccia. Iron oxide more dull hematite red and an orange-brown. Hanging wall is argillized schist with envelopes of hematitic stain along fractures out for a few feet from vein. Abundant chrysocolla | " | | | | | | |

PROSPECT or AREA
Oklahoma

SAMPLE RECORD
PAGE 2 OF 4

STATE AZ COUNTY Pinal AMS SHEET MTN. RANGE(±) WORK BY

| SAMPLE NUMBER | TOPO QUAD | SEC | TWP | RNG | DATE | DESCRIPTION | SAMPLE TYPE | LABORATORY ANALYSIS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | ppb Au | ppm Ag | As | Sb | | | |
| JD-386 | Mineral Mtn. 7.5' | 17 | 3S | 11E | 6-2-88 | Above vein curves to the NE along strike. This sample at southern outcrop terminus just before the curve: same vein as 385. Deep inclined shaft, concrete foundation, open stope up into outcrop. Vein is 3 to 4 feet wide, N10W, 65SW. Hematitic stain into hangingwall and footwall along fractures and schistosity. Pinal schist may be slightly hardend by silicification locally. Veinlets up to 2" wide and irregular quartz seams and vugs into hangingwall may carry weak grade. Difficult to sample without bias. | Rock chip | | | | | | | |
| JD-387 | " | " | " | " | " | Possible northward extension of the Oklahoma vein. Deep shaft. Vein may be 20 feet wide with 8 feet of silica-hematite on footwall, then possible calcite center, then 6 to 8 feet of silica-hematite. Some chrysocolla.<br>At least 2 other veins occur east of this vein and the main access road; not sampled. | " | | | | | | | |
| JD-388 | Florence NE 7.5' | 7 | " | " | " | Vein supports a small hill. Vein is N15W, 60SW two feet wide all quartz vein breccia with specular hematite. Possible vein apophyses may make minable width 2 or 3 times greater. | " | | | | | | | |
| JD-389 | " | " | " | " | " | Vein that is apparently not the northward projection of 388. Near vertical shaft. Vein strike N18W, is 1.5 feet wide. | Dump | | | | | | | |
| JD-390 | Mineral Mtn. 7.5' | 8 | " | " | " | Eastern and northernmost vein sampled on prospect. Has different aspect: Very little iron, still with quartz and minor copper. N45W, 65NE (note easterly dip). Vein is | Dump | | | | | | | |

PROSPECT or AREA
Oklahoma

SAMPLE RECORD
PAGE 3 OF 4

STATE AZ COUNTY Pinal AMS SHEET MTN. RANGE(±) WORK BY

| SAMPLE NUMBER | TOPO QUAD | SEC | TWP | RNG | DATE | DESCRIPTION | SAMPLE TYPE | LABORATORY ANALYSIS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | ppb Au | ppm Ag | As | Sb | | |
| JD-391 | Mineral Mtn. 25' | 8 | 3S | 11E | 6-2-88 | Northern "end" of the curving vein sampled at 386. Adit with large dump, red hematite-colored. Adit heads S65E into hanging wall of the vein and had some drifting off it. Sample from siliceous-hematitic dump random samples. Chrysocolla. | Dump | | | | | | |
| JD-392 | " | 17 | " | " | 6-3-88 | East of the Oklahoma mine, possibly southern projection of Tani's vein or more likely a subparallel separate vein. N25W, 62SW, 1.5 feet wide with typical black hematite breccia matrix. Footwall fault has vein fragments in fault breccia. | Rock chip | | | | | | |
| JD-393 | " | " | " | " | " | On Tani's vein South of where he sampled it N05E, 57NW. 2 to 3 feet wide. Note several 1/2 to 3" wide banded and vuggy veins entering hanging wall schist at acute angles to main vein. | " | | | | | | |
| JD-394 | " | " | " | " | " | Further south on Tani's vein. Vein is 3 to 4 feet thick, multiply-banded, very siliceous and locally vuggy with quartz crystals. | " | | | | | | |
| JD-395A | " | " | " | " | " | Tani's vein south of 394. Vein is split into two parts. A is the footwall against a footwall fault N25W, 47W while the vein is N45W, 55W. 6" to 1.5' banded hematitic silica and breccia with abundant chrysocolla. | " | | | | | | |
| -395B | " | " | " | " | " | B = "horse" of schist with white quartz veins (possible Precambrian), trace hematite and with tan altered schist. | " | | | | | | |

PROSPECT or AREA Oklahoma

SAMPLE RECORD
PAGE 4 OF 4

STATE AZ COUNTY Pinal AMS SHEET MTN. RANGE(±) WORK BY

| SAMPLE NUMBER | TOPO QUAD | SEC | TWP | RNG | DATE | DESCRIPTION | SAMPLE TYPE | LABORATORY ANALYSIS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | ppb Au | ppm Ag | As | Sb | | | |
| JD-395c | Mineral Mtn. 7.5' | 17 | 3S | 11E | 6-3-88 | Part C is 1.0 to 1.5 feet of black hematitic siliceous breccia with much less copper. | Rock chip | | | | | | | |
| -396 | " | " | " | " | " | Southend of same hill now has three small veins as mapped by Kersey. 396 is the easternmost, N15W, 60W up to 2' wide with abundant quartz crystals and chrysocolla. | " | | | | | | | |
| JD-397 | " | " | " | " | " | 397 is the middle vein, 65 feet west of 396 and is the least impressive. Has less hematite and more wallrock (i.e. less silica) 4" to 1.0' wide, N10E, 78NW). | " | | | | | | | |
| JD-398 | " | " | " | " | " | 398 is 45' west of 397. N25W, 50SW. Hematite-rich quartz vein breccia 1.0' wide. | " | | | | | | | |
| JD-399 | " | " | " | " | " | Easternmost vein sampled on property. N33W, 47SW. Is a 3' wide hematite-quartz-breccia vein with little visible chrysocolla. Vein may not persist far to north but appears to have strong southward extent and has been sampled by Kersey. | " | " | | | | | | |

## *GENERAL REFERENCES

REFERENCE 1 F1 < USBM-ABGMT PRO[illegible]TION DATA FILE

REFERENCE 2 F2 < USBM FILE DATA - CLUSTER # 755

REFERENCE 3 F3 < ABGMT CLIPPINGS FILE DATA

REFERENCE 4 F4 < USGS OPEN FILE REPORT 78-468, 1978

A13 < L. GREENSHAW, C.L. ZUFEIT, ROSS BOYLE, YOUNG CONNELLY (1936) >

Mills 111

## U.S. CRIB–SITE FORM

### RECORD IDENTIFICATION

*RECORD NUMBER B10 < >
*RECORD TYPE B20 < X 1 M >
DEPOSIT NUMBER B40 <
*REPORT DATE G1 < 82 ƀ 03 > YR. MO.
*INFORMATION SOURCE B30 < 1 2 >
*FILE LINK IDENT. B50 < USBM-0040210915
*REPORTER(SUPERVISOR) G2 < LARABA, PETER (last, first, middle initial) ( GEST, DON (last, first, middle initial) ) >
*REPORTER AFFILIATION G5 < ABGMT >
*SITE NAME A10 < OKLAHOMA MINE >
SYNONYMS A11 < TROXEL GROUP >

### LOCATION

+MINING DISTRICT/AREA A30 < MINERAL MOUNTAIN DISTRICT >
*COUNTY A60 < PINAL >
*STATE A50 < A Z >
*COUNTRY A40 < U S >
*PHYSIOGRAPHIC PROV A63 < 1 2 ƀ >
*DRAINAGE AREA A62 < 1 5 0 5 0 1 0 0 ƀ >
*LAND STATUS A64 < 4 9 ƀ ƀ ( 1 9 7 8 ) >
*QUADRANGLE NAME A90 < MINERAL MOUNTAIN ( 1 9 6 4 ) >
*QUADRANGLE SCALE A100 < 2 4 0 0 0 >
SECOND QUAD NAME A92 < ( ) >
SECOND QUAD SCALE A91 < >
+ELEVATION A107 < 2 2 0 0 ƀ F T >

UTM
*NORTHING A120 < 3 6 6 9 2 8 0 >
*EASTING A130 < 4 7 7 4 4 0 >
*ZONE NUMBER A110 < + 1 2 >

*ACCURACY
ACCURATE [✓ ACC] (circle)
ESTIMATED EST < >

GEODETIC
+LATITUDE A70 < – – N >
+LONGITUDE A80 < – – W >

CADASTRAL
+TOWNSHIP(S) A77 < 0 0 3 S : ƀ : ƀ : ƀ >
+RANGE(S) A78 < 0 1 1 E : ƀ : ƀ : ƀ >
+SECTION(S) A79 < 17 : ƀ 20 : ƀ : ƀ >
+SECTION FRACTION(S) A76 < C OF THE SECTION BOUNDARY BETWEEN SECTIONS 17 AND 20 >
+MERIDIAN(S) A81 < GILA AND SALT RIVER >

+POSITION FROM NEAREST PROMINENT LOCALITY A82 < .8 MILES SW OF MINERAL MOUNTAIN (ELV. 3351) >
+LOCATION COMMENTS A83 < >

* ESSENTIAL INFORMATION
\+ ESSENTIAL SOMETIMES OR HIGHLY RECOMMENDED

## COMMODITY INFORMATION

*COMMODITIES PRESENT C10 < C.U. A.G. A P.B.
*ORE MINERALS C30 < UNKNOWN
COMMODITY SUBTYPES C41 <
+GEN. ANALYTICAL DATA C43 <
COM. INFO. COMMENTS C50 <

## * SIGNIFICANCE

### PRODUCER

MAJOR PRODUCTS MAJOR < P.B. >
MINOR PRODUCTS MINOR < A.G. >
POTENTIAL PRODUCTS POTEN < A.U. C.U. >
OCCURRENCES OCCUR < >

### NON-PRODUCER

MAIN COMMODITIES PRESENT C11 <
MINOR COMMODITIES PRESENT C12 <
OCCURRENCES OCCUR <

## *PRODUCTION

### PRODUCER

PRODUCTION [✓ YES] (circle) PRODUCTION SIZE [✓ SML] MED LGE (circle one)

### NON-PRODUCER

PRODUCTION UND NO (circle one)

## *STATUS

## EXPLORATION OR DEVELOPMENT

### PRODUCER

STATUS AND ACTIVITY A20 < 4 >

### NON-PRODUCER

STATUS AND ACTIVITY A20 < >

+DISCOVERER L20 <
+YEAR OF DISCOVERY L10 < > +NATURE OF DISCOVERY L30 < B > +YEAR OF FIRST PRODUCTION L40 < 1935 > +YEAR OF LAST PRODUCTION L45 < 1956
+PRESENT/LAST OWNER A12 < ROY TROXEL (1935) , W.D. ROBERTS (1936)
+PRESENT/LAST OPERATOR A13 < MINERAL MOUNTAIN MINING AND MILLING CO. (1939), R.TROXEL (1935),
EXPL./DEV.COMMENTS L110 <

## DESCRIPTION OF DEPOSIT

*DEPOSIT TYPE(S) C40 < VEIN / SHEAR ZONE
DEPOSIT FORM/SHAPE M10 < TABULAR
+DEPTH TO TOP M20 < > +UNITS M21 < > +MAXIMUM LENGTH M40 < > +UNITS M41 < >
+DEPTH TO BOTTOM M30 < > +UNITS M31 < > +MAXIMUM WIDTH M50 < > +UNITS M51 < >
+DEPOSIT SIZE M15 [✓ SMALL] M15 < MEDIUM > M15 < LARGE > (circle one) +MAXIMUM THICKNESS M60 < > +UNITS M61 < >
STRIKE M70 < > +DIP M80 < >
DIRECTION OF PLUNGE M100 < > +PLUNGE M90 < >
DEP. DESC. COMMENTS M110 < >

## DESCRIPTION OF WORKINGS

Workings are: SURFACE M120 UNDERGROUND [✓ M130] BOTH M140 (circle one) +OVERALL LENGTH M190 < > +UNITS M191 < >
+DEPTH BELOW SURFACE M160 < > +UNITS M161 < > +OVERALL WIDTH M200 < > +UNITS M201 < >
+LENGTH OF WORKINGS M170 < > +UNITS M171 < > +OVERALL AREA M210 < > +UNITS M211 < >
DESC. OF WORK. COM. M220 < MANY SHAFTS AT DIFFERENT DEPTHS.

## GEOLOGY

+AGE OF HOST ROCK(S) K1 < P.R.E.C.
+HOST ROCK TYPE(S) K1A < SCHIST , AMPHIBOLITE SCHIST
+AGE OF IGNEOUS ROCK(S) K2 <
+IGNEOUS ROCK TYPE(S) K2A <
+AGE OF MINERALIZATION K3 < T.E.R.T. ~~[illegible]~~ PROBABLY MIOCENE
+PERT. MINERALS (NOT ORE) K4 <
+ORE CONTROL/LOCUS K5 < NW TRENDING FISSURE VEINS , DIP 55 - 70 SW
+MAJ. REG. TRENDS/STRUCT. N5 <
+TECTONIC SETTING N15 <
+SIGNIFICANT LOCAL STRUCT. N70 < N TRENDING FAULTS , NW TRENDING FISSURES
+SIGNIFICANT ALTERATION N75 <
+PROCESS OF CONC./ENRICH. N80 <
+FORMATION AGE N30 < P.R.E.C.
+FORMATION NAME N30A < PINAL SCHIST
SECOND FM AGE N35 <
SECOND FM NAME N35A <
+IGNEOUS UNIT AGE N50 <
+IGNEOUS UNIT NAME N50A <
SECOND IG. UNIT AGE N55 <
SECOND IG. UNIT NAME N55A <
GEOLOGY COMMENTS N85 < MINERALIZATION AGE PROBABLY SAME AS TERTIARY INTRUSIONS IN AREA

## GENERAL COMMENTS

GENERAL COMMENTS GEN <

1912

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA 85007

March 8, 1976

To: John Jett, Director
From: Glen Walker, Mining Engineer
Subject: Weekly report ending 3/5/76

Monday, March 1 - Austin Carter called re: geophysical anomaly found on his claim by Mr. Gear of El Paso Nat. Gas Co. He said he dug down to the deposit indidated and found it was about 6 ft. thick and rather soft (altered). Mr. Gear sampled it. It is about 200 ft. N. of his previous diggings on a ± 6" streak of Au-quartz. Mr. Hollom came in to determine the land status on a Au deposit he found 8 miles west of Cleator. He was told how to find out about the land. A Denver driller called to learn about drill holes for discovery work on locations. It was explained. Vic Randolph called to learn if he could rent long-hole drill steel from a mining contractor in the Globe area. He was directed to Cecil, the ore trucker, as I know no contractors at Globe.

Tuesday, March 2 - A man phoned for a market for graphite. When asked what type he had he couldn't answer. It was suggested he determine the type then contact 2 or 3 companies, whose names were provided. Called Tom Lynch to determine the location of the two strip coal mines of Peabody Coal Co. They are in sec. 4,5 8, 9 T35N, R18E, and sec. 4, 8, 9, 16, & 17, T36N, R18E. A Mr. Greenphal called for the location of Alma Mtn., which I was unable to find. A Mr. French came in to discuss the current uranium boom. Mr. Cochrane, Mesa, phoned for the State of Oklahoma geologist, whom I was uanquainted with. A Man called for the tungsten market. He was given the names and address of Union Carbide & Rennametal.

Wednesday, March 3 - Went to the old Heath mill 21 mi. north of Wikieup, where there was no one and there appeared to have been no work done since the last visit. Stopped at the "smelter" 2½ mi. north of Wikieup where a Mr. Chris Paul said there had been no activity since he had been there last August. He said that several people had voiced interest, but made no investment. He also said the cost of fluxes had been excessive prior to his arrival. It rained or snowed all day and I was advised not to try the trail to Cedar, therefore, after a short visit with Dusty Denton and some of his cronies I left Wikieup.

Thursday, March 4 - Accompanied Mrs. Flax & Mr. Hudgins to her 70 Sleeping Angel claims west of Mineral Mtn., 15 miles NE of Florence. Here we examined four paralled drift adits near the old Oklahoma shaft, where brecciated zones of varying widths are sporadically mineralized with green copper minerals. Then we traced 4 of these brecciated zones in intrusive andesite across 26 of the claims. The mineralization, as in the adits, is very discontinuos laterally and in only one place was it observed to be more than 3 ft. wide. The country rock here is gray, fine grained gneiss that has been intruded along N15°-25°W breaks by andesite which has been faulted & silicified. Mr. Hudgins, a retired chemist from PD who has convinced Mrs. Flax that there is an open-pit type of Cu deposit here.

Thursday, March 14 Con't. - if any are found then the County Recorder's office should be consulted with regard to the annual assessment requirement. They said they had found a considerable area of outcrop with fine Au near the old Whippsaw mine. Bob Lehner was in and we discussed the possibility of the occurrence of carbonaceous shale in the north end of the Empire Mountains and the south end of the Tucson Mountains. He said he would investigate those areas.

Friday, March 15 - Rick Lanning, Phoenix Gazette, called to say he had been "rained out" last week-end when he went prospecting in Trilby Wash. A woman called to learn of visits to mines. She was advised to contact the individual mine offices. Harry Milsap called fo water consumption in Pima County by the mining industry. He was referred to the Arizona Mining Assocation . Austin Carter, New River, Called to say Inspiration Cons. Copper Co. had turned down both his and Jim Boyles Cu prospects 7 miles south of New River on the basis of 25 geochem samples. He thinks he has a vanadium deposit and wanted Union Carbide Corp. address in Bishop, California.

Sunday, March 17 - Accompanied Mrs. R. Flax, 4549 E. Becker Lane to her 40 unpatented claims including the old Oklahoma mine in Sec. 7, 17, 18 T3S, R11E in Pinal County. These claims are contiguous on the west, south and north to a large group of patented claims owned by Minerals Trust Co., 1st National Bank Bldg., Phoenix. They are along the west side of Mineral Mountain. Near the old Oklahoma vertical shaft is a 75 foot long open cut about 15 feet deep at the north face, showing a siliceous brecciated very irony vein dike with scant chrysocolla. This vein extends N-S to N20°W and dips west at 50-60°; it can be traced by its bold outcrop, extending 2-8 feet above the sericitic schist, for perhaps 2000 feet. Toward its north end another similar vein outcrops some 150 yds east and is parallel to it. This second vein has been mined to a shallow (10-12 feet) depth by a smaller excavations on both veins. About ½ mile east of the old Oklahoma vein is the new Oklahoma which is similar in all respects to the other veins. Here an open cut 40 fee long and 10 feet deep ends in a drift which is caved. About 50 yds. south of the drift is another side hill open cut about 75 feet long. This vein as the others is traceable by it outcrop for several thousand feet. Although Mrs. Flax had 3 or 4 assay results of probably specimen material from the property she had no notion of where they were from. It was therefore suggested all the excavations and the bold outcrops be thoroughly sampled preparatory to presentation of the property for lease or sale. A William Watson who works for and lives on the Polaris Mining Co. property accompanied me on the examination of Mrs. Flax claims as he has done most of the annual work on them and is therefore quite familiar with the ground. The Polaris property consists of 55 unpatented claims about 2 miles south of Mrs. Flax property and is in an area of monzonite. Near the camp several sizeable pits have been dug on oxide Cu mineralization. Mr. Watson said the rock also contained an appreciable value in Au. He also stated the company had purchased a mill in New Mexico which was soon to be erected on the property.

Phone calls - 13, Visitors - 9, Field visits - 2.

GWalker

When my opinion of this situation was asked I suggested he sample the gneissic rock between the silicified dikes to determine its Cu content. The gneiss is everywhere very fresh except with a couple of feet of the dikes. During our conversation at dinner, Mrs. Flax said she & her brother, a Kansas City Dr., visited the Heath mill on Thanksgiving with the idea of buying it & processing Cedar Valley Mines Co. ore, but were unable to contact the principals. She went on to say since then Cedar Mines Co. have bought a mill in Auburn, Calif., and moved it into Phoenix for some repairs & will fix the trail to the mine & truck it up there in the near future.

Friday, March 5 - Off - sick.

Phone calls - 8

Visitors - 2
Field visits - 3

E

Oklahoma Group

DATE: January 18, 1985

TO: Mr. F. J. Menzer, Chief Geologist

FROM: J. A. Waegli, Geologist

SUBJECT: Arizona Department of Mineral Resources
List of Flux Properties

In early October, 1984, Mr. John Robertson, Ore Buyer for Phelps Dodge Corporation, requested that the Arizona Department of Mineral Resources (ADMR) compile a list of properties in the state that could produce material grading +80% $SiO_2$ and +1/3 O/T Au. In response, Mr. Nyal Niemuth, Mineral Resources Specialist with the ADMR, compiled a list of 16 properties (attached) that he feels are capable of producing +70% $SiO_2$ with $100.00 metal credits. (He stated that he did not know of any mines capable of meeting Mr. Robertson's criteria.)

November 19-21 were spent in Phoenix examining ADMR files to obtain information on each of the mines. Mr. J. E. DuHamel of Western Exploration screened their files and compiled the resulting information in a memo dated November 27 (attached). Based on his memo, pertinent reports were copied from the Western Exploration files on December 3 and 4.

The following is a listing of these 16 properties arranged in order by quad number. A brief description of each property is given, with information on current activity and a summary of past work conducted by Phelps Dodge Corporation. Recommendations based on information compiled to date are also given. Table 1 summarizes information compiled in this report.

# M. P. R. 1226

# Mineral Hill Group

# Pinal County, Arizona

## Location:

The Mineral Hill group of claims surround the peak shown as Mineral Mountain on the Florence topographic sheet of the U.S.G.S. The claims are in Township 3 S, Range 11 E, and the road to them turns off from the Florence Junction - Florence Highway, about 5 miles south of Florence Junction.

## General:

This group of claims was presented for our consideration by H. H. Nichols who represents a group who have taken short options on the various properties. There are over a hundred claims included in the group.

## Geology:

Mineral Mountain is a prominent peak east of the highway with a narrow ridge at the top formed by a rhyoline dike which is intruded in schist. Other dikes and mineralized zones run a little west of north and can be seen from some distance. Veins or silicefied zones are up to 100 feet wide and are scattered over an area one half mile wide by three miles long.

Towards the southern end of the zone there is more alteration of the schist and dioritic intrusions are encountered. There are a few small diabase dikes in the vein zones.

## Mineralization:

Broad silicified zones have been cut by later fractures, and quartz, calcite, lead, copper, gold and silver minerals have been introduced. These later veins are from one to five or more feet wide and in some places consist almost entirely of calcite. Lead and copper showings are scattered but the gold and silver values are said to be more regular. A number of samples from various mines are said to have averaged 0.10 Oz. Au. and 2.00 Oz. Ag. Lead and Copper results were erratic. Considerable ore has been shipped from the district but Mr. Nichols did not have the returns.

## Development:

There is a 220 foot drift with two shallow winzes and small stopes on the Red Top or Kegler claim. On the Byers group of nine claims there is a 250 foot tunnel, a shallow shaft and various minor workings. The Hamilton group has two tunnels, each about 500 feet long and a 395 foot shaft that was not entered. The Greenbau group has a 200 foot shaft and various drifts and cuts. There are also limited workings on the Troxel and Pinal groups.

In all these workings only a few spots of mineable ore have been developed and stopeing has been very limited.

## Conclusions:

This is a large area of strong mineralized zones but the ore values are scattered and erratic. There is too much calcite in the veins to allow much migration of copper and secondary enrichment would not be important. This area cannot be recommended for development.

H. F. REED
Geologist

cc-Mr. C.E.Weed
R.H.Sales
V.D.Perry
A.J.McDonald

OKLAHOMA GROUP (f) Pinal
Abstracted to AzMILS KAP
5-23-1996

REPORT ON THE

# SILVER BAR MINE

## MINERAL MOUNTAIN MINING DISTRICT

## PINAL COUNTY, ARIZONA

by

**Michael J. Skopos**
Chief Geologist
Golden Eagle International, Inc.

**8 February 1995**

Pages 13-22 not provided

# TABLE OF CONTENTS

Page

SUMMARY OF THE SILVER BAR MINE v

I. INTRODUCTION ........ 1

II. LOCATION AND ACCESS ........ 2

III. PROPERTY ........ 3

IV. REGIONALLY ACTIVE PRODUCING MINES AND PRODUCTION IN THE IMMEDIATE VICINITY OF THE SILVER BAR MINE ........ 5

V. PAST PRODUCING MINES WITHIN A 3-MILE RADIUS OF MINERAL MOUNTAIN AND THE SILVER BAR MINE ........ 11

<u>The Silver Bar Group</u> ........ 12

VI. HISTORY OF THE SILVER BAR MINE ........ 14

VII. ORE RESERVES ........ 24

VIII. MINING AND MILLING OPERATION ........ 28

- A. Phases of the Mining and Milling Operations ........ 30
  1. Roads ........ 30
  2. Cacti Removal ........ 30
  3. Culverts ........ 32
  4. New Haul Road ........ 32
- B. The Mining Process ........ 32
- C. The Milling Process ........ 32

IX. The Pilot Plant ........ 34

X. The Recovery Process ........ 36

- A. Copper Recovery: Description of CCP Processing ........ 36
- B. Primary Metal Recovery ........ 41
  1. The Tank Process ........ 41
  2. The Electro-refining Step ........ 42

XI. Key Investment Considerations ........ 44

XII. Conclusions ........ 45

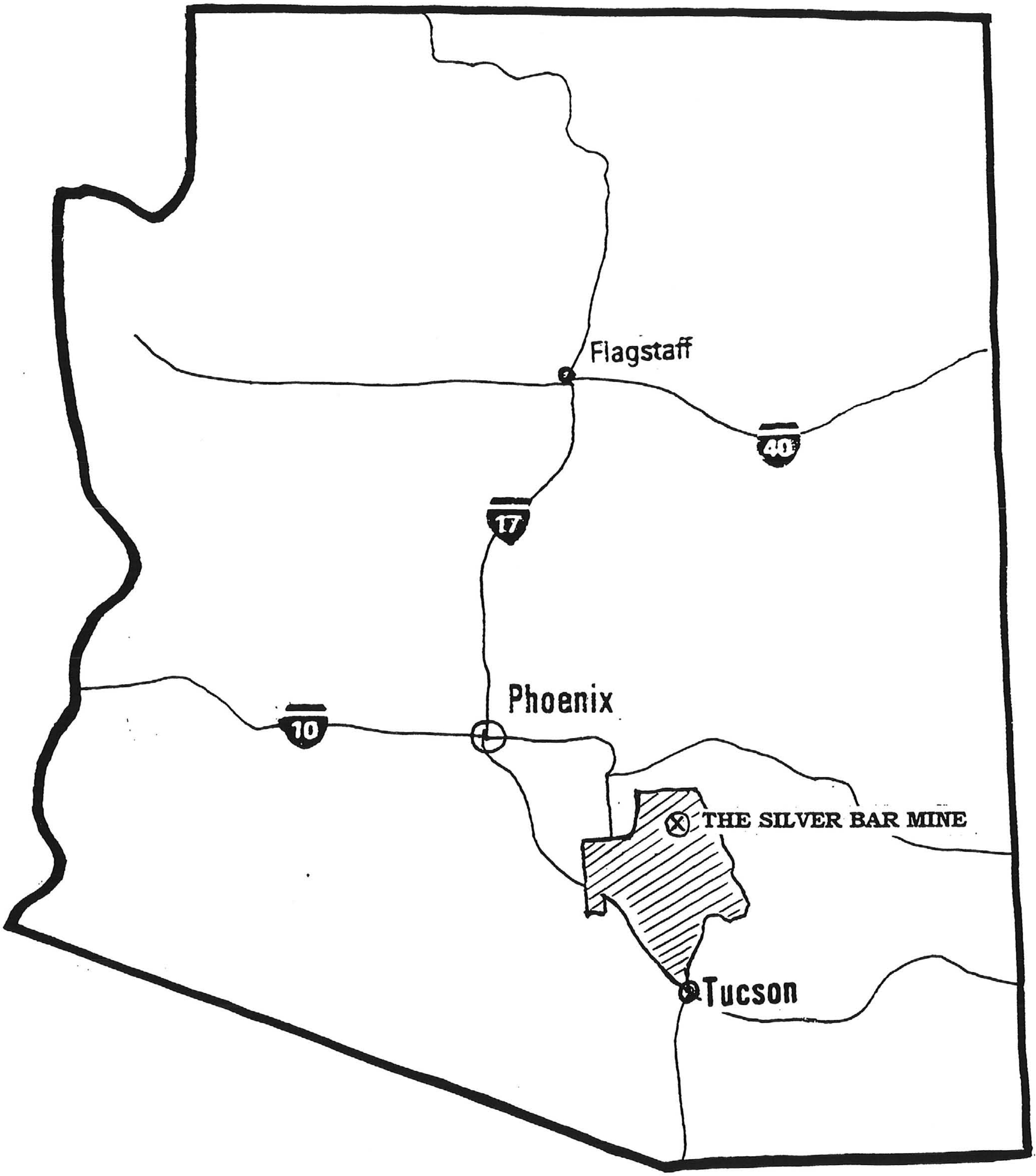
Appendix A

Appendix B

# LIST OF EXHIBITS

| **Exhibit** | **Name** | **Page** |
|---|---|---|
| | Map of Arizona and The Silver Bar Mine | iv |
| 1 | Mining Claim Map | 4 |
| 2 | Production of Base Metals and Precious Metals from Mines in the Immediate Vicinity of the Silver Bar Mine | 7 |
| 3 | 1992 Mine Ranking by Production of Mines in Immediate Vicinity of the Silver Bar | 8 |
| 4 | Active and Inactive Porphyry Copper Deposits in the Vicinity of the Silver Bar | 9 |
| 5 | Geological Map of Active and Inactive Porphyry Copper Deposits | 10 |
| 6 | Tectonic Lineament Trends | 18 |
| 7 | Summary of Assays Taken from The Silver Bar Mine Site | 25 |
| 8 | Location Map: Copper and Gold Pits, Mill Area, and Water Wells 1-3 | 26 |
| 9 | Key Personnel of The Silver Bar Project | 27 |
| 10 | Map of Area Features | 31 |
| 11-A | CCP Process Flow Diagram | 37 |
| 11-B | CCP Plant Process Flow Diagram: Copper + Gold & Silver Recovery | 38 |

# MAP OF ARIZONA
# AND
# THE SILVER BAR MINE



# SUMMARY
# OF
# THE SILVER BAR MINE

**Location:** 50 mi southeast of Phoenix near Florence Junction, AZ (pp iv, 10, 26).

**Description:** 4,565 ac (open pit mine) located on a massive geological structure called Mineral Mountain Quadrangle.

**Other Mines:** There are five other producing mines on this same geological structure (pp 5-6). They have produced the following to date (pg 7):

Gold: 10,344,400 oz.
Silver: 54,491,000 oz.
Copper: 10,300,000 tons

**Engineering & Assay Reports:** There are 19 separate, independent geological engineering reports (1927-1995) which verify the huge reserves at The Silver Bar (pp 11-26).

**January, 1995 Report:** In January, 1995, comprehensive testing of assays were carried out on just 1.3 acres at The Silver Bar, showing proven, in-place reserves of over $109 million (pp 25-26). Total proven reserves exceed $2 billion.

**Patented Process:** A patented recovery process for copper produces copper in a pure powder form. Costing only $.40/lb to produce, it sells for up to $14.00/lb (pp 28-33). This process also avoids the need for a costly smelter.

**Pilot Plant:** A small pilot plant is in place (pp 34-35).

**Funding Requirements:** $5.3 million will increase production to 15,000 tons per day, producing over $6 million per month in gross revenues (pg 43).

# I. INTRODUCTION

The writer was asked to highlight chronologically the history of the Silver Bar Mine Project. This report is based on detailed research and study of all available literature from the United States Geological Survey at Tucson, Arizona; the Minerals and Mining Division of Arizona State University at Phoenix Arizona; Bureau of Mines in Washington, DC; and other available professional geological geophysical, geochemical, engineering and metallurgical reports.

The writer examined the various surface and underground workings and confirmed by sampling and assaying the precious and base metal open pit and open cut mining and milling in progress by the Mineral Mountain Mining Company personnel.

# II. LOCATION AND ACCESS

The Silver Bar property is located approximately 50 lineal miles southeast of Phoenix, Arizona and 68 miles north-northwest of Tucson, Arizona. The property is located 10 miles northeast of Florence, Arizona (the county seat of Pinal County), and 20 miles southwest of Globe, Arizona.

There are two accesses to the property, the most direct being five miles south of Florence Junction via Highway 80, 89 to Cottonwood Canyon drainage. Proceed east 5-1/2 miles on good all-weather gravel road to the entrance of the Cottonwood Canyon and across a cattle guard followed by the next right, or southeast, for one mile to the mill site. The mill site is located in the southwest corner of Section 8, Township 3 South, Range 11 East, G.S.R.B. and M. The second access is located 3-1/2 miles east of Florence Junction on Highway 60, 70. It is eight miles to the south and southeast over good all-weather gravel road to the center of the property in Cottonwood Canyon. The location is shown on the Mineral Mountain, Arizona Quadrangle 7.5 minute 1964 series topographic map.

The Silver Bar property lies in the Mineral Mountain Mining District, mainly on and north of Mineral Mountain in Pinal County, Arizona. It is located in Sections 3, 4, 5, 6, 7, 8, 9, 10, 16, 17, 18, 32, and 33 of Township 2 and 3 South, Range 11 East, Gila and Salt River Base and Meridian.

# III. PROPERTY

**Part 1** --The patented ground (formerly known as Moon property) includes 37 claims; a total of 719 acres is shown in red on mining claim map (Exhibit 1).

**Part 2** --The Hansen Silver Bar Claims include 32 mining claims and 640 acres, outlined in silver on the mining claim map (Exhibit 1). These claims consist of:

SB 1-20
Juanita 1-6
Omega 1-4
SB Millsite
Second Chance

**Part 3** --The peripheral unpatented mining claims total 179 claims and 3,206 acres, as follows:

SBN 15-31
SBN 33-63
SBN 66-68
SBN 71-75
SBN 77
SBN 82-83
SBN 136-143
SBN 144-154
SBN 85-87
SBN 90-135
Silver Bar A, B and C

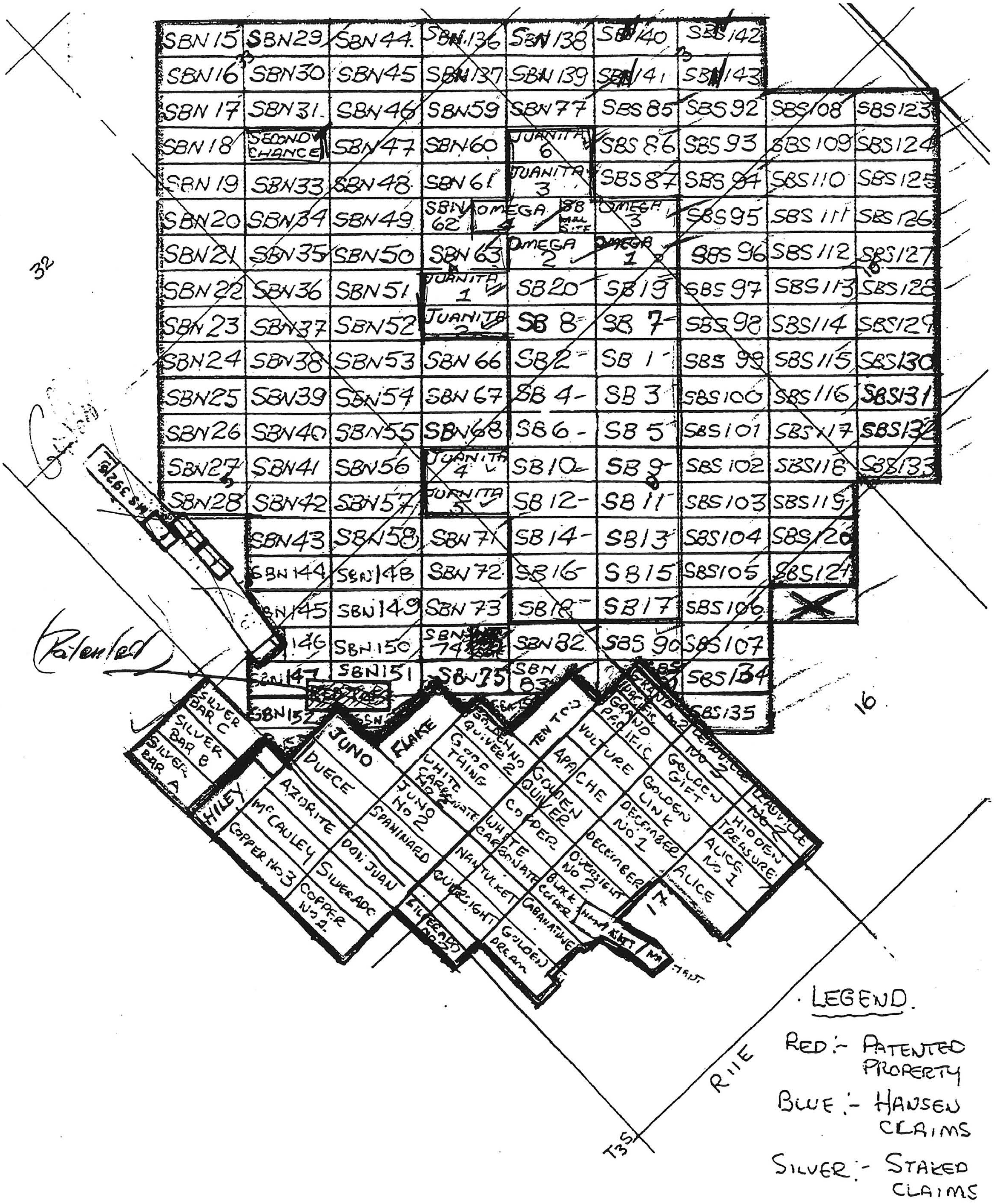
| | |
|---|---|
| 719 | Patented Ground |
| 640 | Hansen Silver Bar |
| 3,206 | Peripheral Unpatented Mining Claims |
| **4,565** | **Total acreage** |

The above claims are located in Sections 3, 4, 5, 6, 7, 8, 9, 10, 16, 17, 18, Township 3 South, Range 11 East and Sections 32 and 33, Township 2 South, Range 11 East, Gila and Salt River Base and Meridian in Pinal County, Arizona.

The title work of the 719 acres of patented land was completed by United Title on December 9, 1994. Taxes for the four parcels for the period mid-1993 to mid-1994 were $1,160.29 and due as of December 31, 1994. Both the 32 Hansen Silver Bar and the 178 Peripheral Unpatented Mining Group Claims were in good standing with Pinal County and the Bureau of Land Management until August 31, 1995. A $100-per-claim fee at that time will place the two groups in good standing until August 31, 1996. The Quit Claim Deeds of the Hansen Silver Bar Group of 32 claims were deeded to Mineral Mountain Mining Co. by the three owners: Robert J. Dierking, dated March 17, 1994; Wayne W. Hansen, dated March 18, 1994; and Frank A. Clark, dated April 14, 1994.

**Exhibit 1**

# MINING CLAIM MAP



## IV. REGIONALLY ACTIVE PRODUCING MINES AND PRODUCTION IN THE IMMEDIATE VICINITY OF THE SILVER BAR MINE

Arizona continues to rank as the nation's leading minerals producer. As it has since 1910, Arizona leads the nation in copper production. A total of 2.542 billion pounds of copper was produced in 1992, 65% of the U.S. total. In addition, Arizona is among the leaders in the production of molybdenum and silver (Exhibits 2, 3, 4, & 5).

Summarized below are some of the active mines listed by the Arizona Department of Mines and Mineral Resources.

| Map # | Plant and Description |
|---|---|
| 17 | **Arimetco Inc.** is rehabilitating the Van Dyke Mine, which adjoins Magma's underground Miami Mine. |
| 18, 4 | **Asarco Inc.** operations consist of the Hayden copper smelter and the Ray Mine and Concentrator. The Ray Mine consists of an open pit mine, two mills, a 26,000 ton-per-day concentrator at Hayden and a newly-commissioned 30,000 ton-per-day concentrator at Ray, dumps and heap leach operation, and a 40,000 ton-per-year SX-EW[1] plant at Ray. Output from the new mill made Ray the second largest producer in the state in 1992. Reserves are 1.1 billion tons. This puts the Ray Mine in an elite group of three deposits in the U.S. with reserves in excess of one billion tons. Ray copper production in 1992 was 331,108,908 pounds. |
| 7 | **Cyprus Climax Metals Company** was Arizona's second largest producer of copper in 1992 and continues to be the largest producer of molybdenum. The Miami property consists of three open pit copper mines formerly known as Inspiration, Bluebird and OxHide, an SX-EW plant, a smelter recently expanded to a capacity of 650,000 tons per year, an acid plant, SX-EX plant, electrolytic refinery, a 135,000 tons-per-day rod plant, and a 24,000 ton-per-day concentrator. The Miami Mine produced 124,575,000 pounds of copper in 1992. |
| 19, 20, 6 | **Magma Copper Company:** There are two mining divisions in the area: the Pinto Valley and the Magma underground mine. The Pinto Valley Mine in situ and Miami No. 2 are tailings leach operations. The Pinto Valley Mine consists of an open pit mine, a 63,000 ton-per-day concentrator, dump leach, and an 8,000 ton-per-day SX-EW plant. The Pinto Valley operations (#19) |

---

[1] SX-EW: Copper oxide and certain sulfide ores are amenable to treatment by heap leach, treated with a dilute sulfuric acid.

produced 180,331,000 pounds of copper in, while the Magma Miami Mine (#20) produced 19,504,000 pounds of copper in 1993. The Magma underground mine (#6) produced 24,401,786 pounds of copper. The average grade in 1992 was 5.56% copper per ton, ten times the average content of the Arizona copper ore.

8 **Magma's Conoco Inc. deposit** was purchased in 1992. The purchase price is listed between $15 million and $22 million. This deposit has ore reserves listed at 2.2 billion tons of .37% copper oxide ore and 3.9 billion tons of .39% copper sulfide ore per ton, for a total of 6.1 billion tons -- no doubt one of the biggest deposits in the world. Magma is planning to be in production by 1997, with an estimated cost of $100 million. This property appears to adjoin the Company's Silver Bar Mine to the southwest.

Exhibit 2

# PRODUCTION OF BASE METALS AND PRECIOUS METALS FROM MINES IN THE IMMEDIATE VICINITY OF THE SILVER BAR MINE

## Gila and Pinal County, Arizona

| Company | Date | Copper (tons) | Lead (tons) | Zinc (tons) | Gold (oz) | Silver (oz) | Molybdenum (tons) |
|---|---|---|---|---|---|---|---|
| Pioneer Superior Mine (Magma) | 1875-1981 | 1,175,752 | 138 | 38,623 | 705,500 | 40,618,000 | |
| Miami Inspiration Mine (Cyprus) | 1899-1981 | 5,234,508 | 462.5 | 4.5 | 136,000 | 9,358,000 | 10,290 |
| Mineral Creek Mine | 1905-1981 | 2,795,975 | 6,061 | 10 | 1,900 | 2,257,000 | |
| Mineral Hill and Mineral Mountain Mines | 1887-1977 | 254.7 | 214 | 23 | 191,000 | 2,258,000 | |
| Miami Inspiration, Pinto Valley, Oxide, and Miami Mines combined | 1982-1992 | 828,487 | | | | | |

**Exhibit 3**

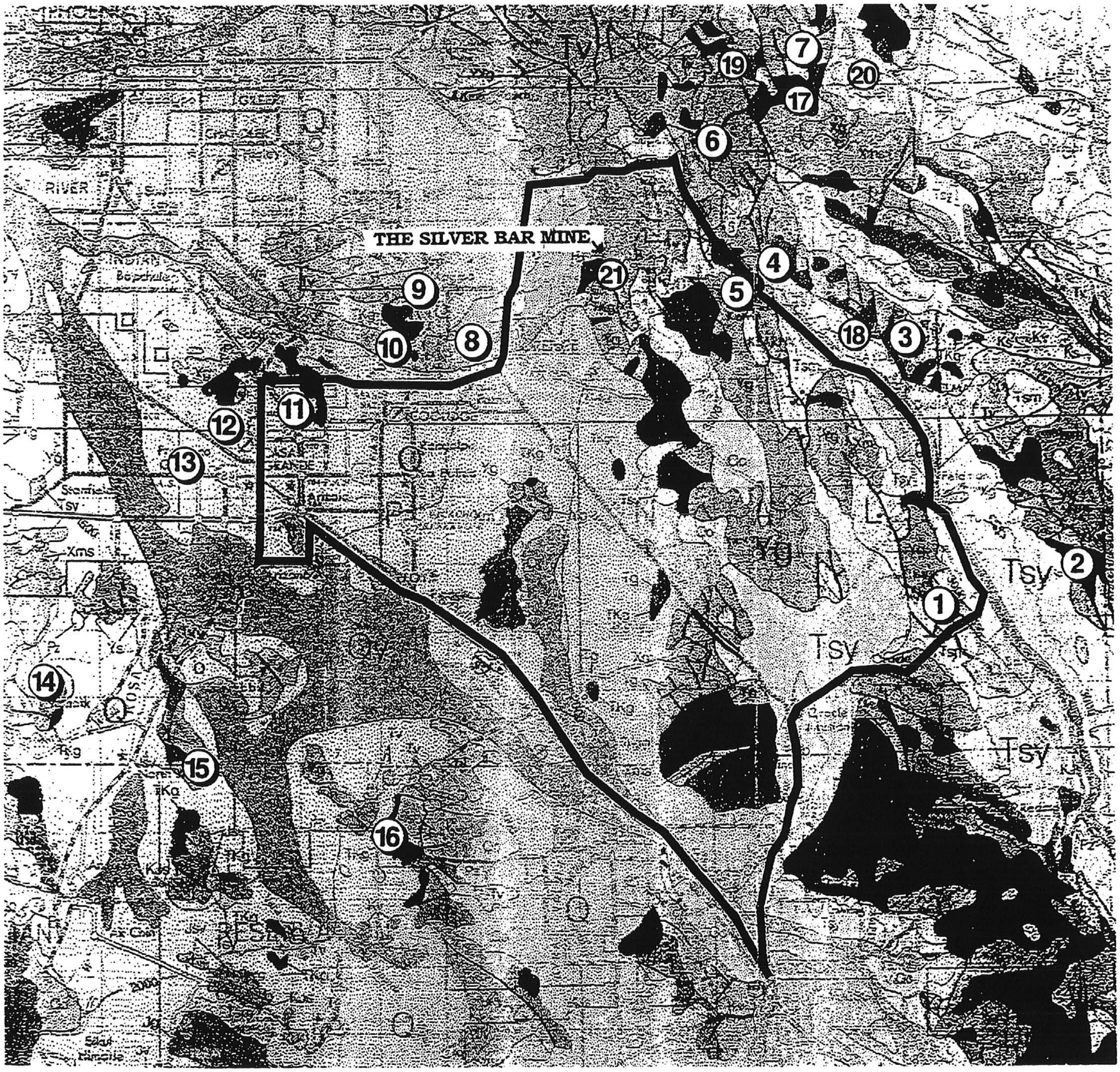
# 1992 MINE RANKING BY PRODUCTION OF MINES IN IMMEDIATE VICINITY OF THE SILVER BAR MINE

## (Copper Production Only)

| Rank | Mine/Company | Production (lb) | % of total |
|---|---|---|---|
| 2 | Ray/Asarco Inc. | 331,108,985 | 13.0 |
| 3 | San Manuel/Magma Copper Co. | 330,141,371 | 13.0 |
| 6 | Pinto Valley/Magma Copper Co. | 180,331,000 | 7.1 |
| 7 | Sierrita/Cyprus Copper Co. | 147,840,000 | 5.8 |
| 8 | Twin Buttes/Cyprus Copper Co. | 140,144,000 | 5.5 |
| 9 | Miami/Cyprus Copper Co. | 124,575,000 | 4.9 |
| 10 | Superior/Magma Copper Co. | 24,401,786 | 1.0 |
| 11 | Miami/Magma Copper Co. | 19,504,000 | 0.8 |
| 12 | Silver Bell/Asarco Inc. | 6,650,000 | 0.3 |
| 13 | Johnson/Arimetco International Inc. | 8,156,435 | 0.3 |

**Exhibit 5**

# GEOLOGICAL MAP OF ACTIVE AND INACTIVE PORPHYRY COPPER DEPOSITS



Please refer to Appendix A for explanation of map units.

# V. PAST PRODUCING MINES WITHIN A 3-MILE RADIUS OF MINERAL MOUNTAIN AND THE SILVER BAR MINE

| | | |
|---|---|---|
| Ag, Pb, Zn, & Au | 191A<br>P | **Ajax** -- The workings include a shaft and three levels. The vein was traced for 3,100 ft. through Mineral Mountain. Alternate names include Orphan Boy, Juno, Jumbo and Silver Peak. |
| Au & Ag | 188<br>P<br>Middle Camp | **Arizona Gold** -- Alternate name: Middle Camp. Had ore reserves of 10,500 tons averaging 0.63 oz. gold and 10 oz. silver per ton. Had 40 diamond drill holes. This mine is still in production. |
| Au & Ag | 212E<br>P | **Arizona Silver Queen** -- Alternate name: Havelana Group. |
| Cu, Ag, Au, Pb, & Zn | 190 | **Coronado** -- Workings consisted of 185-ft incline shaft and 185-ft vertical shaft interconnected. The property has rich gold pockets. Alternate names: Apache and Wall. |
| Au | 216<br>P | **B&G Mine** -- Surface gold ore body. |
| Au, Au & Ag | 208C<br>P | **Desert King** -- Underground. Alternate names: Newberry and Arizona King. |
| Cu, Ag, Pb, & Zn | 191B<br>P | **Blue Crystal** -- Workings consist of 750-ft shaft; veins are parallel with the Woodpecker Mine. |
| Au | 187A<br>P | **Chakaverde** -- Both surface and underground workings consist of four levels to the 375-ft level. Ore reserves shown of 40,590 tons grading 0.16 oz. gold per ton. |
| Ag | | **Gorman & Hall** -- Alternate name: Silver Peak. |
| Ag, Au & Pb | 186A<br>P | **Habstritts Silver** -- The workings are comprised of surface open cuts, shallow pits and 250 ft of underground tunnels, drifts and stopes. |
| Au & Cu | 208A<br>P | **Herring** -- Six shafts on the property. Alternate names: Herron and Horace. |
| Cu & Au | | **Meyer Mine**. |
| Cu & Au | 203B<br>P | **Red Top** -- Workings include shaft, a 100-ft tunnel and two winzes. Production of $100,000. |

|  |  |  |
|---|---|---|
| Ag, Mn & Cu | P | **Reymert Mine** -- Produced 2,284,000 oz. of Silver up to 1945. Ore was mined from two 400-ft shafts, 2,000 ft apart. Reserves by G.M. Colvocoresses estimated (1945) of 300,000 to 500,000 tons containing eight to ten oz. silver per ton and three to five percent Mn. |
| Ag | 218 P | **Silver Dipper** -- Surface and underground ore body. |
| Au, Ag & Pb | 180 P | **Smock** -- Development workings consist of a 100-ft tunnel and two winzes, shaft, several cuts, and trenches. Both surface and underground ore bodies occur. |
| Au, Ag, Cu, & Pb | 181 | **Sunset** -- Good past gold producer, several levels developed with depth potential. |
| Cu, Ag, Pb, & Au | 208E | **Superstition** -- Patented, blocked ore; has possibility of large low-grade copper deposit at depth. |
| Pb, Au, Ag & Cu | 195 P | **Silver Bell and Martinez** -- Two mines, both surface and underground. Workings have been developed to 400-ft depth. The ore shoots have some massive galena or lead. |

Current active producing mines in the immediate area of the Silver Bar Mine include:

Arizona Gold
Red Top
Silver Bell and Martinez

## Silver Bar Group

|  |  |  |
|---|---|---|
| Au, Ag, Cu, Pb, & Zn | Pinal ttt<br>211B<br>219A<br>211B<br>211B<br>222B<br>204<br>ttt<br>ttt | **Oklahoma Group** -- Consists of numerous surface cuts, pits, shafts, winzes, tunnels and stopes. Alternative properties included in this group: Lost Gorilla, Bonanza, Lew, Hummingbird, Alta Group, Last Chance, Marguerite, Sleeping Angel, Prince Elena, Vaughn, Greesehaw, Troxel. |
| Au, Ag, Cu, Pb, & Zn |  | **Silver Bar, Juanita and Omega** -- This property consists of numerous shafts, winzes, tunnels, large surface showings with cuts and pits. The Copper and Gold Hill deposits which will be mined initially are part of this group. |
| Ag, Au, Cu, Pb, & Zn | Pinal 204 | **Black Copper** -- Past producer, with stamp mill. Mine workings include tunnels, winzes, shafts, and stopes. |

## ;ynopsis of Ore Controls (Ray Mine)

The Ray mine is a porphyry copper deposit hosted in Precambrian Pinal Schist and liments of the Apache Group. These have been intruded by Precambrian diabase sills l were later intruded by the granite mountain porphyry of Laramide age, the probable ırce for the mineralizing solutions.

Pinal Schist is a quartz-sericite-schist within the deposit. The rock is usually soft d broken. A metarhyolite unit of the schist has a reported age of 1.66 billion years. ıe bulk of the secondary sulfide mineralization is found in this unit. The Ruin granite :roduced as batholiths into Pinal Schist is a coarse-grained quartz monzonite dated 42 billion years. The contact between the units to the southwest of the mine is often :ed as a probable control for the later intrusions and eventually the deposit itself, llowing a long period of erosion of the younger. Precambrian quartzose units of the pache Group were deposited. Cretaceous intrusions of the Tortilla quartz diorite date at ›proximately 70 million years. A younger series, the Granite Mountain porphyry dated l million years, has long been considered to be the causative (source of the mineralization ›lutions and copper) intrusion of Ray. A porphyritic granodiorite, rather than granite, the ›ck is composed of oligoclase, quartz, orthoclase, and biolite magnetite phenocrysts in an rthoclase-rich matrix.

## 'oston Butte Porphyry Copper Deposit (Conoco)

This major deposit is located west of Mineral Mountain. Precambrian rocks nclude quartz monzonite porphyry (Oracle Granite), which forms the host rock for the leposit, and Precambrian diabse dikes, aplite dikes, schlieran of biotite, and metasomatized nclusions are common within the quartz monzonite porphyry is the major host for nineralization, fracturing, brecciation, and the creation of permeable zones all related to he intrusions of laramide granodionite porphyry about 62 million years old controlled the listribution of mineralization. Chalcopyrite, the principal copper mineral, occurs in veins, veinlets and dissemination with biotite.

oversize from this scalping screen is discharging to a 48" conveyor which is the primary feed for the 7' Simons Cone. All potential dust-creating points in the crushing circuit will have dust suppression sprays applied to cut down any airborne particulates.

The Simons Cone crushes the ore to a 3/8" minus size fraction, ready for mill feed. The discharge from the Simons Cone crosses a third scalping screen where oversize material (elongated pieces) are returned by conveyor to the Simons feed conveyor. This crushing plant is capable of crushing up to 15,000 tons per day in the configuration in which it is laid out. The ultimate ore feed for the final Phase Four of the mining plan is 15,000 tons per day.

The crushing plant and processing plant, which are located on the patented ground, are powered by a set of two 600-KVA Duetsch diesel (air cooled) generators. This crushing plant has a control tower from which the crusher operator can direct the final ore stream either to the gold mill or to the pond feed system of pass-under hoppers, which can hold 350 tons of crushed ore.

The ore directed to the gold mill is picked up from a surge pile using a Reclaim Tunnel Feeder, and is placed by conveyor in a hopper on an apron feeder that feeds the flexowall conveyor system for the gold plant.

The ore being directed to the ponds goes into a 350-ton pass-under hopper. The 22-ton haulpaks are filled from the pass-under hopper and move the ore to the ore pond currently being filled.

## IX. THE PILOT PLANT

The Pilot Plant is currently being constructed on the patented ground. It is located on the patented claim known as Copper 1. This pilot plant consists of a crushing circuit with a 10″ x 12″ primary jaw and a small set of roll crushers. The crushed ore reports to a ball mill feed bin and from there is conveyed to a 3′ x 5′ Denver ball mill. This ball mill has a 40-mesh screen in place. The passing 40-mesh material reports to two pulsating jigs with the jig hutch material reporting to a 7′ x 14′ concentrating table. A concentration of "cons" and "mids" is removed at the table. The overflow from the jigs and the table reports to a sand pump and is pumped to a conditioning tank where the pH is adjusted.

The slurry from the conditioning tank proceeds to a set of four Denver Sub A flotation cells, where a flotation concentrate is removed, producing a relatively metal-free tailing stream. The tailings from the flotation cells report to a DorRco double-rake classifier, where it is dewatered and becomes a chemical-free washed sand product. The water from the rake reports to a collector tank and is pumped to a 16,000-gal settling tank where the sediment-free overflow is returned to the water system of the plant. New water is added to the circuit from a water well located in the vicinity of the pilot plant.

The three concentrate streams from this gravity and flotation plant are fed into one of seven cross-link polyethylene processing tanks in a pilot mill and lab building currently under construction adjacent to this existing upgrade plant. The three concentrate streams from a day's production in the upgrade plant report to one of the seven processing tanks. The material is placed in the processing tank, which contains a 1% $H_2SO_4$ leaching solution. Each of these processing tanks contain a mixing propeller and is constantly stirred while containing material. The leaching solution is passed through the ore and is in a closed circuit with a solution processing tank. The solution reports to the solution processing tank where the digested copper is removed from the solution as a copper powder.

The barren copper leaching solution reports to an iron removal tank where it is treated with ammonium hydroxide to remove the iron as a jarosite precipitate. The barren solution reports to a makeup tank where $H_2SO_4$ is added to make up a 1% $H_2SO_4$ (sulfuric acid) leaching solution. The jarosite precipitate reports to a centrifuge, where it is dewatered, and thereafter to a drying unit.

The newly-created 1% $H_2SO_4$ solution returns to the leaching tanks to digest additional copper. The copper leach continues until the concentrate is reasonably copper-free. At this point, the leaching solution is drained from the leaching solution tank and a gold/silver leaching solution consisting of a 5% thiourea solution is stirred and continuously monitored for pH, Eh and temperature. This leaching solution removes the gold, silver and other metals from the concentrate.

The pregnant solution is removed from the leaching tank once the digestion is completed and reports to polishing filters, where the particles are removed down to one micron in size. The clear pregnant solution now reports to an ESA reactor where the gold and silver are removed from the solution and absorbed on the charged carbon felt in the ESA reactor. The spent solution returns to a barren/makeup circuit where it is conditioned to receive more gold and silver in further leaching.

The carbon felt is stripped in an electro-winning circuit and the gold and silver are removed as a foil product from starter sheets in the electro-winning circuit. The foil is placed in a crucible and is melted with fluxing material, after which it is poured into a dore bar. These dore bars are removed to a refinery in Phoenix. All leaching and processing tanks in this pilot unit have their own containment tanks to mitigate possible spills.

The pilot plant building will also contain a complete lab facility with sample prep and analysis equipment on hand.

# X. THE RECOVERY PROCESS

As indicated previously, there are two stages in the metal recovery process. The first stage is the copper recovery stage, while the second is the recovery of other metals, or Primary Metal Recovery stage, which includes the gold and silver recovery. Copper can be recovered using the PMR recovery; however, gold and silver will not be recovered in the Copper Recovery stage unless a Primary Metal Recovery system is added as a second stage.

## A. Copper Recovery: Description of CCP Processing

The following is a general description of the Copper Cement Powder process and the technology employed in the planned Mineral Mountain Mining Co. ("MMMCo") Copper Producing Plant to be located on the Silver Bar Mine property near Apache Junction, Arizona. This process description also refers to the attached CCP Process Flow Diagram (Exhibits 11-A and 11-B).

MMMCo plans to have the copper ore mined by experienced miners. The copper ore will be mined in "open pit" style with good grade control, then trucked by 22-ton haulpaks to the crushing plant where it will be crushed to 3/8″- material.

Carbonates and oxides of copper are very porous rocks; therefore, the leaching agent in this case, dilute $H_2SO_4$ (1% solution), is able to penetrate the rock rapidly in an inundated leach mode, quickly digesting the copper. The crushed ore will then be trucked from the crushing area underpass hoppers by 22-ton haulpaks to one of the 12 operational leach ponds, which are a key part of the MMMCo Copper Cement Powder processing plant.

Each of these leach ponds are capable of holding approximately 15,000 tons of ore along with approximately 1,500,000 gal of leaching agent (dilute 1% $H_2SO_4$) per pad. Each leach pond will be lined with a double liner system equipped with a Tracetek twisted couple leak detector system, which reports back to the process control unit (PCU) in the mill. This system goes to alarm if the upper liner is penetrated. At all times, the lower line maintains the leach pond's integrity. Upon alarm, the PCU indicates precisely where in the liner the leak has occurred, and a copy of the pond overview can be printed to give the exact location for later repair when the pond is next emptied of its solution and ore.

The haulpaks containing the crushed copper ore begin the loading of a pond by backing up to the shallow end and dumping the ore. They continue moving out onto the previously deposited ore as they progress with the pond filling. Once dumped, the ore is push-spread over the total area of the pond by a bulldozer equipped with wide service tracks.

## Exhibit 11-A

# CCP PROCESS FLOW DIAGRAM

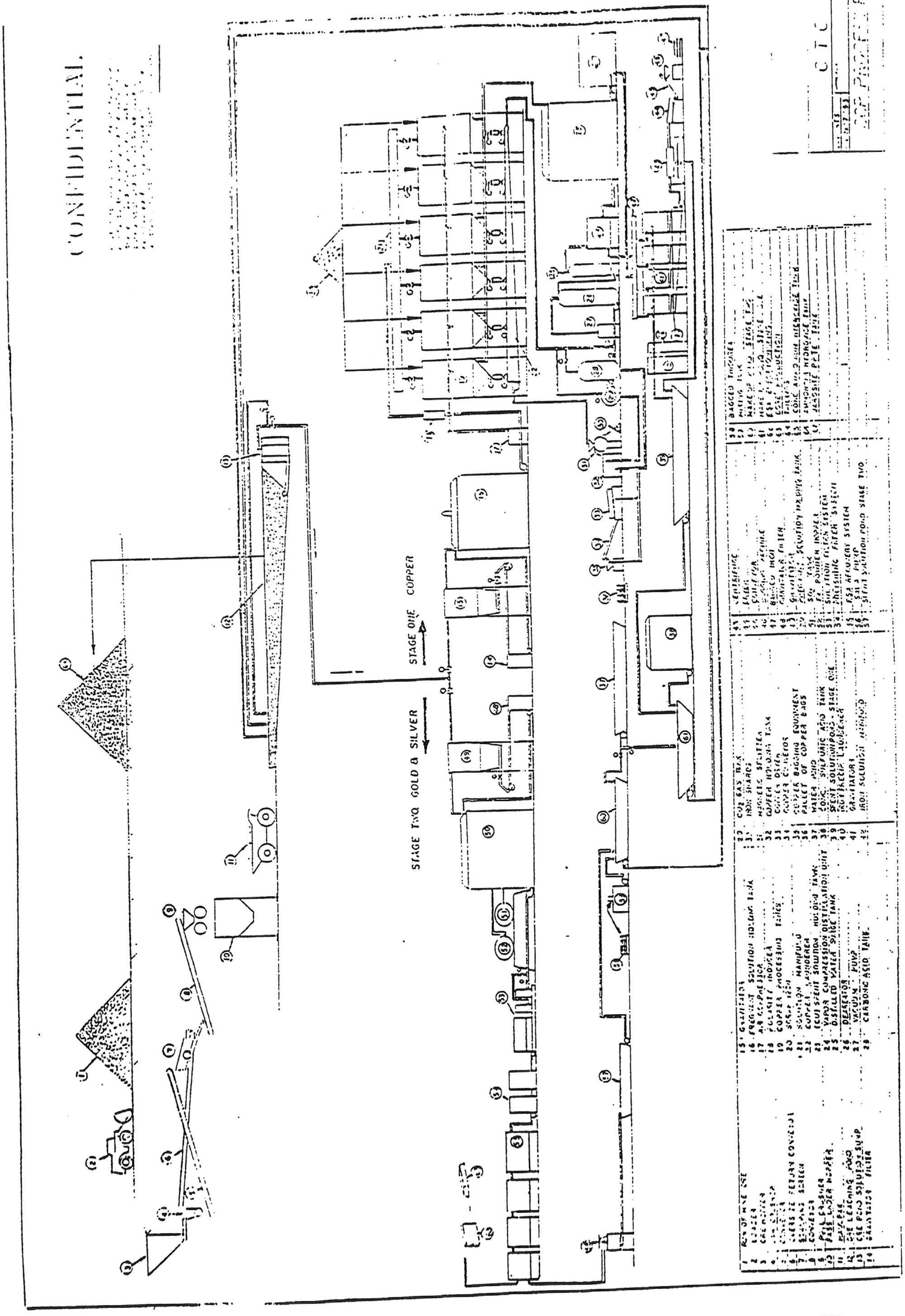
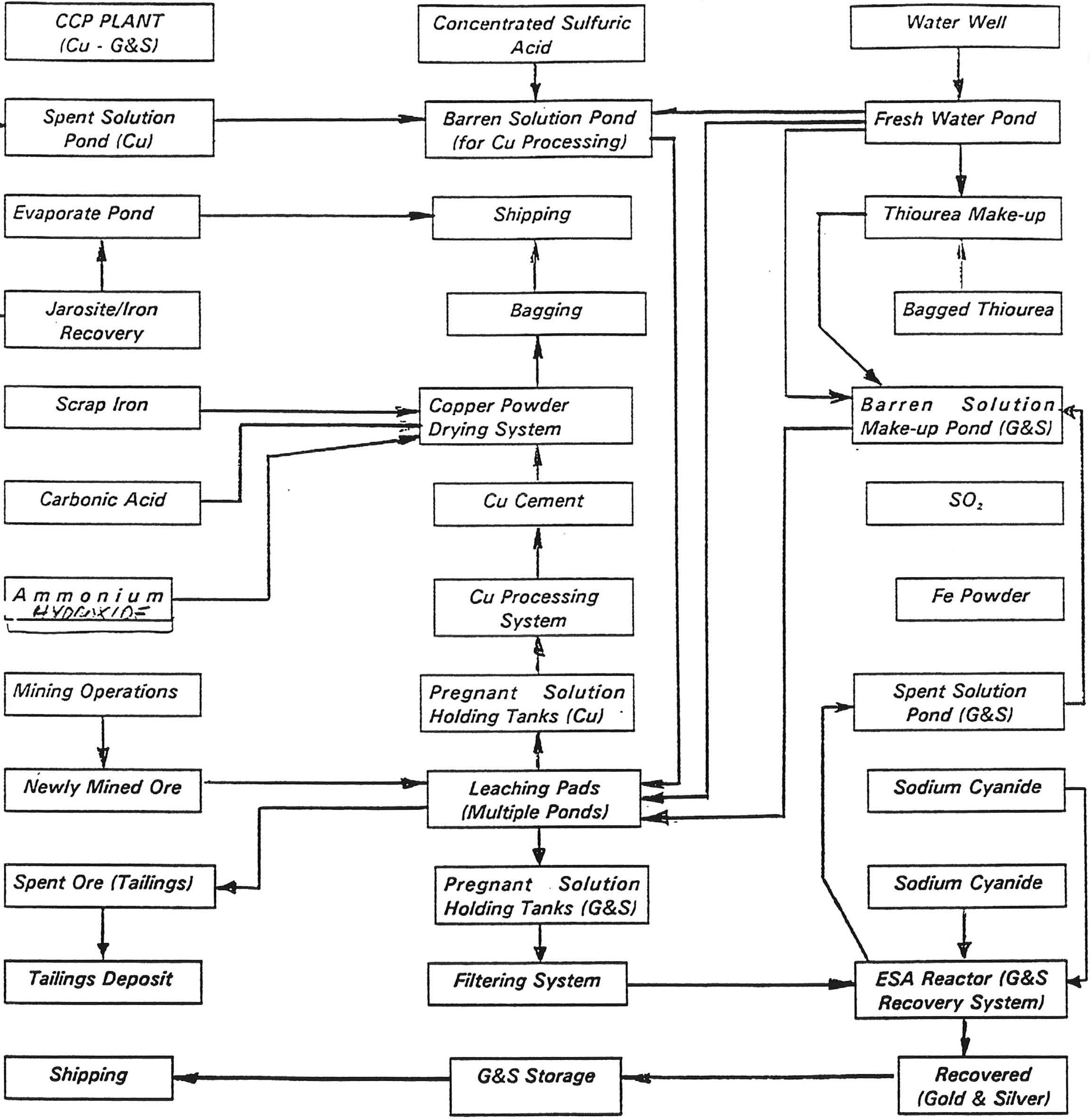


Exhibit 11-B

# CCP PLANT PROCESS FLOW DIAGRAM: Copper + Gold & Silver Recovery



On a normal day, one leach pond is emptied and another one filled, allowing for approximately 15,000 tons per day movement of copper ore from the mine to the ponds, and a like amount transferred from the ponds to the final depository for the processed ore. Once the ore is spread throughout the pond and the ore handling equipment removed, the barren leaching solution is added to the pond from the leachant makeup pond.

The leachant makeup tank is continuously made up and filled with a 1% dilute $H_2SO_4$ using concentrated acid from one of the two concentrated acid tanks and water from the fresh water pond. Once the leachant has been added to the pond, the $H_2SO_4$ digests the copper and makes a copper sulfate ($Cu_2So_4$). The copper sulfate solution, now called the pregnant solution, can be recirculated by submersible pumps (4″) located in the pregnant solution pickup tanks. There are two pregnant solution pickup tanks located in the deep end of each pond; therefore, there are four submersible pumps (4″) capable of handling approximately 600 gpm per pump on each pond.

The pond sump tanks are cross-link polyethylene tanks, inert to most chemicals including dilute sulfuric and dilute thiourea acids. Each of these sump tanks are housed within containment tanks with normally closed stainless steel knife gate valves (computer operated) controlling the leach pond solution effluent. The containment tanks have a capacity of approximately 14,000 gal each with the pond discharge pipe (12″) automatically closing during any power failures. The sump pumps are valved to either send the pregnant solution to the holding tanks or recirculate the solution back to the shallow end of the pond in order to increase the copper sulfate concentration level within the pond prior to the processing of the pregnant solution to remove the copper.

The valves on these pumps are controlled by the PCU, which continually samples the pond stream to ascertain the $Cu_2So_4$ concentration level in order to assure continuously delivering an acceptable $Cu_2So_4$ concentration level into the process tanks. The pond stream samples flow through a centrifugal filter at the pond and then on to an auto stream sampler located in the CCP building. This auto stream sampler has 24 channels representing each of 12 ponds and the corresponding 12 spent solution streams after processing. The process control unit communicates with an Inductively Coupled Plasma Photospectrometer (ICP) unit that requests samples from the appropriate stream. The sample is then nebulized into the ICP for metal content of copper, gold, silver, and any other appropriate metals as desired.

The sample is also analyzed for iron content and the iron form contained in the solution. When the pregnant solution is showing a $Cu_2So_4$ level greater than .35 gpm, the solution is directed from the pond to the pregnant solution holding tank, passing through a gravitator along the way. Here the particles are removed. Once in the pregnant solution holding tanks. the solution is monitored and adjusted for pH, temperature, Eh, $FE^{++}$, and $Cu_2So_4$ . When the solution is optimum on the above readings, the pregnant solution is then pumped from the holding tank to the appropriate manifolds, then into the appropriate readily available copper processing tanks. The decisions made here as to manifolds and tanks are again controlled by the PCU. At the processing tank, a crib containing scrap steel is placed into its holding position on the tank frame.

All holding tanks and processing tanks in the copper recovery process, unless otherwise noted, are black cross-link polyethylene, and each tank area will be appropriately contained in the mill with all of these containment areas generally built with concrete containment walls coated with Engard II (or equivalent) acid and base-resistant waterproof coatings. Each containment area will have the ability to contain over three times the total capacity of the entire tankage in that area and will be sumped with automatic level control pumps sending the solutions back to the appropriate holding ponds. These sumps have high-low level alarm and leak alarm systems which report back to the process control computer center.

Once the crib is in place, the processing tank lid is moved into the proper position and the tank is closed. The lid has a cross-link polyethylene expandable 12″ line that evacuates the area over the solution. The evacuated gas is put through a scrubber, and the scrubbed gas is then released into the atmosphere. Once the tank is securely closed, the PCU opens a manifold valve for that tank and fills the tank to the appropriate level (using PCU level control) with pregnant solution. The diffuser in the tank is immediately activated by the PCU and diffused air is circulated through the tank. The copper in the $Cu_2So_4$ goes to a Cu-to-Cu metallic bond and drops as Cu metal from the solution.

This Cu metal is pure and has a fineness of 70% less than 10 microns. The copper drops through the solution to the bottom of the cone-shaped process tank. At the bottom of the tank, the PCU opens the upper valve in the copper collection chamber and closes the bottom valve. The copper continues to fall as pure copper until the copper collection chamber indicates that the chamber is approaching a state of full capacity (350 lb of copper). The top valve on the chamber is then closed, and the copper deposited in the chamber is purged with an inert gas that stops the copper from oxidizing. Once this purge is completed, the copper is removed ("dropped") from the chamber by opening the bottom valve and pushing the copper out, using an inert gas push. The copper is fed, in an inert atmosphere, to the magnetic separator to remove any iron shards and then into an inert atmosphere dryer, where the copper is dried in an oxygen-starved environment.

The dried copper can now be pelletized into copper briquettes (4″x4″x3″) or can be directly bagged into "super saks", or 40-lb plastic lined bags. Each of these super saks, containing 1.5 metric tons of copper, are then palletized and shipped by truck to the loading docks at Long Beach, California for sea shipment, if appropriate, to the customer (Kanematsu, for example).

Once the copper drops from the solution, the solution is considered spent and is sent to an iron removal system. For each pound of copper produced, .8 lb of iron becomes a sacrificial cathode to the solution. The iron enters the solution as $FE^{++}$. This $FE^{++}$ goes through several chemical reactions to become FeO which, when precipitated from the solution, can be dried and bagged for use as a fertilizer base product. This $FE^{++}$ is also made available to the thiourea PMR System. The spent solution is now sent to a spent solution holding pond where it is monitored for $Cu_2So_4$, iron and pH, then pumped to the leachant solution makeup pond to be reconstituted as barren solution and reused.

The copper process described above is a closed-circuit, zero-discharge circuit save, except for the copper and iron products being removed as commodities and the scrubbed gasses removed from the process tanks and exhausted to the atmosphere. The gasses should now be non-offensive to the atmosphere. The dilute sulfuric acid (1%) used in this leaching process is contained throughout the plant, with a number of man showers and eyeball showers appropriately located for treating inadvertent splashes to employees.

The $CO_2$ gas used in limited amounts as an inert atmosphere over the copper is vented to the atmosphere. The dilute ammonium hydroxide (5%) used in the Jarosite precipitation has its own containment area and the emitted gasses are scrubbed in that area for ammonium fumes.

## B. Primary Metal Recovery

In the PMR system, most cationic metals can be recovered from the ore including gold, silver and copper. The first PMR system that will be put into operation at this site will include a fluidized bed tank leach system. The tank plant for this system has been purchased from Fondaway Canyon in Nevada. This closed-circuit system has many unique features for dealing with ore.

### 1. The Tank Process

In order to initialize this process, a 1,200-lb sample of the metal-bearing ore is run in a sample leaching program using the same leaching technology as is planned in the ore processing system. In addition to the anticipated leaching cycle times and mass balance, the 1,200-lb sample generates the software package for the processing plant. The processing plant, with its software in place, now runs the ore program in the manner described below.

A processing tank (one of four in the plant) is charged with 120 tons of warm water taken by pumps from the fresh water pond. This water is now subjected to air injection from the tank's air grid system. The process computer now calls for an 80-ton ore charge to be fed into the tank. The flexowall shuttle conveyor conveys the ore to the top of the tank (approximately 65 ft up), and the 3/8-in minus ore falls into the air-charged water. The ore now becomes fluidized and, once 80 tons have been introduced into the tank, the top level of this fluidized bed is brought up to the desliming launderer in the tank top and the slimes are removed form the ore bed.

A turbidity and clarity sensor informs the computer when the desliming step has been completed, and the water-adding system is turned off. The water is then drained from the processing tank and the initial leaching agent is fed into the tank and fluidized. The slimes from the ore pass through a high-speed three-step solid/liquid separation system, with the solids going to green-balling and the liquids returning to a makeup pond. The dried green balls, or pellets, are returned to the ore pile.

Once the leaching agent is in the tank and is fluidized, the process computer system controls the leach in the following manner:

Each of the four processing tanks is in some stage of the processing cycle at all times. A swik kleen sampler on each process tank generates a real-time liquid sample that is sent to the Auto Stream Analyzer. The sample, if uncalled for, is sent to a sample dump tank and then to a solution makeup pond.

The process control computer can call for a sample from any of the four process tanks at any time. The sample is called for as follows:

The Operator Interface Unit (OIU) of the process control computer pulls up the standard graph for the ore body that was generated in the software package. The computer then signals the ICP unit (Inductively Coupled Plasma Photospectrometer) that it wants to read the sample from, for example, Process Tank 4 (PT4) for gold. The ICP unit informs the Auto Stream Analyzer that a sample is required form the PT4 channel. The PCU (Process Control Unit) in the Auto Stream Analyzer redirects the PT4 channel to the nebulizer in the ICP unit and the sample is read by the ICP unit. The Auto Stream Analyzer than purges itself, recalibrates, and awaits another call.

The ICP unit reads the spectrum of up to 73 metals and measures the change of intensity in the solution of the metals in the scan, producing an X-Y plot that is sent to the OIU of the process computer. This plot is plotted on the Metal Standard Graph for the particular metal, and the computer scans the graph, or curve, for EI (economic infeasibility) on that metal. Once EI is noted, the leach for that metal in PT4 is terminated. When the leach is terminated for the desired metals in the system, the air to the tank is turned off, the pregnant solution is drained to the holding tank, and the ore is quickly neutralized, rinsed and removed from the process tank to solid/liquid separation. The rinse solution reports to a makeup pond and the dewatered spent ore reports to a tailings pile for removal to tailings use.

During the above leaching process, which is carried out using thiourea as the leaching agent, a computer keeps the solution in balance and stabilized by using appropriate sensors. Once the process tank has been emptied of the solution and ore charge, the computer system prepares it for the delivery of new, fresh warm water to restart the process in that particular tank. Using thiourea as the leaching agent, a typical gold/silver leach should take approximately four hours for all of the stages of one cycle.

### 2. The Electro-refining Step

Once the thiourea solution has digested the metals from the ore based on the leaching graphs, the solution is now called a metal pregnant solution. This pregnant solution, once drained from the process tank, reports to a holding tank and then to a primary filtering system. The primary filtering system removes any particulates above 15 microns in size. The pregnant solution then reports to a polishing filter, where particulates down to one micron are removed. The clear pregnant solution now reports to an ESA (Expanded Surface Area) reactor, where the cationic metals are removed.

The above process is called "electroloading" of the metals. The cathodic frames from the presses, once loaded, are removed by an AGV (Automated Guided Vehicle). The AGV, carrying ten cathodic frames loaded with metal, moves these frames to an electro-winning ESA Reactor and places them in the reactor. The electrowinning reactor removes the metals and places the appropriate metals on Titanium starter plates. The AGV removes the starter plates when they are loaded and places them in a high-security stripping vault where the sheets of gold, silver or copper are stored prior to removal to a metals buyer.

The electro-refining area of the plant is located in a high-security area adjacent to the copper processing area.

# XI. KEY INVESTMENT CONSIDERATIONS

The initial funds of $1.2 million and subsequent $4.3 million earmarked for the mining and milling will take place in four graduated phases.

Phase One is underway with the pilot plant. The gravity circuit for the gold and silver recovery is operating, while the floatation circuit is being phased in. Also, the Phase One 2,400-ton plant site is being prepared. The two open pits, the Copper Hill and Gold Hill, have been opened up and can supply the mill feed needed for operation of Phases One through Four.

The total funds of $5.5 million, based on the conservative engineering business plans examined, will generate the funds needed to phase in the 15,000-ton-per-day operation (Phase Four). The cash flow generated from the 2,400-ton-per-day operation alone will net the Company a conservative $6 million per month. The writer has confirmed both ore reserves at the Copper Zone and the Gold Zone. Ample reserves are available at this time, but additional definitive ore reserve drilling will be essential.

## XII. CONCLUSIONS

Based on this writer's 38 years of mining experience with porphyry copper and gold deposits, the Silver Bar Group has the earmarks of becoming a major mining operation for the following reasons:

1. ? Consolidation of seven square miles of contiguous property.
2. B.S. Similar structure on geological host rock which controls the ore bodies within the district.
3. B.S Three major regional structural lineament appear to control the major copper producers in the district.
4. B.S Historically, the area has been a good producer of gold and silver.
5. B.S In the immediate area of the largest producing copper and silver mines in the United States.
6. B.S Three of the biggest copper reserves in the country of over 1 billion tons each.
7. B.S This area has lead U.S. copper production since 1910, and production is growing.
8. ? A diversification containing both precious metals of gold and silver plus base metals of copper, lead, zinc, and molybdenum.
9. Good grades and widths of ore from the Copper and Gold Hill of over 100 ft.
10. Practically no initial stripping ratios.
11. Recent results by the writer averaging 3% copper over widths of 100 ft plus lead, zinc, silver values, and good gold results.
12. Low cost open pit mining methods will be utilized.
13. B.S New technology in the recovery of pure copper powder on the property, plus gold and silver.
14. The new technology will reduce costs significantly over other major producers.
15. The expertise of the key personnel in all phases of the operation (see Exhibit 9) and placing the main plant on-stream in relatively short period of time.
16. Strength in the recent copper, gold and silver price, and good price over the next two years were substantiated by top analysts.
17. B.S The property contains both low- and high-grade deposits, which is ideal for blending the ores and maintaining an economic balance.
18. B.S A consolidation of over 15 past-producing gold, silver, lead, and copper mines.
19. Conservative ore reserves from the Copper and Gold Zones of 1,650,000 tons, containing a gross value of $110 million. Both ore bodies are wide open along strike and to depth.
20. B.S. Processing plant will cost only $5.5 million, compared to $50 to $75 million for comparative mining operations.

# APPENDIX A

## Explanation of Map Units

(Exhibit 5)

# EXPLANATION

## MAP UNITS

| | |
|---|---|
| Qy | Young alluvium (Holocene to latest Pleistocene)—Deposits in present-day river and stream channels, flood plains, and playas. |
| Q | Surficial deposits (Holocene to middle Pleistocene)—Alluvium in present-day valleys and piedmonts, eolian deposits, and local glacial deposits. |
| Qo | Older surficial deposits (middle Pleistocene to latest Pliocene)—Alluvium with less abundant talus and eolian deposits. |
| QTb | Basaltic rocks (Holocene to late Pliocene: 0 to 4 Ma). |
| ■ | Volcanic rocks (Quaternary to late Pliocene)—Rhyolitic to andesitic rocks associated with unit QTb. |
| Tsy | Sedimentary rocks (Pliocene to middle Miocene)—Units deposited during and after late Tertiary normal faulting, sedimentary parts of the Bidahochi Formation, and the Bouse Formation; commonly capped by patches of Quaternary surficial deposits. |
| Tby | Basaltic rocks (Pliocene to late Miocene: 4 to 8 Ma). |
| ■ | Volcanic rocks (Pliocene to middle Miocene: 4 to 15 Ma)—Rhyolitic to andesitic rocks associated with units Tby and Tb. |
| Tb | Basaltic rocks (late to middle Miocene: 8 to 16 Ma)—Units, such as the Hickey Formation, erupted after most mid-Tertiary volcanism and tectonism. |
| Tsm | Sedimentary rocks (middle Miocene to Oligocene: 15 to 38 Ma)—Deposited during mid-Tertiary orogenic activity in the Basin and Range Province and southwestern Transition Zone. |
| Tv | Volcanic rocks (middle Miocene to Oligocene: 15 to 38 Ma)—Silicic to mafic flows and pyroclastic rocks; includes some subvolcanic intrusions. |
| Tsv | Volcanic and sedimentary rocks (middle Miocene to Oligocene). |
| ■ | Subvolcanic intrusive rocks (middle Miocene to Oligocene). |
| ■ | Granitoid rocks (early Miocene to Oligocene: 18 to 38 Ma). |
| Tso | Sedimentary rocks (Oligocene to Eocene or locally Paleocene)—Units deposited on the Colorado Plateau and Transition Zone prior to or during the initial phases of mid-Tertiary volcanism; many units were deposited by drainages flowing north and east onto the Colorado Plateau; includes "rim gravels" and associated finer grained rocks along the Mogollon Rim; also includes Chuska Sandstone; some units, especially those in the Transition Zone, may overlap in age with unit Tsm. |
| ■ | Granitic rocks (early Tertiary to Late Cretaceous: 45 to 75 Ma)—Commonly muscovite-garnet-bearing peraluminous granite and associated pegmatite. |
| ■ | Granitoid rocks (early Tertiary to Late Cretaceous: 55 to 85 Ma)—Generally metaluminous granite to diorite and subvolcanic porphyry. |
| Kv | Volcanic rocks (Late Cretaceous; early Tertiary near Safford)—Rhyolitic to andesitic volcanic rocks and locally associated sedimentary and subvolcanic intrusive rocks. |
| Kmv | Mesaverde Group (Late Cretaceous)—Yale Point Sandstone, Wepo Formation, and Toreva Formation. |
| Ks | Sedimentary rocks (Cretaceous)—Dakota Sandstone, Mancos Shale, and related rocks near Show Low, Morenci (Pinkard Formation), and Deer Creek. |
| KJs | Sedimentary rocks with local volcanic units (Cretaceous to Late Jurassic)—Bisbee Group (largely Early Cretaceous) and related rocks, Temporal, Bathtub, and Sand Wells Formations, rocks of Gu Achi, McCoy Mountains Formation, and Upper Cretaceous Fort Crittenden Formation and equivalent rocks. |
| Jm | Morrison Formation (Late Jurassic)—Locally mapped with San Rafael Group. |
| Js | San Rafael Group (Late to Middle Jurassic)—Bluff and Cow Springs Sandstones, Summerville Formation, Todilto Limestone, Entrada Sandstone, and Carmel Formation. |
| Jgc | Glen Canyon Group (Early Jurassic)—Navajo Sandstone, Kayenta and Moenave Formations, and Wingate Sandstone. |

| | |
|---|---|
| Jg | Granitoid rocks (Jurassic)—Granite to diorite, with local alkaline rocks; includes Triassic(?) granitoids in Trigo Mountains. |
| Jsv | Sedimentary and volcanic rocks (Jurassic)—Sil Nakya, Ali Molina, and Pitoikam Formations, Cobre Ridge tuff, Rudolfo Red Beds, Recreation Red Beds, Gardner Canyon Formation, and part of the Canelo Hills Volcanics in southern Arizona; Harquar formation and rocks of Slumgullion in western Arizona. |
| Jv | Volcanic rocks (Jurassic; locally latest Triassic)—Mount Wrightson Formation, part of Canelo Hills Volcanics, Mulberry Wash Volcanics, Black Rock Volcanics, and equivalent rocks. |
| JŦR | Sedimentary and volcanic rocks (Jurassic and Early Triassic)—Buckskin Formation, Vampire Formation, and Planet Volcanics in west-central Arizona. |
| ŦRc | Chinle Formation (Late Triassic)—Shinarump Conglomerate Member ( ŦRcs ) mapped separately in most areas. |
| ŦRm | Moenkopi Formation (Middle[?] and Early Triassic) |
| Mzo | Orocopia Schist (Jurassic protolith; Cretaceous metamorphism) |
| MzPz | Mesozoic and Paleozoic rocks—Structurally complex Jurassic, Triassic, and Paleozoic rocks in west-central Arizona. |
| Pz | Paleozoic rocks, undifferentiated. |
| P | Sedimentary rocks (Permian)—Kaibab Limestone, Toroweap Formation, Coconino Sandstone, San Andres Formation, and Glorieta Sandstone on the Colorado Plateau; age-equivalent rocks in the Basin and Range Province and Transition Zone are included with unit PP. |
| PP | Sedimentary rocks (Permian and Pennsylvanian)—Hermit Shale, Supai Group, Naco Group, De Chelly Sandstone, Cutler Group, Pakoon Limestone, Callville Limestone, and Queantoweap Sandstone. |
| [illegible] | Sedimentary rocks (Mississippian to Cambrian)—Redwall Limestone, Temple Butte Limestone, and Tonto Group in northern Arizona; Escabrosa Limestone, Percha Shale, Martin Formation, El Paso Limestone, Abrigo Formation, and Bolsa Quartzite in southern Arizona. |
| Ys | Sedimentary rocks (Middle Proterozoic)—Grand Canyon Supergroup (locally Late Proterozoic), Apache Group, Troy Quartzite, and local basalt flows and diabase. |
| [illegible] | Diabase (Middle Proterozoic; 1100 Ma). |
| Yg | Granitoid rocks (Middle Proterozoic; 1400 Ma). |
| YXg | Granitoid rocks (Middle or Early Proterozoic; 1400 Ma or 1650 to 1750 Ma). |
| Xg | Granitoid rocks (Early Proterozoic; 1650 to 1750 Ma)—Granite, granodiorite, tonalite, quartz diorite, diorite, and gabbro, commonly foliated. |
| [illegible] | Quartzite (Early Proterozoic; 1700 Ma)—Mazatzal Group and similar rocks. |
| Xm | Metamorphic rocks (Early Proterozoic; 1650 to 1800 Ma)—Undifferentiated metasedimentary, metavolcanic, and gneissic rocks. |
| Xms | Metasedimentary rocks (Early Proterozoic; 1650 to 1800 Ma). |
| Xmv | Metavolcanic rocks (Early Proterozoic; 1650 to 1800 Ma). |

## MAP SYMBOLS

| | |
|---|---|
| — | Contact |
| — | Fault |
| — | Low-angle normal fault |
| — | Detachment fault |
| — | Thrust or reverse fault |
| ▨ | Middle Tertiary mylonitic fabric; lined pattern is approximately parallel to lineation. |
| ░ | Mesozoic to early Tertiary metamorphic fabric in Proterozoic to Mesozoic sedimentary rocks |

# APPENDIX B

## Resumes of Key Personnel

Tel. No: 929 0460

# GRAHAM C. DICKSON

Curriculum Vitae

**CELEC INC.**
Vancouver, Canada
1993- present
A company manufacturing process equipment for the mining industry.

Responsible for development of patents, fabrication, assembly and installation of equipment.

Metallurgical test work, conceptual and detailed design and installation carried out for the following projects:

Bighorn Mine, Roddy Resources
Cuervo Mine , Glamis Gold
LW Mine, LW Mining
Reg Mill, Skyline Resources

Metallurgical test work and conceptual design carried out for the following projects:

Nickel Plate, Int. Corona.
Hope Brooke Gold, BP Selco
Mt. Nansen Mill, BYG Res.

**OROCON INCORPORATED**
Mississauga, Canada
1986- 1993

**GENERAL MANAGER**
Managed day-to-day operations, Responsible for; Accounting department and financial reports; Compensation and bonuses; Project accounting, budgeting and contract negotiations.
Managed metallurgical test laboratory
Process metallurgical test work carried out for the following mills:

Reg Mill, Skyline Resources**
Magino, Muscocho Resources**.
Magnacon, Muscocho Resources**
Dome Mountain, Teeshin Resources
Crypto Project, Noble Peak Resources
Ketza River, Canamax Resources**
Golden Patricia, Bond Gold**

(** indicates turnkey mills built by Orocon Inc.)

**HITEC ORE PROCESSING**
Mississauga, Canada
1984- 1986
An engineering/construction cmpny,

**VICE PRESIDENT R&D**
Mandate to provide laboratory and research facilities to instigate research aimed at providing new milling concepts.
Designed, installed laboratory facilities in both Canada and USA.

Conceptual and detailed design of 1600 tpd milling facility, field engineering, construction management, mill commissioning and operator training carried out for the following mill:
Fondaway Canyon, Millcreek Mining

Metallurgical test work carried out for the following corporations:

St. Joe Minerals
Barrick Resources
Sullivan Mines
Gordex Minerals
Aurtec
BP Selco
Falconbridge
Noble Peak Resources
Biologicals Inc.
Whiteshell Resources
Puissance
Monk Gold

**HSA SYSTEMS**
Rexdale, Canada
1983-1984
A manufacturer of advanced technology process equipment

**DIRECTOR OF COMMERCIAL DEVELOPMENT**

Mandate to expand business beyond the metal finishing pollution control area.

Opened up a new area of business previously untapped serving major photo finishers and graphic arts industries.

Developed a major metal recovery system for a client in the mining industry

Expanded marketing concepts to include sale of licensing rights.

**HSA REACTORS LTD**
Rexdale, Canada
1982

**MANAGER, PRODUCT DEVELOPMENT**

Mandate to improve company products to withstand rigorous commercial usage ( 24hr non-stop operation ).

Successfully developed methodology for product testing.

**HSA REACTORS LTD**
Rexdale, Canada
1981 - 1982

**MANAGER, TECHNICAL SALES & SERVICE**

Mandate to set up and run both field installation and service groups for Canada and the USA.

Hired, trained and supervised a team of 8 engineers/chemists.

Designed and implemented factory quality control testing.

High morale amongst team satisfied clients across USA and Canada.

Environmental test work, conceptual and detailed design, sales and installation carried out for the following facilities:

Masterlock, Milwaukee
ITT Cannon, L.A.
Texas Instruments, Dallas
Superior Plating, Chicago
Varland Metals, Cincinnati
Xpert Metals, Ontario
Western Windfall, Nevada
Blackhawk Mine, Nevada
Red Rock Mill, Nevada
Precision Plating, Fort Wayne
Inland Motors, West Virginia

Metalhrgical test work and conceptual design carried out for :
Indium recovery from tailings, Kidd Creek Mine
Gold and Silver recovery from geothermal waters, Teck Corp.

**HSA REACTORS LTD**
Cincinnati
USA
1979-1981

**PROJECT MANAGER**

Mandate to administer joint venture between:
i) USA Environmental Protection Agency
ii) National Association of Metal Finishers. iii) HSA Systems to demonstrate equipment viability.

Designated "Milestone" project by USA Congress for the EPA.

| | |
|---|---|
| **ROYAL SCHOOL OF MINES**<br>IMPERIAL COLLEGE LONDON UNIVERSITY<br>Metallurgy Department<br>London, England<br>1973-1979 | **RESEARCH OFFICER**<br>Consulted to British industry on a wide variety of technical problems.<br>Operated university instrumentation center, including AA, XRF, XRD, IR, UV/VIS, Spark source spectroscopy, Inorganic mass spectrometry and Electron microprobe analysis.<br>Instructed 2nd year mineral processing students . Practical and theoretical. |
| **ROYAL SCHOOL OF MINES**<br>IMPERIAL COLLEGE<br>LONDON UNIVERSITY<br>1969-1973 | POSTGRADUATE STUDENT<br>Thesis examined the synthesis of and the chromatographic properties of new chelating agents and their metal chelates on alumina and silica media. |
| **ROYAL COLLEGE OF SCIENCE**<br>IMPERIAL COLLEGE<br>LONDON UNIVERSITY<br>1966-1969 | UNDERGRADUATE STUDENT<br>B.Sc.(Spec.) Honors in Chemistry.<br>A.R.C.S. |

## TECHNICAL PAPERS

"Chromatography and Solvent Extraction of Organometallic Complexes". G. C. Dickson and D. A. Pantony. "Final Scientific Report" Aerospace Research Laboratories , U.S.Air Force Contract F61052-67-C-008, February 1st, 1973 pages 1-24.

"Evaluation of the Electrochemical Recovery of Cadmium from Plating Rinse water at a Metal Finishing Plant". D. T. Vachon, W. Bissett, B. A. Calver and G. C. Dickson. "Plating and Surface Finishing", 1986 Vol. 73, No.4 pages 68-73.

"Electrowinning of gold and silver from leach solutions". J. Honz, G. C. Dickson, Electrochemical Society Spring Meeting, Cincinnati, Ohio, May 6-11, 1984. (Abstract #276).

"The Regeneration of Cyanide from Milling Solutions Containing Copper Cyanide Complexes and Thiocyanates." G.C.Dickson. "Proceedings Gold Mining Effluent Treatment Seminar", Vancouver, B.C. February 15-16, 1989, pages 265-277.

## PATENT

"Electochemical Reactor for Copper Removal from Barren Solutions." US Patent 4,911,804 . Inventor G. C. Dickson, March 27th 1990.

## PATENT UNDER DEVELOPMENT

"Electrochemical Diaphragm Reactor for Precious Metal Recovery from Pregnant Thiourea/Sulfuric Acid Solutions". Inventor G.C.Dickson.

## COMPUTER SKILLS

| | |
|---|---|
| Experienced in the use of the following operating systems: | MS DOS, UNIX, Windows. |
| Experienced in the use of the following spreadsheets: | Excel, Lotus 123, Multiplan |
| Experienced in the use of the following word processing systems: | Word, WordPerfect, EasyWriter |
| Experienced in the use of the following programming languages: | Basic, "C". |
| Experienced in the use of the following accounting software: | Accupac, Profitmaster. |
| Experienced in the use of: | AutoCAD Release 12 |

Experienced in Hardware assembly and Software installation and customization.

## OTHER INTERESTS

[redacted]

Squash, Baseball, Gardening

## JAMES R. BROWN JR.

Technical Consultant, Co-Trustee of Brown Family Trust

## BACKGROUND AND EXPERIENCE

Mr. Brown has an extensive background in process engineering. All phases of business management were developed during a career which started with an education in Geology at McMaster University and progressed to management of companies with proprietary technologies.

Mr. Brown has invested a considerable amount of time in developing new and improved processes for the treatment of ore, contaminated soils, and incinerated fly ash. These technical developments form the basis for the B.F.T. technologies concerning Primary Metal Recovery (P. M.R.) Plants, and the Copper Cement Powder Processes. Mr. Brown has developed these technologies over a period of years and has obtained legal protection for his know-how and designs. This includes patents, copyrights, and confidential trade secret data, designs, pilot plants, business plans, and other information all of which form the basic package of technology to be assigned to C.T.C.

Mr. Brown has displayed an entrepreneurial spirit and creative ability to apply his knowledge to invent and develop new ideas into new products and processes. Mr. Brown has held many positions during his working career which allow him to address the implementation of the technology from many viewpoints. His work record of technical and commercial experience is as follows:

## REPRESENTATIVE EXPERIENCE

1993 to Present - Founded C.T.C. Consolidated the Silver Bar Mine property, the Moon Patented Ground and area of interest claims into the Mineral Mountain Mining Company, which is a wholly owned subsidiary of C.T.C.

1985 to 1993 - President of Celar Systems, Inc., President of W.C. & R.R., Inc. a waste concentration and resource recovery company, President of Contact Land Company. Much of this time was spent in developing and proving the P.M.R. and Copper Cement Powder Technologies, building Pilot Plants, and studying, planning and marketing the viability of the commercial application for these technologies. The result of these efforts are the current status of the P.M.R. and Copper Cement Powder technology.

1983 to 1985 - Founded and financed Hitech Ore Processing into new mining technology.

1980 to 1983 - Vice President of Mining Operations, W.H.B. Chan & Co., Los Angeles, California. Responsible for setting up and managing multiple mining operations in leaching and flotations systems. Acquisition of mining properties and seeing them into production stance.

1978 to 1980 - General Partner Goloconda Limited Partners, developed North American Mine, Placer and Silica Facility. Constructed and managed a successful Placer Plant and operation.

1972 to 1978 - Self-employed mining and milling operations in gold, silver, antimony and tungsten. He managed and implemented the start up of both mining and milling procedures for higher mill efficiencies.

1971 to 1972 - Site Geologist and Engineer, developing Placer operations for Monarch Oil Co., Akron, Ohio.

1969 to 1971 - Standard Resource Inc., Geologist and Vice President of Marketing, Silver and Silver Operations, Carson City, Nevada.

1967 to 1969 - Vice President of Hemisphere Food Products. Developed facilities to manufacture and market an automobile beverage dispensing unit.

1964 - 1967 - Self-employed and involved with various Research and Development Projects.

1.) Polymer Chemistry - Member of team that developed integral hard surface urethane foam. Sold the rights to the patent.

2.) Member of team that developed and patented an automatic beverage dispenser for automobiles - rest of team were family members. Sold the rights to the patents.

1962 to 1964 - Employed by Geological survey of Canada Regional Geology - Interior Mountains, British Columbia.

EDUCATION:

1958 to 1963 - Geology, Mc Master University, Hamilton, Ontario, Canada.

AWARDS:

1987 - Selected by E.N.R. as Engineer of the Year Candidate.

1987 - Governors Industry Appreciation Award, Nevada.

**JOHN H. BANDY**
**Engineering Manager - CTI**

## BACKGROUND AND EXPERIENCE

*Mr. Bandy has gained extensive experience from helping implement the business plans of CTI and actively managing the engineering operations. His experience in engineering includes "Hands on" design and applications operations as well as overall management and business planning responsibilities. He has been with Custom Technologies, Inc. since August 6, 1984 and has been intimately involved with the engineering aspects of all of the projects which involved with general engineering know-how and advanced material handling expertise. Each of the CTI advanced material handling systems are custom developed and designed to suit the specific requirements of the application.*

*His recent management experience includes being a Member of the CTI Board of Directors for over two years and currently serves as the Manager of Engineering. His responsibilities include the participation in the preparation of the annual business plan goals and resource requirements, budget development, department policies and standards, personnel evaluation and training programs, maintaining a technical resource listing and library for technical and vendor information, preparation of manpower requirement plans and project schedules, assure proper technical content for projects and proposals, develop proposals and estimates, performance reports and presentations to potential clients.*

*His engineering experience includes the direct involvement with the development and design of many automated material handling systems, some of which have been installed throughout the world and which reflect the application of the latest technologies. He has extensive "Hands on" design and application of the electrical control systems and machine operations, project management of construction contracts including procurement, inspection, scheduling, and installation. He has extensive experience in automated systems, automated guided vehicles, custom designed cranes, conveyor systems, auxiliary steel mill equipment, special machinery, robotics and special material handling devices. He has contributed to development of innovative solutions to material handling problems which has led to three patents being awarded to CTI.*

## REPRESENTATIVE PROJECTS AT CTI

- *The Houston Omniport™ automated cargo handling system for Bechtel Civil with a thirty million dollar budget. This involved the procurement and integration of equipment from the USA, Europe, and Japan.*
- *The design and supply of a new concept automated guided vehicle system for the transportation of hot metal within a foundry which has been patented by CTI.*
- *The design and specifications of an automated hot coil transfer system.*
- *The development of a family of woodyard cranes for a client of CTI.*
- *The concept development, design, manufacture, and installation of the patented CTI Cargomover® bag and box handling machines.*

## *SUMMARY OF PREVIOUS WORK EXPERIENCE*

*June 22, 1972 to July, 1984: Morgan Engineering in Alliance, Ohio is a manufacturer of heavy duty cranes and specialty equipment primarily for the steel industry. Other industries served included the nuclear, government, shipping, military, aluminum, copper, utilities and heavy industry on a worldwide basis.*

*Management experience includes starting as a member of the electrical engineering department and progressed from drafting, checking, ordering equipment, estimating, and project responsibility. Four years were spent in the proposal department with responsibilities for the electrical portion of the estimates and proposals as well as presentations to the potential customers. Three years where then spent in the electrical engineering department as the supervisor with responsibilities for technical supervision of four engineers and CAD personnel.*

*Engineering experience and capability includes the ability to prepare the most cost effective solution along with familiarity with USA and foreign codes and technical requirements. The electrical systems for the equipment required application knowledge from simple AC and DC motor controls, motors, limit switches, lighting and wiring to complex systems that involved automated equipment controlled from a central computer.*

### *REPRESENTATIVE PROJECTS*

- *An automated pipe handling system which included a central computer controlling automated gantry cranes, pipe handling machines and transfer cars for a manufacturing and storage facility.*
- *A computer based electrical cost estimating system for cranes was developed and utilized which included the cost of shop labor, electrical equipment and all associated expenses.*
- *Developed, proposed, estimated and designed the electrical systems for various types of cranes, transfer cars, custom machines, hook attachments and automated systems for material handling applications.*

*January 13, 1972 to April 16, 1972: GEM Refractories in Sebring, Ohio*

*Experience: As the Assistant Plant Engineer, the primary responsibilities were the electrical layout and supervision of equipment installation for a plant addition.*

*May 15, 1971 to September 17, 1971: Nease Chemical Co. in Salem, Ohio*

*Experience: As the Plant Maintenance Superintendent, the primary responsibility was the supervision of eight maintenance personnel to provide continuous plant operation.*

*November 1, 1968 to March 31, 1971: Ravenna Arsenal Inc. in Ravenna, Ohio*

*Experience: As a Staff Engineer, the primary responsibilities were to develop the electrical design, layout and specifications for construction contracts to reactivate and install new equipment in ammunition loading lines. Also designed control systems for production machinery, interfaced with the electrical contractors during the bidding process to final installation and operation, and supervised maintenance personnel.*

## EDUCATION

- *Bachelor of Science degree from Akron University in 1968*

  *Major: Electrical Engineering; Co-Op: Three (3) semesters*

- *Recently successfully completed the Fundamentals of Engineering test to obtain a Professional Engineers license in Ohio.*

- *A.M.A. management courses at Stark Technical College in Canton, Ohio and other business seminars covering various subjects.*

- *Miscellaneous technical seminars concerning equipment components and systems applicable to automation and electrical controls.*

## PROFESSIONAL ASSOCIATIONS

- *National Society of Professional Engineers, Canton Chapter*

- *The Association of Iron & Steel Engineers*

- *Delegate to Advanced Manufacturing Research - Integrator Conferences*

- *Material Handling Institute - CTI alternate Representative to the Integrated Systems and Control Product Section (1989 - Present)*

**DR. KENNETH J. REID**
*Technical Consultant, Professor of Mineral Engineering, Department of Civil & Mineral Engineering, University of Minnesota, Minneapolis, Minnesota.*

## BACKGROUND AND EXPERIENCE

Dr. Reid was educated in England at the University of Birmingham for his B.Sc., and at Cambridge University for his Ph.D. in Chemical Engineering. He spent two years on fellowship at the University of California involved with research and advanced studies in Chemical Engineering topics. He then spent seven years with C.S.I.R.O in Australia, working in mineral processing research and the simulation and control of grinding, classification, and flotation systems.

Dr. Reid then served as an Associate Professor in the Department of Mining Engineering and Applied Geophysics at McGill University in Canada where he was responsible for establishing a new program in Advanced Mineral Processing. He then spent six years working on the Zambian Copperbelt where he created and headed IPAC Services, a department providing technical services in process analysis and control for the two principal mining companies in Zambia. During this period Dr. Reid was responsible for introducing several technical innovations including on-stream particle size analysis, on-stream x-ray fluorescence analysis and computer control for concentrators. He also initiated extensive simulation work covered closed circuit grinding and flotation for control purposes and material balance packages for metallurgical performance reporting.

In 1977 Dr. Reid was appointed Professor of Mineral Engineering in the Department of Civil and Mineral Engineering and Director of the Mineral Resources Research Center at the University of Minnesota. Recently Dr. Reid has focussed his activities on the application of mineral processing and extractive metallurgical engineering principles for the solution of problems in waste processing technology. Dr. Reid has had over 120 technical papers published and has authored over 40 company reports.

## REPRESENTATIVE EXPERIENCE

| | |
|---|---|
| 1977 to Date - | Professor of Mineral Engineering, Department of Civil & Mineral Engineering, University of Minnesota, Minneapolis, Minnesota |
| 1977 to 1991 - | Director, Mineral Resources Research Center, University of Minnesota, Minneapolis, Minnesota |
| 1971 to 1977 - | Head of NCMM/RCM, IPAC Services, Kitwe, Zambia |
| 1969 to 1971 - | Associate Professor, Department of Mining Engineering and Applied Geophysics, McGill University, Hamilton, Ontario, Canada |
| 1963 to 1969 - | Senior Research Scientist, Chemical Engineering Division, CSIRO, Melbourne, Australia |

1)

## RESEARCH ACTIVITIES

- Mineral Processing Unit Operations
- Precious Metals Extraction Technologies
- Applied Plasma Technology in Processing Metals
- Direct Smelting
- Pelletizing Processes
- Process Analysis and Control
- Waste Processing Technologies

## EDUCATION

B.Sc. Chemical Engineering, University of Birmingham - 1957
Ph.D. Chemical Engineering, Cambridge University - 1960
Postdoctoral Fellow, University of California, Berkeley, 1961-63

## AWARDS

Harkness Fellow (1960)
Commonwealth Fund - New York

## ASSOCIATIONS/SERVICE ACTIVITIES

University: Senate Committee on Research
Chairman, Patent & Technology Transfer Committee
Chairman, Earth Resources Committee of the University
Executive Council for Natural Resources

State: Minnesota Minerals Coordinating Committee
Minnesota Legislature Science & Technology Resources Council

National: NMAB Committee on Energy & Comminution
Chairman, National Association of Mineral Institute Directors
Authors Committee, ISS/AIME book "Applications of Plasma Technology in Process Metallurgy"

2)

**BRUCE L. BREWER**
**President and CEO - CTI**

## BACKGROUND AND EXPERIENCE

Mr. Brewer was one of the co-founders of Custom Technologies, Inc. and has been the President and CEO since its inception. He was instrumental in formulating and implementing the business plans of CTI and actively managing the operations. Experience in engineering includes "Hands on" design and applications operations as well as overall management and business planning responsibilities.

His first exposure to industry was in the aerospace industry providing electro mechanical packaging designs for military type equipment. This provided a familiarization with government specifications and regulations, and the applications of multi-disciplined engineering principles to reliable equipment design. This exposure bridged the transition from electron tubes to solid state electronics and printed circuit boards used in present day commercial equipment.

He has gained extensive experience in the application and design of electrically powered cranes and special machinery for industrial use. This was gained while working for Alliance Machine and Morgan Engineering in Alliance, Ohio from 1960 into 1984. He had been awarded patents for equipment designs at both companies. Additionally, several patents for various types of material handling machines which provide innovative solutions not previously utilized by industry have been obtained since CTI was formed in 1984. His recent experience has been focused on the development of patented and proprietary material handling concepts and equipment for CTI to be utilized in various installations around the world.

## REPRESENTATIVE PROJECTS

- Development and formulation of Integrated Automated Terminal facilities for applications worldwide. These multi-purpose facilities are designed to permit the handling of large throughputs of cargo in bulk, breakbulk, neobulk, and containerized form. Each system contains unique features and methods and include the utilization of special machines and software as developed by CTI and associated companies. Each facility employs designs which represent "state-of-the-art" material handling methods and controls. Each of these IAT's are designed to provide cost effective operations for the next 20 years and beyond.

- Instrumental in the concept development and design of the following CTI proprietary machines and associated advanced handling systems:

    1. CTI CARGOMOVER® Semi-automated warehouse load/unload machine for handling up to 2800 bags or 3600 boxes per hour.

    2. CTI CARGOMOVER® Semi-automated railcar loader/unloader to facilitate the handling up to 1800 bags or 2500 boxes per hour.

    3. CTI CARGOMOVER® Semi-automated truck loader/unloader to facilitate the handling up to 1800 bags or 2500 boxes per hour.

4. *Semi-automatic truck loader/unloader for handling of palletized cargo.*

5. *Special loading/unloading stations to facilitate the loading of palletized cargo into or out of movable racks called unit load devices or large terminal pallets.*

6. *CTI PALLETVEYOR™ machine to facilitate the fast and easy transfer of palletized cargo between a ship's hold and a landside warehouse facility.*

7. *CTI/MCS Mobile PALLETLIFT™ machine to facilitate the fast and easy transfer of Palletized and Unitized cargo between a ship's hold and a landside warehouse facility.*

8. *CTI Mini-Palletizer™ machine to facilitate the fast and easy transfer of bagged or box cargo onto pallets or to assist in de-palletizing operations.*

9. *CTI - UPAGV™ system which uses utility power to drive the Automated Guided Vehicle (AGV) while providing continuous operation with unlimited hauling capacity.*

- *CTI - Advanced Material Handling Systems and associated equipment for the unloading of steel and finished wood products from ships and transferring the cargo through the facility to trucks or railcars for inland transportation.*

- *Instrumental in the development and supply of an integrated Automated In-Process Pipe Storage & Retrieval System for USX, Birmingham, Alabama.*

- *Instrumental in the development and supply of Semi-Automated Container Handling Systems for marshalling yard service at Matson Terminals, Port of Long Beach, CA. and Port of Richmond, CA.*

- *Instrumental in the development and supply of Semi-Automated Aluminum Anode Handling System for Alcoa, Rockdale, Texas.*

- *Developed and produced a Patented Expandable Trolley Design - 2 Girder Ladle Cranes for AHMSA, Monclova, Mexico.*

- *Led engineering project teams in producing a 23 Steel Mill Crane Package for China Steel Corporation, Taiwan. The first crane was custom designed and shipped on schedule within a 5 month time frame as compared to a normal 8 to 9 month time frame.*

- *Instrumental in developing and promoting Stabilized Reeving Hoisting Systems in place of Guided Steel Columns for Automated Storage and Retrieval Cranes.*

- *Promoted and implemented a Computerized Standard Costing System for use in preparing bids for cranes and auxiliary mill equipment. This drastically reduced bid turnaround time and resource costs while improving estimate accuracy.*

- *Implemented a Computer Aided Design System (INTERGRAPH) for use in producing engineering drawings, B/M's, calculations, and data.*

- *Implemented a Comprehensive Electrical Documentation System utilizing the CAD System to produce a complete set of appropriate electrical information to permit easy installation, check out and troubleshooting of sophisticated automated equipment.*

- *Led a special engineering task force which was established to introduce and implement industrial cranes (CMAA Base) into a traditionally steel mill crane (AISE Base) facility.*

- *Special assignment to develop systems documentation and establishment of a comprehensive engineering and quality assurance program for a growing high tech electronic hardware and software supplier.*

## *EDUCATION*

- *Bachelor of Science* *Kent State University, 1959* *Major: Aviation Technology*

- *Various Courses and Seminars concerning Business Management Subjects and Technical Developments applicable to Material Handling.*

## *ASSOCIATIONS*

- *Association of Iron & Steel Engineers* *1973-Present*

- *Material Handling Institute -* *Crane Manufacturers Association of America (1980-1984 served on Eng. Committee)*

- *Material Handling Institute -* *CTI Representative to MHI (1986 - Present)*

- *Material Handling Institute -* *CTI Representative to the Integrated Systems and Control Product Section (1986 - Present)*

- *Engineering Advisory Committee - Kent State University (1981-1984)*

- *Engineering Advisory Committee - Youngstown State University (1991-Present)*

***Carey R. Allen.***
***Technical Consultant, Mining Operations.***

## ***BACKGROUND AND EXPERIENCE***

*Mr. Allen has an extensive background in process engineering and all phases of mining operations and management as developed during a career which included working with the Mr. Brown on projects associated with the development of the BFT technologies. Mr. Allen has considerable experience in Project Management and Field Operations of mining related processes and possesses a working knowledge of the requirements and supplier involved with setting up and operating mining and processing plants. Mr. Allen has invested a considerable amount of time in helping to develop new and improved processes for the treatment of ore, contaminated soils, and incinerated fly ash. These technical developments form the basis for the BFT technologies concerning Primary Metal Recovery (PMR Plants) and the Copper Cement Powder Processes. Mr. Allen has held many positions during his working career which allows him to address the implementation of the BFT technology from many viewpoints. His work record experience is as follows:*

*1990 to Present - Technical Consultant to the Brookline Mining Company performing metallurgical research for various projects and also performed technical consulting for mining operations for various other clients.*

*1989 to 1990 - Technical consultant for Foundry Service and Supplies, Inc. Responsible for metallurgical research and testing of ceramics as aerospace tooling materials for super plastic forming and diffusion bonding processes. In addition, designed and constructed ovens and furnace for ceramic heat treating.*

*1988 - 1989 - Consultant to Mohave Gold Inc. for mining and heap leach development.*

*1985 to 1988 - Vice President, General Manager for Celex Systems. Responsible for the design and construction of State-of-the-Art PMR Plant. This plant was portable, of modular design, and contained computer controlled leaching and recovery systems for recovering precious and base metals. This also involved extensive work with acidic thiourea leaching of refractory and carbonaceous ores and incinerated sludge ash utilizing an electro chemical recovery circuit. Work also included the design and construction of a laboratory facility and a pilot leach Plant.*

*1985 - Technical Consultant and Operations Manager for Sierra Western Resources in developing and placing into production two small heap leaching projects in central Nevada.*

*1983 to 1985 - Project Manager for Virginia District Mining. Developed a heap leach operation near Dayton, Nevada. Assisted in the development of a placer project in Arizona. Managed the laboratory and smelting operations. Assisted the Nevex Gold Co. with Pilot heap leach and design of the recovery plant.*

*1980 to 1983 - Project Manager for Tseng Mining. Managed an innovative pond leaching concept with a 900 TPD Merrill-Crowe zinc precipitation recovery plant. Directed and managed the laboratory and smelting operations. Assisted with the implementation and development of an electro chemical recovery process.*

***EDUCATION:*** *Attended Fresno State University*

## DR. KENNETH J. REID

*Technical Consultant, Professor of Mineral Engineering, Department of Civil & Mineral Engineering, University of Minnesota, Minneapolis, Minnesota.*

### BACKGROUND AND EXPERIENCE

*Dr. Reid was educated in England at the University of Birmingham for his B.Sc., and at Cambridge University for his Ph.D. in Chemical Engineering. He spent two years on fellowship at the University of California involved with research and advanced studies in Chemical Engineering topics. He then spent seven years with C.S.I.R.O in Australia, working in mineral processing research and the simulation and control of grinding, classification, and flotation systems.*

*Dr. Reid then served as an Associate Professor in the Department of Mining Engineering and Applied Geophysics at McGill University in Canada where he was responsible for establishing a new program in Advanced Mineral Processing. He then spent six years working on the Zambian Copperbelt where he created and headed IPAC Services, a department providing technical services in process analysis and control for the two principal mining companies in Zambia. During this period Dr. Reid was responsible for introducing several technical innovations including on-stream particle size analysis, on-stream x-ray fluorescence analysis and computer control for concentrators. He also initiated extensive simulation work covered closed circuit grinding and flotation for control purposes and material balance packages for metallurgical performance reporting.*

*In 1977 Dr. Reid was appointed Professor of Mineral Engineering in the Department of Civil and Mineral Engineering and Director of the Mineral Resources Research Center at the University of Minnesota. Recently Dr. Reid has focussed his activities on the application of mineral processing and extractive metallurgical engineering principles for the solution of problems in waste processing technology. Dr. Reid has had over 120 technical papers published and has authored over 40 company reports.*

### REPRESENTATIVE EXPERIENCE

| | |
|---|---|
| *1977 to Date -* | *Professor of Mineral Engineering, Department of Civil & Mineral Engineering, University of Minnesota, Minneapolis, Minnesota* |
| *1977 to 1991 -* | *Director, Mineral Resources Research Center, University of Minnesota, Minneapolis, Minnesota* |
| *1971 to 1977 -* | *Head of NCMM/RCM, IPAC Services, Kitwe, Zambia* |
| *1969 to 1971 -* | *Associate Professor, Department of Mining Engineering and Applied Geophysics, McGill University, Hamilton, Ontario, Canada* |
| *1963 to 1969 -* | *Senior Research Scientist, Chemical Engineering Division, CSIRO, Melbourne, Australia* |

## *RESEARCH ACTIVITIES*

- *Mineral Processing Unit Operations*
- *Precious Metals Extraction Technologies*
- *Applied Plasma Technology in Processing Metals*
- *Direct Smelting*
- *Pelletizing Processes*
- *Process Analysis and Control*
- *Waste Processing Technologies*

## *EDUCATION*

*B.Sc. Chemical Engineering, University of Birmingham - 1957*
*Ph.D. Chemical Engineering, Cambridge University - 1960*
*Postdoctoral Fellow, University of California, Berkeley, 1961-63*

## *AWARDS*

*Harkness Fellow (1960)*
*Commonwealth Fund - New York*

## *ASSOCIATIONS/SERVICE ACTIVITIES*

*University:* *Senate Committee on Research*
*Chairman, Patent & Technology Transfer Committee*
*Chairman, Earth Resources Committee of the University*
*Executive Council for Natural Resources*

*State:* *Minnesota Minerals Coordinating Committee*
*Minnesota Legislature Science & Technology Resources Council*

*National:* *NMAB Committee on Energy & Comminution*
*Chairman, National Association of Mineral Institute Directors*
*Authors Committee, ISS/AIME book "Applications of Plasma Technology in Process Metallurgy"*

*BLB-1388*

2)

**BRUCE L. BREWER**
*President and CEO - CTI*

## BACKGROUND AND EXPERIENCE

Mr. Brewer was one of the co-founders of Custom Technologies, Inc. and has been the President and CEO since its inception. He was instrumental in formulating and implementing the business plans of CTI and actively managing the operations. Experience in engineering includes "Hands on" design and applications operations as well as overall management and business planning responsibilities.

His first exposure to industry was in the aerospace industry providing electro mechanical packaging designs for military type equipment. This provided a familiarization with government specifications and regulations, and the applications of multi-disciplined engineering principles to reliable equipment design. This exposure bridged the transition from electron tubes to solid state electronics and printed circuit boards used in present day commercial equipment.

He has gained extensive experience in the application and design of electrically powered cranes and special machinery for industrial use. This was gained while working for Alliance Machine and Morgan Engineering in Alliance, Ohio from 1960 into 1984. He had been awarded patents for equipment designs at both companies. Additionally, several patents for various types of material handling machines which provide innovative solutions not previously utilized by industry have been obtained since CTI was formed in 1984. His recent experience has been focused on the development of patented and proprietary material handling concepts and equipment for CTI to be utilized in various installations around the world.

## REPRESENTATIVE PROJECTS

- Development and formulation of Integrated Automated Terminal facilities for applications worldwide. These multi-purpose facilities are designed to permit the handling of large throughputs of cargo in bulk, breakbulk, neobulk, and containerized form. Each system contains unique features and methods and include the utilization of special machines and software as developed by CTI and associated companies. Each facility employs designs which represent "state-of-the-art" material handling methods and controls. Each of these IAT's are designed to provide cost effective operations for the next 20 years and beyond.

- Instrumental in the concept development and design of the following CTI proprietary machines and associated advanced handling systems:

  1. CTI CARGOMOVER® Semi-automated warehouse load/unload machine for handling up to 2500 bags or 3500 boxes per hour.

  2. CTI CARGOMOVER® Semi-automated railcar loader/unloader to facilitate the handling up to 1800 bags or 2500 boxes per hour.

  3. CTI CARGOMOVER® Semi-automated truck loader/unloader to facilitate the handling up to 1800 bags or 2500 boxes per hour.

4. *Semi-automatic truck loader/unloader for handling of palletized cargo.*

5. *Special loading/unloading stations to facilitate the loading of palletized cargo into or out of movable racks called unit load devices or large terminal pallets.*

6. *CTI PALLETVEYOR™ machine to facilitate the fast and easy transfer of palletized cargo between a ship's hold and a landside warehouse facility.*

7. *CTI/MCS Mobile PALLETLIFT™ machine to facilitate the fast and easy transfer of Palletized and Unitized cargo between a ship's hold and a landside warehouse facility.*

8. *CTI Mini-Palletizer™ machine to facilitate the fast and easy transfer of bagged or box cargo onto pallets or to assist in de-palletizing operations.*

9. *CTI - UPAGV™ system which uses utility power to drive the Automated Guided Vehicle (AGV) while providing continuous operation with unlimited hauling capacity.*

- *CTI - Advanced Material Handling Systems and associated equipment for the unloading of steel and finished wood products from ships and transferring the cargo through the facility to trucks or railcars for inland transportation.*

- *Instrumental in the development and supply of an Integrated Automated In-Process Pipe Storage & Retrieval System for USX, Birmingham, Alabama.*

- *Instrumental in the development and supply of Semi-Automated Container Handling Systems for marshalling yard service at Matson Terminals, Port of Long Beach, CA. and Port of Richmond, CA.*

- *Instrumental in the development and supply of Semi-Automated Aluminum Anode Handling System for Alcoa, Rockdale, Texas.*

- *Developed and produced a Patented Expandable Trolley Design - 2 Girder Ladle Cranes for AHMSA, Monclova, Mexico.*

- *Led engineering project teams in producing a 23 Steel Mill Crane Package for China Steel Corporation, Taiwan. The first crane was custom designed and shipped on schedule within a 5 month time frame as compared to a normal 8 to 9 month time frame.*

- *Instrumental in developing and promoting Stabilized Reeving Hoisting Systems in place of Guided Steel Columns for Automated Storage and Retrieval Cranes.*

- *Promoted and implemented a Computerized Standard Costing System for use in preparing bids for cranes and auxiliary mill equipment. This drastically reduced bid turnaround time and resource costs while improving estimate accuracy.*

- *Implemented a Computer Aided Design System (INTERGRAPH) for use in producing engineering drawings, B/M's, calculations, and data.*

- *Implemented a Comprehensive Electrical Documentation System utilizing the CAD System to produce a complete set of appropriate electrical information to permit easy installation, check out and troubleshooting of sophisticated automated equipment.*
- *Led a special engineering task force which was established to introduce and implement industrial cranes (CMAA Base) into a traditionally steel mill crane (AISE Base) facility.*
- *Special assignment to develop systems documentation and establishment of a comprehensive engineering and quality assurance program for a growing high tech electronic hardware and software supplier.*

## *EDUCATION*

- *Bachelor of Science* *Kent State University, 1959* *Major: Aviation Technology*
- *Various Courses and Seminars concerning Business Management Subjects and Technical Developments applicable to Material Handling.*

## *ASSOCIATIONS*

- *Association of Iron & Steel Engineers* *1973-Present*
- *Material Handling Institute -* *Crane Manufacturers Association of America (1980-1984 served on Eng. Committee)*
- *Material Handling Institute -* *CTI Representative to MHI (1986 - Present)*
- *Material Handling Institute -* *CTI Representative to the Integrated Systems and Control Product Section (1986 - Present)*
- *Engineering Advisory Committee - Kent State University (1981-1984)*
- *Engineering Advisory Committee - Youngstown State University (1991-Present)*

*Corey R. Allen.*
*Technical Consultant, Mining Operations.*

## *BACKGROUND AND EXPERIENCE*

*Mr. Allen has an extensive background in process engineering and all phases of mining operations and management as developed during a career which included working with the Mr. Brown on projects associated with the development of the BFT technologies. Mr. Allen has considerable experience in Project Management and Field Operations of mining related processes and possesses a working knowledge of the requirements and supplier involved with setting up and operating mining and processing plants. Mr. Allen has invested a considerable amount of time in helping to develop new and improved processes for the treatment of ore, contaminated soils, and incinerated fly ash. These technical developments form the basis for the BFT technologies concerning Primary Metal Recovery (PMR Plants) and the Copper Cement Powder Processes. Mr. Allen has held many positions during his working career which allows him to address the implementation of the BFT technology from many viewpoints. His work record experience is as follows:*

*1990 to Present - Technical Consultant to the Brookline Mining Company performing metallurgical research for various projects and also performed technical consulting for mining operations for various other clients.*

*1989 to 1990 - Technical consultant for Foundry Service and Supplies, Inc. Responsible for metallurgical research and testing of ceramics as aerospace tooling materials for super plastic forming and diffusion bonding processes. In addition, designed and constructed ovens and furnace for ceramic heat treating.*

*1988 - 1989 - Consultant to Mohave Gold Inc. for mining and heap leach development.*

*1985 to 1988 - Vice President, General Manager for Celer Systems. Responsible for the design and construction of State-of-the-Art PMR Plant. This plant was portable, of modular design, and contained computer controlled leaching and recovery systems for recovering precious and base metals. This also involved extensive work with acidic thiourea leaching of refractory and carboneeous ores and incinerated sludge ash utilizing an electro chemical recovery circuit. Work also included the design and construction of a laboratory facility and a pilot leach Plant.*

*1985 - Technical Consultant and Operations Manager for Sierra Western Resources in developing and placing into production two small heap leaching projects in central Nevada.*

*1983 to 1985 - Project Manager for Virginia District Mining. Developed a heap leach operation near Dayton, Nevada. Assisted in the development of a placer project in Arizona. Managed the laboratory and smelting operations. Assisted the Nevex Gold Co. with Pilot heap leach and design of the recovery plant.*

*1980 to 1983 - Project Manager for Tseng Mining. Managed an innovative pond leaching concept with a 900 TPD Merrill-Crowe zinc precipitation recovery plant. Directed and managed the laboratory and smelting operations. Assisted with the implementation and development of an electro chemical recovery process.*

*EDUCATION:* *Attended Fresno State University*