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WEE

J.H.C.

DEC 29 1967

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

December 27, 1967

W.E.S.

JAN 19 1968

FILE MEMORANDUM

A brief magnetometer survey was made by Mr. W. G. Farley and I over a biotite - copper showing as mentioned in a report by Mr. J. A. Briscoe (File Aa-16A.15.0; Apache Mines Area, Owl Head Mining District, Pinal County, Arizona). The outcrop as exposed is about 40' wide and 65' long and consists of biotite, magnetite, remnant feldspars and green oxide copper.

Two lines were run across the area using a Barringer GM-102 magnetometer and the results indicate that the biotite - copper showing is confined to the exposure and does not extend into the alluvium either to the north or east (see attached magnetometer profiles).

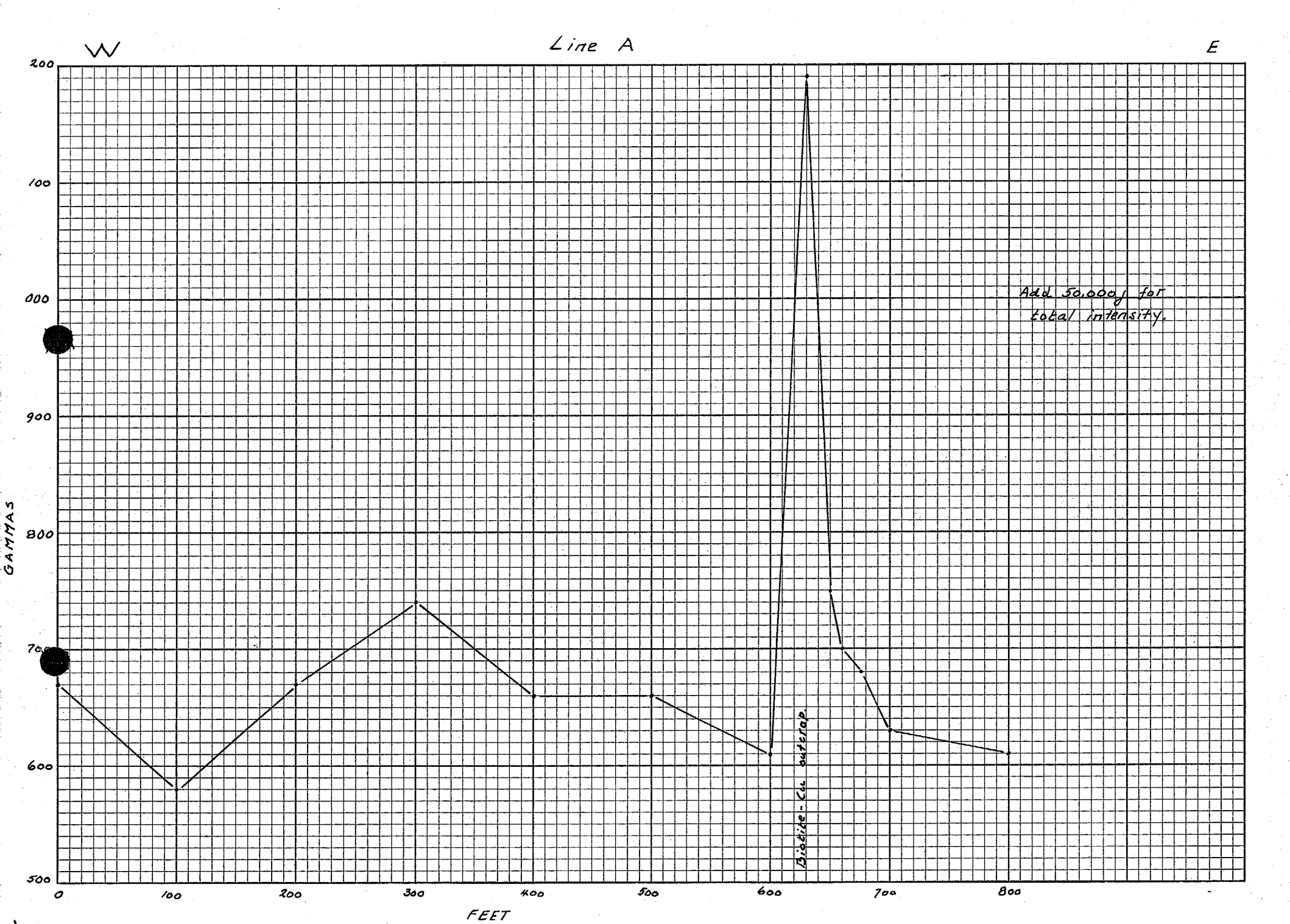
One E-W line was run approximately 300' to the North of the mineralized outcrop in the alluvium. No anomalous values were obtained.

The occurrence is of no interest to the Company.

R. H. Luning

R. H. Luning

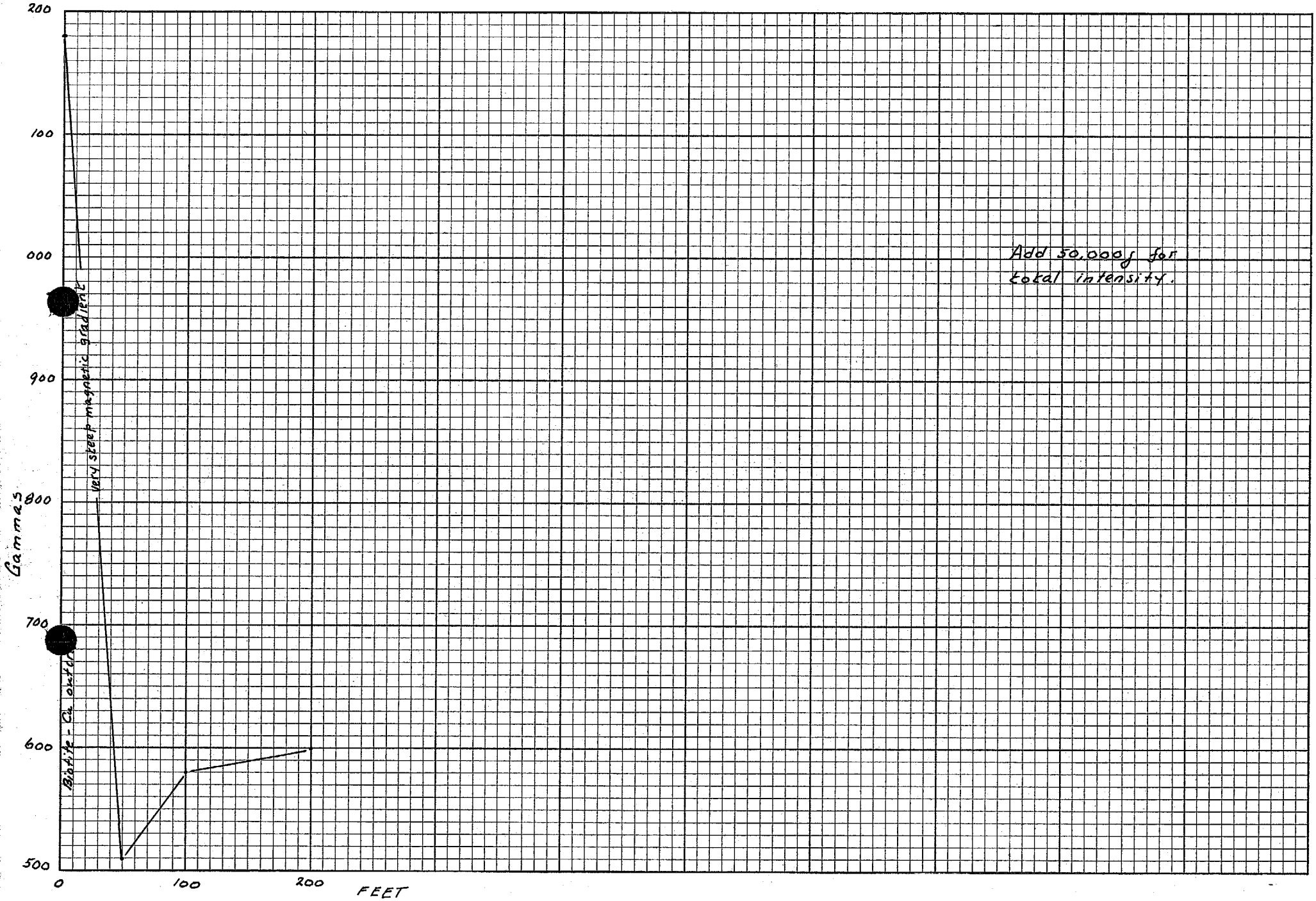
RHL:kc
Attachment
cc: WGFarley
JABriscoe



S

Line B N 30°E

N



AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

October 6, 1967

TO: R. J. LACY

FROM: W. G. FARLEY

GEOPHYSICAL SURVEYS
OWL HEAD BUTTES
PINAL CO., ARIZONA

Summary

During the period December 1966 through August 1967, approximately 150 line miles of reconnaissance I.P.-resistivity was run in the Owl Head Buttes Mining District in a search for disseminated copper mineralization. This survey detected several weak anomalous I.P. zones and three of moderate strength. Adequate explanations were found in outcrops near and within these anomalous zones to conclude that no large disseminated copper deposits exist within these areas. The I.P.-resistivity survey in this area has now been terminated.

Context

The I.P.-resistivity survey in the Owl Head Buttes was run simultaneously with two different electrode configurations; (1) a wenner 2000 foot "a", and (2) a three electrode 1000 foot "a". Additional traverses with other electrode spacings were run over anomalous I.P. zones. Traverse lines were spaced 1/2 to 1 mile apart depending on I.P. response and accessibility. The attached plan map (Fig. 1B) shows the location of I.P.-resistivity stations and the contoured values of I.P. and resistivity obtained with the wenner 2000 foot "a". Map 1B has been put on a sepia overlay so a direct comparison can be made with the underlying geological map (Fig. 2) of this area by C. F. Barter (University of Arizona master thesis - 1962). The I.P. plan map shows a background response ranging from about 2 m. v./v. to about 5 m. v./v. I.P. values from 5 to 8 are considered weakly anomalous, 8 to 11 moderately anomalous, and over 11 strongly anomalous. Weak I.P. anomalies were detected over the weakly mineralized San Juan copper deposit, Durham Hills copper deposit, near the Blue Star Mine, and in the Apache Mines area. Moderate anomalous I.P. response was obtained in three areas. These areas are circled in red on the I.P. plan map (Fig. 1B) and are labeled Zone 1, Zone 2 and Zone 3.

Zone 1

Zone 1, within the 8.0 m. v./v. contour, covers an area 2500 feet by 1000 feet in size. The maximum I.P. response of 10.3 m. v./v. was obtained with the 3 electrode 1000 foot "a". Background response in this area is about 3.0 m. v./v. A depth determination from I.P. profiles Fig. 3 and 4 indicates the top of the polarizer to be 200-300 feet below the surface. This anomalous I.P. area was examined by W. E. Saegart, J. A. Briscoe and the author. Several areas of Pre-Cambrian schist and pre-mineral volcanics outcrop within and near the anomalous I.P. zone. These outcrops contain a few narrow, weakly mineralized quartz veins and diabase dikes. On profiles Fig. 3 and 4, it can be seen that the anomalous I.P. area corresponds to the very high resistivity Pre-Cambrian schist. This schist has much magnetite as indicated by magnetite sands in the washes and the aeromagnetic map, Fig. 1A. This magnetite in combination with a few weakly mineralized veins and dikes is believed to be the source of the Zone 1 I.P. anomaly. The amplitude of I.P. response is enhanced by the high resistivity which results from the abundance of quartz in the schist. The Zone 1 I.P. anomaly is of no further interest.

Zone 2

Zone 2 (Fig. 1B and 5) within the 8.0 m. v./v. contour covers an area about 1000 feet by 2000 feet. The profile (Fig. 5) over this anomaly shows a double peak with the wenner 2000 foot "a" and a single peak with the 3 electrode 1000 foot "a". The wenner 1000 foot "a" and 500 foot "a" did not show anomalous response. This anomaly falls on the edge of a high resistivity zone and its shape suggest a narrow band of contact mineralization. This anomaly is of no further interest.

Zone 3

Zone 3 is the largest size I.P. anomaly detected in the Owl Head Buttes survey. The area within the 8 m. v./v. contour is 2700 feet east-west by 3700 feet north-south. The peak I.P. response obtained was 10.0 m. v./v. with the wenner 2000 foot "a". The wenner 500 foot, 750 and 1000 foot gave very little anomalous response (see Fig. 6 and 7). This indicates a very deep polarizer, probably several hundred feet in depth. The area over this anomaly was examined by Mr. Saegart, Mr. Briscoe and myself. We found much more outcrop then was shown on C. F. Barter's geological map. The center of the anomalous I.P. zone has extensive outcrops of Pre-Cambrian gneiss and schist showing no alteration or mineralization.

Extrenous polarizers, such as clay, graphite, chlorite or magnetite which might be the source of polarization below a deep water table, did not occur in the schist and gneiss outcrops over the I.P. anomaly. The I.P. anomaly also could not be coming from a segregation of magnetite at depth because the anomaly occurs in a magnetic low trough (See Fig. 1A). Another puzzling feature is the relatively low resistivities of 100-200 ohm feet over the schist and gneiss outcrops which overlie the zone-3 anomaly. Similar looking outcrops a couple of miles to the west had resistivity values from 500 - 3000 ohm feet. A possible explanation could be that the schist and gneiss outcrops over the zone-3 I.P. anomaly are part of a thin thrust plate overlying mineralized rock below. I recommend an I.P. decay test over this anomaly to determine if the polarizer is coming from a sulphide source or extrenous source. If a sulphide source is suggested, detailed geological mapping of this area should be made looking particularly for evidence of thrust faulting.

Wayne G. Farley

Wayne G. Farley

WGF:mc
Attach.
cc: JHCourtright
WESaegart
JABriscoe

Fig. 1

111°00'W

32°45'N

850

900

800

850

Highway 80.89

51000

950

900

850

800

750

700

DURHAM HILLS

Pipeline Road

Pipeline Road

650

600

750

Powerline Road

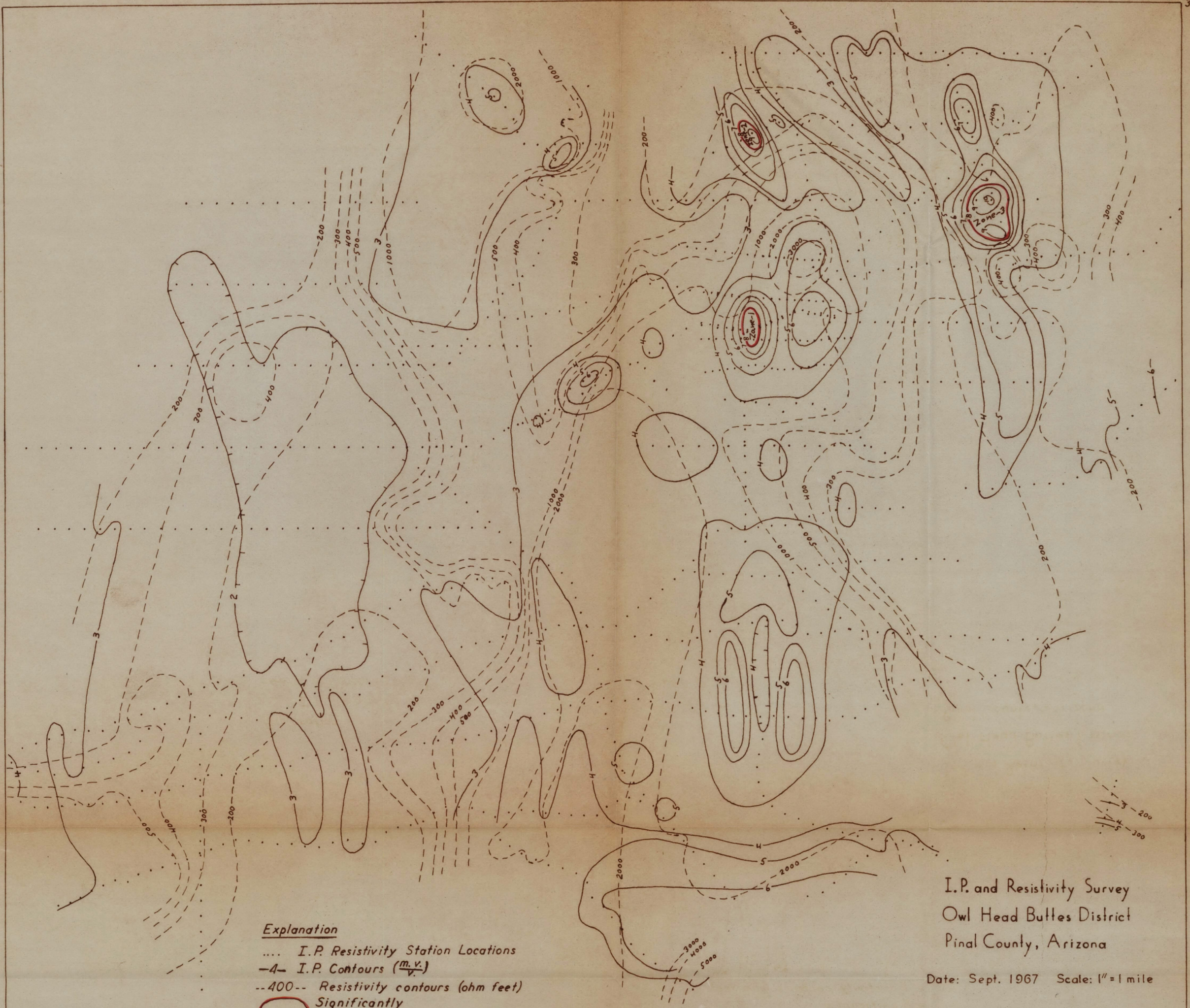
AEROMAGNETIC MAP OF OWL HEAD BUTTES AREA

Flight lines flown at 2 mile intervals
Altitude 6,800 feet m.s.l.
JULY 1967

Fig. 18

111° 00'

32° 45'



Explanation

.... I.P. Resistivity Station Locations

—4— I.P. Contours ($\frac{m.v.}{v.}$)

--400-- Resistivity contours (ohm feet)

Significantly Anomalous I.P. Zones

I.P. and Resistivity Survey
Owl Head Buttes District
Pinal County, Arizona

Date: Sept. 1967 Scale: 1" = 1 mile

FIGURE 2

111°00'

32°45'

OWL HEAD BUTTES

Geologic Map after C.F. Barter

LEGEND

Sedimentary Rocks

QTs — Partially Consolidated and Unconsolidated Alluvium

Tp — Pantano Formation

pEm — Mescal Limestone (marble)

pEds — Dripping Spring Quartzite

Igneous Rocks

QTba — Basalt Dikes

QTt — Tuff, Tuffaceous Sandstone, Flows

QTb — Basalt Flows

Tu — Andesite and Basalt Flows, Ignimbrites and Tuffs

Td — Quartz Diorite and Diorite Dikes

pEqd — Antelope Quartz Diorite

pEo — Owl Head Intrusives

pEg — Durham Granite

Metamorphic Rocks

pEp — Pinal Schist

pEb — Gneiss

Quaternary

Tertiary

Younger Precambrian

Older Precambrian

Contact - Dashed Where Questionable

Fault - Dashed Where Probable

50

Strike and Dip of Bedding

30

Strike and Dip of Foliation

40

Strike and Dip of Volcanics

55

a b f

Gravity Profile Points

Shaft

Pit

Prospect

Tunnel

Well

U.S. 5

Primary Road

Secondary Road

Intermittent Stream

Contour Line

Fig. 3

West

Electrode Configeration
- Wenner 2000' "a"
- 3 elec. 1000' "a"
- Wenner 1000' "a"
- Wenner 500' "a"

Resistivity (Ohm-feet)

East

I.P. and Resistivity
Olsen Wash
Owh Head Buttes
Pinal Co., Arizona
Date: Aug. 1967 W.G.F.

I.P. (m.s.)

Anomalous Zone-1

Florence Highway

Scale: 1" = 2000'

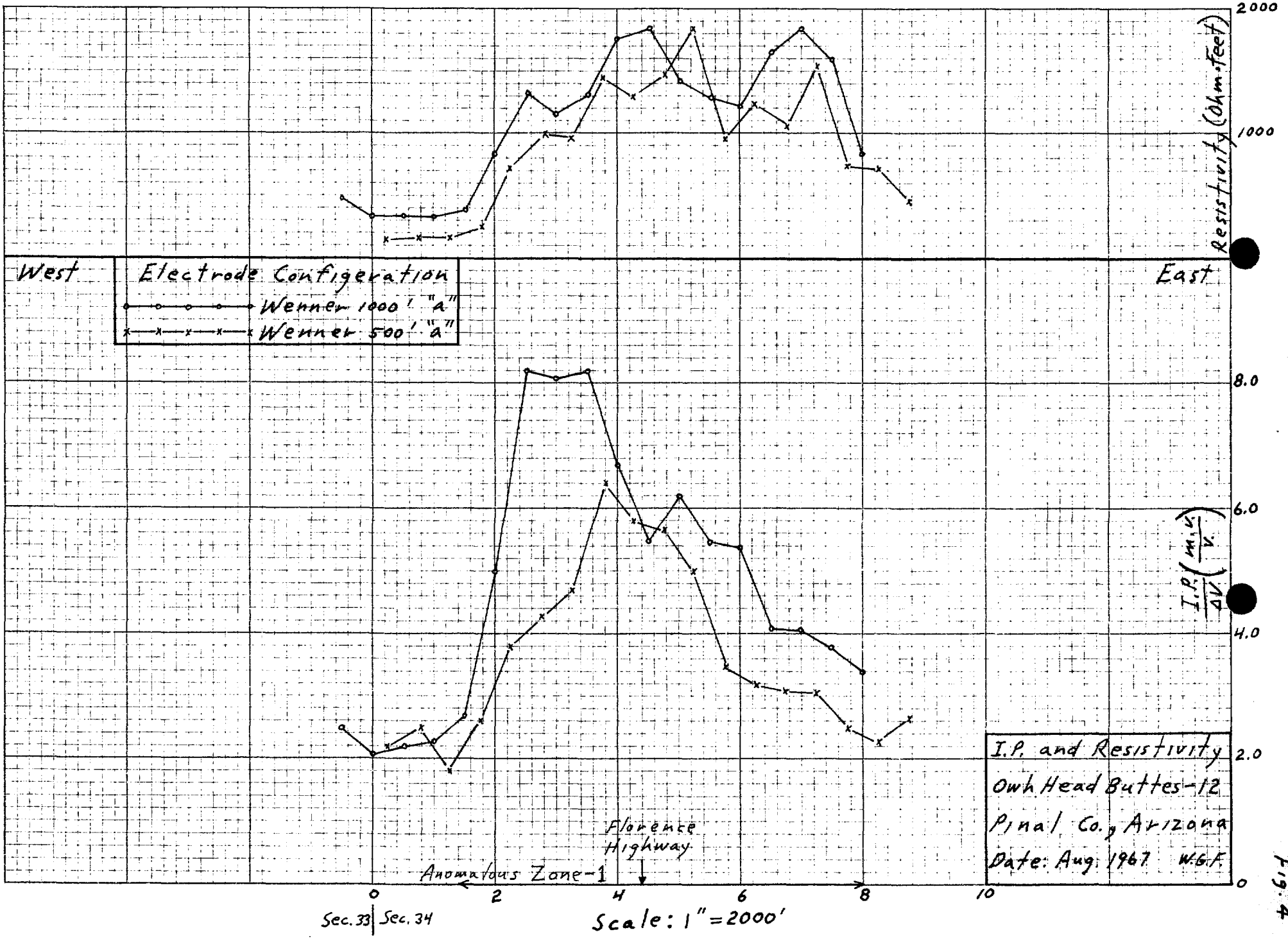


Fig. 4

Fig. 3

West

East

Resistivity (Ohm-Feet)

400
300
200
100
0

Electrode Configeration
Wenner 2000' "a"
3 elec. 1000' "a"
Wenner 1000' "a"
Wenner 500' "a"

I.P. and Resistivity
Durham Wash
Owh Head Buttes
Pinal Co., Arizona
Date: Aug. 1967 W.G.F.

10.0
8.0
6.0
4.0
2.0
0

I.P. (m.s.) / ΔV

Anomalous Zone-2

Anomalous Zone-3

0 2 4 6 8 10 12 14 16 18 20 22 24

Florence Highway

Scale: 1" = 2000'

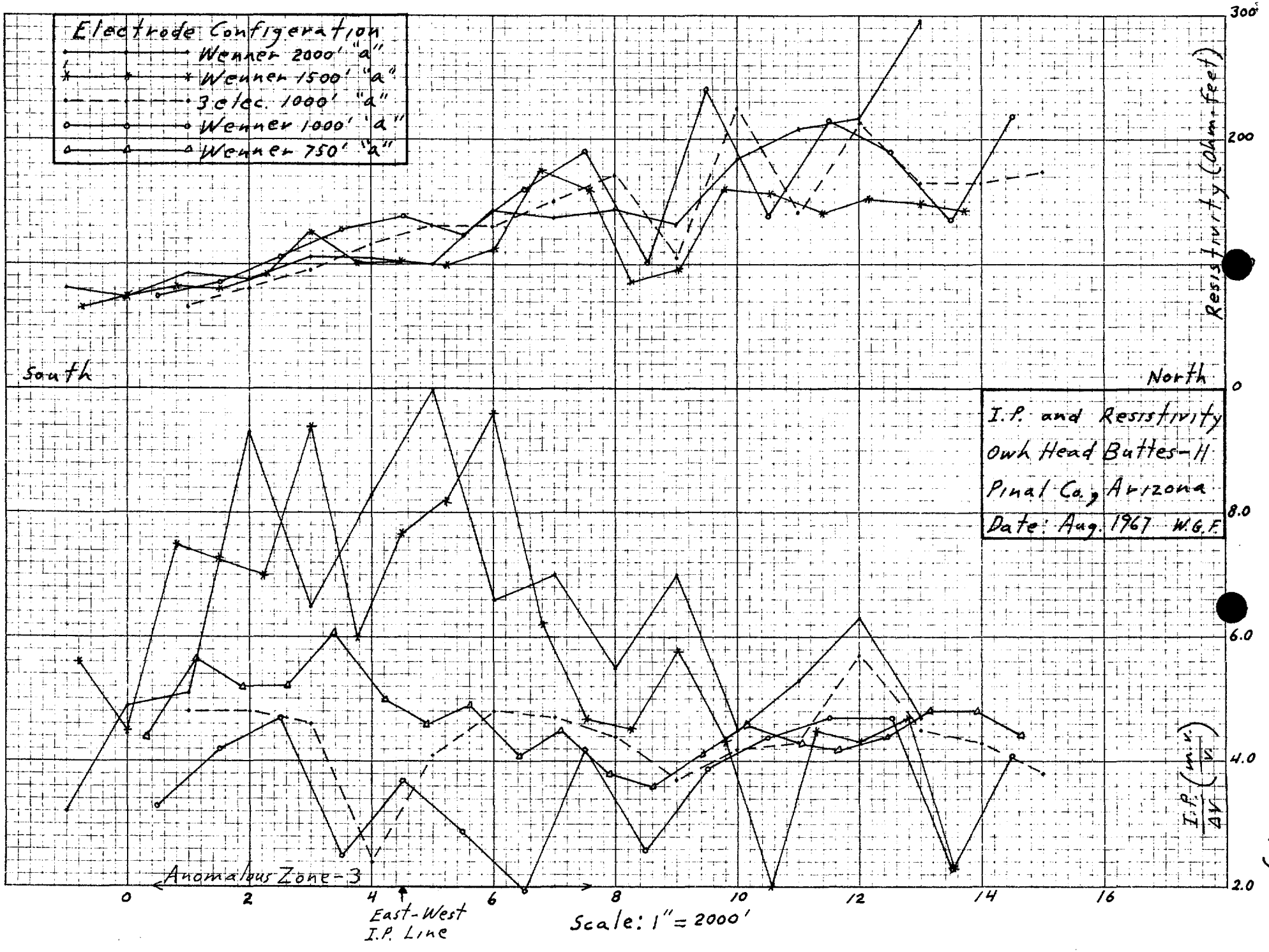


Fig. 9

Fig. 1

West

East

Electrode Configeration
Wenner 2000' "a"
3 elec. 1000' "a"
Wenner 1000' "a"
Wenner 500' "a"

I.P. and Resistivity
Owl Head Buttes-5
Pinal Co., Arizona
Date: Aug. 1967 W.G.F.

Resistivity (Ohm-feet)

I.P. (M.V./V.)

Anomalous Zone - 3

Scale: 1" = 2000'

R 13 E - T 8 S

19 | 20
30 | 29

+25 +23 +21 +19 +17 +15 +13 +11 +9 +7 +5 +3 +1 -1 -3 -5

3000 2000 1000

500 400 300 200 100 0

8.0 6.0 4.0 2.0 0

Revisited by Briscoe, Farley & myself WES, JHC, BAH
on Sept 13. with firm conclusion
that area has no economic potential W. E/S. da 16 A. IP.O

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

August 21, 1967

J.H.C.

SEP 6 1967

W.E.S.
SEP 18 1967

TO: J. H. COURTRIGHT

FROM: JAMES A. BRISCOE

THE OLSEN WASH
I. P. ANOMALY
OWL HEAD DISTRICT
PINAL COUNTY, ARIZONA

General

On July 13, 1967, the head technician on the geophysical crew brought in a high grade sample of chalcocite associated with quartz stringers in andesitic volcanic rock. This sample corresponded to an I. P. anomaly run along Olsen Wash using a 2,000 foot A spacing. You requested, that I examine the showing and the surrounding area. Wayne Farley and myself spent the rest of the day examining the area; the results of the examination being reported hereunder.

Summary and Conclusions

Andesitic flows, flowbreccias, and associated clastics containing fragments of Precambrian rocks show weak copper mineralization and alteration along quartz-carbonate stringers. No pervasive alteration was seen and geochemical sampling shows that the copper is confined to the narrow stringers. Pinal schist cropping out to the west of the anomaly shows no alteration and a geochem sample gave background copper content.

Additional geophysical work with more closely spaced electrodes continues to indicate a source at about 300 feet below the surface. Barter, who did a masters thesis on the Owl Head district, comments that at the San Juan deposit, three miles south of Olsen Wash, pre-mineral andesite lying on mineralized Precambrian basement rocks shows no copper content, and that chances for finding mineralization in the Precambrian beneath barren appearing volcanics is good. This suggests that in the Olsen Wash area, mineralization in the Precambrian may not be reflected by good alteration and capping in the andesite - this is questionable however.

If additional geophysics continues to show an anomaly of economic dimensions, additional geologic and geochemical sampling north and south of Olsen Wash is indicated.

A small silver content, as indicated by assays of vein copper from prospects, might enhance the value of any low grade copper mineralization.

Geology

Rocks cropping out in the area include the Precambrian Pinal schist, Precambrian granite, Cretaceous-Tertiary? andesitic flows, breccias, and associated clastics, and a thin cover of recent alluvial material. In addition, a small outcrop of felsic dikes? and associated biotite-rich lampophyre dikes? were seen at the locus of samples OH-5, 6 & 7 (ATTACHMENT A).

The andesitic material (from which the original chalcocite bearing sample came) consists of a basal? clastic unit containing fragments of Precambrian granite and Precambrian Apache group sediments, overlain by vesicular to massive flows and flow breccias - possibly laharic in origin. The volcanics lie on, and form a thin patchy cover over the Precambrian basement rocks exposed in many places throughout the Owl Head mining district. They are particularly interesting because they appear very similar to, and are probably the equivalent of, both the Picacho Peak volcanic series and the Cloudbrust formation. It is felt, therefore, that these volcanics are pre-ore in age.

Alteration and Mineralization

The andesite in the district shows rather small but persistent signs of copper mineralization in the form of small stringers of quartz, calcite, copper oxides and sparse chalcocite. Such is the case for the Olsen wash anomalous area - the source of the high grade chalcocite sample was a shear zone about a foot wide containing quartz and carbonate stringers. Alteration of the volcanics in the area consists of argillization of the feldspars and ground mass, sparse epidote, weak quartz and carbonate veining with vesicles being filled with both materials in places, and traces of limonite on some fractures. Nowhere were intense veining, bleaching, or evidence of pervasive sulfide mineralization noted.

Geochem samples taken in the andesite (OH-1,2,3, & 5) showed sub-background copper content. A sample (OH-4) taken from the mineralized stringer showed 10 ppm Ag and 0.63% copper.

A small outcrop of felsic and lamprophyric dikes?, possibly cutting the volcanics showed some signs of alteration and limonite stain. A geochem sample of the felsic dike ran 66ppm Cu, and less than 5ppm Mo - a sub-background content (as determined by the U.S.G.S. for the average felsic igneous rock). A sample of the lamprophyric material ran 400 ppm Cu but less than 5 ppm Mo. The copper content is higher than background, and the moly is in the range expected for mafic igneous rocks.

Pinal schist outcropping a short distance to the west showed weak hematite stain on the fractures, but no outstanding alteration or sulfide cavaties were noted. A geochem sample ran only 36 ppm - again sub-background.

To the south at Sutton Well vesicular andesite flows crop out. No alteration or oxide copper was noted at the surface, however celadonite (a green hydrous iron-magnesium silicate) which might be mistaken for oxide copper was seen to line many vesicles. Some cuttings from a drilled well on which a windmill stands contained copper oxide. A sample of this material went 300 ppm Cu, however because other copper rocks found around the abandoned house near the well were apparently brought in from outside the area, I am uncertain whether the copper in the sample was from the subsurface or was "salted" by specimens brought in from elsewhere.

About three quarters of a mile east of the anomalous area in Olsen wash is the Ferguson (or Malone) property. This property has been proposed to the company several times but was always turned down because of its size. A War Minerals Report of the property found in the company files describes about 13,333 tons of indicated oxide copper ore containing 2.5% copper, 2.5 ounces silver and 0.02 ounces gold per ton. The ore is described as occurring in a sheared andesite dike 500 or more feet wide which cuts through the Precambrian granite and Pinal schist found in the area. An unsubstantiated report says that a 250 foot drill hole passed through five feet of 15% copper as chalcocite at a depth of 60 feet.

After visiting the prospect, I feel that the basic dike is actually an elongate body of the same andesite found in Olsen wash. The andesite probably collected in a stream channel cut on the Precambrian basement or it may be down faulted in a small graben structure, in either case the andesite appears to be nothing more than an erosional remnant. A north-south shear cutting the center of the body appears to localize rather high grade copper oxide - probably allophane-chrysocolla and malachite.

A sample of this material contained 1.7% copper and 55 ppm (approximately 1.7 oz) silver, and less than 5 ppm Mo. A geochem sample taken to the east of the fault near the granite contact contained 300 ppm copper, less than 5 ppm Mo and no silver. As found previously, the property is too small to be of interest.

Potential

The outcrops in the area show little in the way of promising capping or alteration. The geochemical samples, with the exception of the lamprophyric material, show sub-background copper, and no silver.

Further geophysical work by Wayne Farley indicates a persistent "source" about 300 feet in depth with indicated total sulfide content of about five percent.

If the volcanics in the area are pre-mineral as they appear to be it would be rather unusual for an economic body within 300 feet of the surface not to be reflected by an alteration and geochemical halo. Barter, however, comments that in the San Juan copper deposit (three miles to the south) "--marble and volcanic rocks seem to be completely lacking in copper values. -- Exactly why the volcanic rocks near this deposit show no copper mineralization is not known, since it is felt that the presence of the large amounts of secondary silica in the volcanic rocks, along with information from other nearby properties, indicates that the volcanic rocks were present at the time of mineralization. The possibility of the continuation of mineralization in the basement rocks under the volcanic rocks is considered to be good." (pp60 & 61)

Although the outcrop appears rather unpromising, if further geophysics continues to show an anomaly of interesting size in the area, additional geology and geochemical sampling to the north and south of Olsen wash may be in order. The chance of encountering silver values in any low grade copper mineralization (as indicated in samples OH-4 & 11) increases the possibilities of the area somewhat.

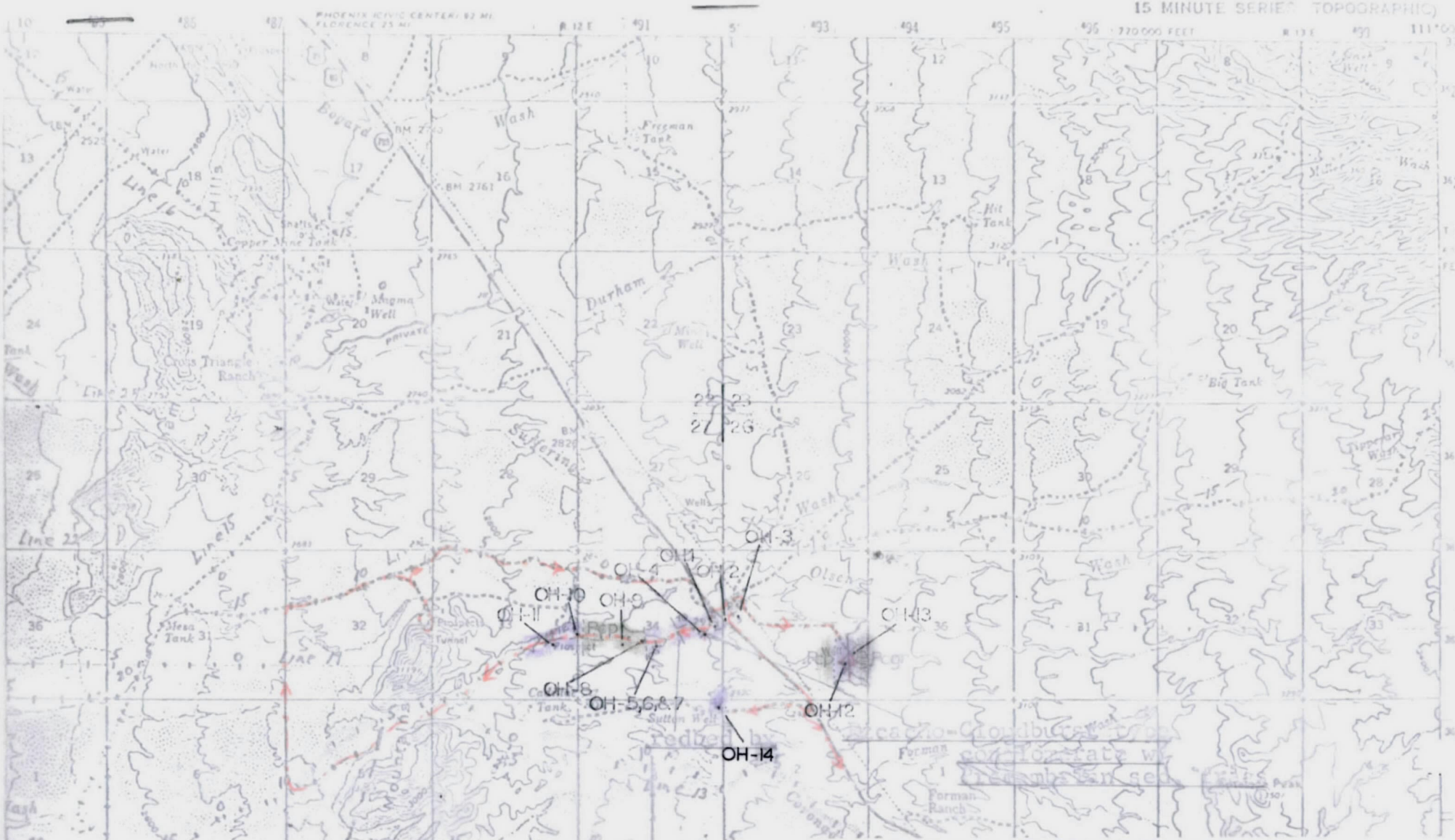
James A. Briscoe

JAMES A. BRISCOE

JAB/mcg
Attachments
cc: WGFarley

REFERENCES

1. Barter, C. F., 1962, Geology of the Owl Head District, Pinal County, Arizona. Unpublished Master Thesis, University of Arizona.



SKETCH MAP OF THE OLSEN WASH AREA
OWL HEAD DISTRICT, PINAL CO., ARIZONA

EXPLANATION

Symbols

- Veins
- Approximate dip & strike
- Traverse line

Rock Types

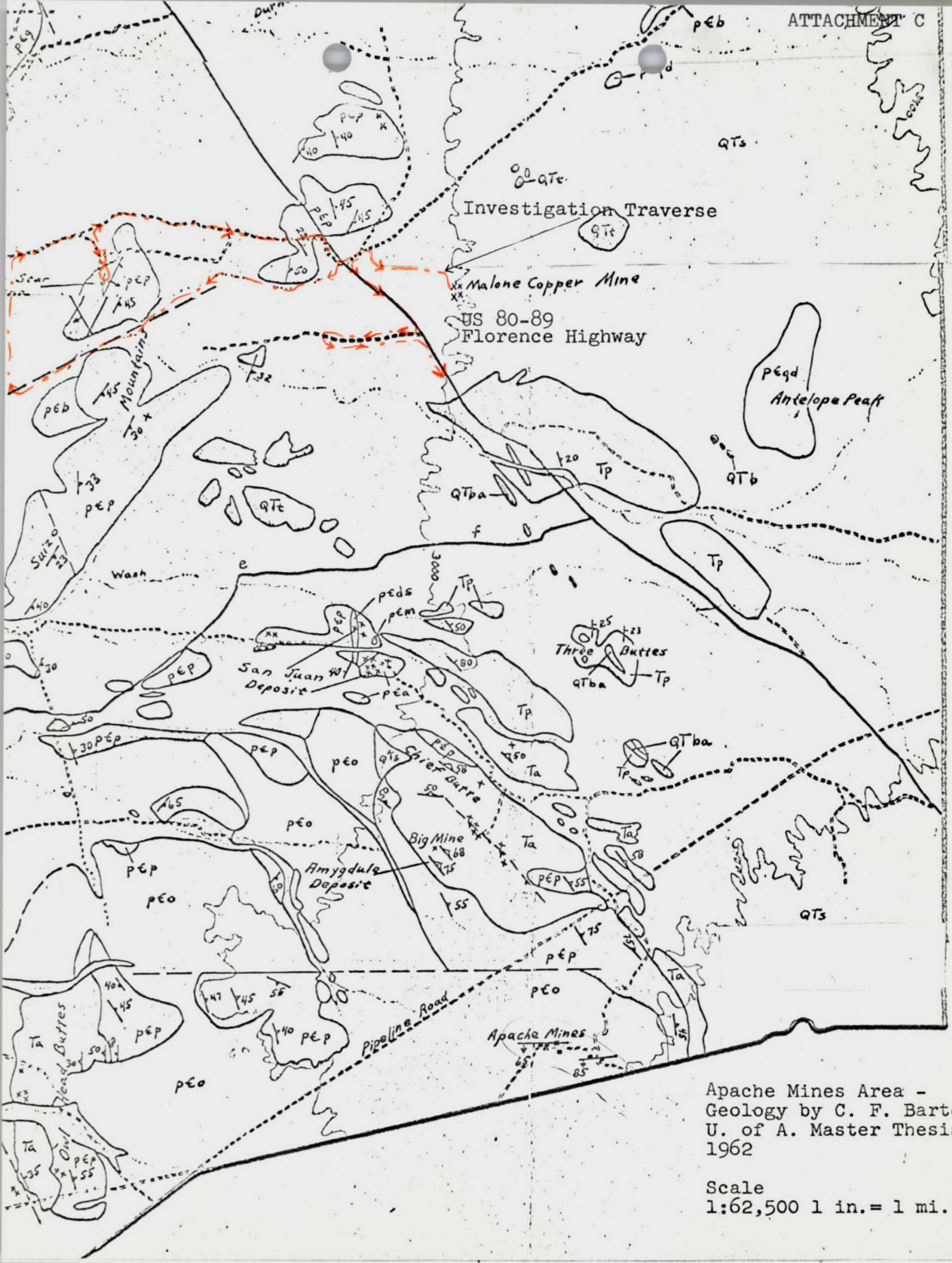
- Cretaceous-Tertiary Andesite
- Pe Oracle? granite
- Pe Pinal schist

ATTACHMENT A

GEOCHEMICAL AND ASSAY RESULTS

Sample No	Silver ppm	Copper ppm	Molybdenum ppm	Description of Sample
OH-2	none	44	<5	Rock chip sample of vesicular basalt exposed in the north side of the wash. Weak epidote, calcite, and sparse limonite stain.
OH-2	"	36	"	Rock and alteration type as above. Sparse chlorite? in vesicles. Some milky white quartz vein material in sample.
OH-3	"	36	"	Rock chip sample of andesite breccia with included fragments of Precambrian granite. Only trace of alteration.
OH-4	10	0.63%	"	Highgraded dump sample taken from four foot deep pit along a north-south trending fault breccia filled with calcite and sparse chalcocite and malachite.
OH-5	none	46	"	Rock chip sample from a boulder of bleached quartzite breccia. Sparse specks of limonite throughout. The boulder was loose and no outcrop was seen.
OH-6	"	66	"	Rock chip sample of felsic dike intruding the andesitic extrusives. Weak chloritic alteration and quartz veinlets, trace barite? sparse red hematite along fractures.
OH-7	"	400	"	Rock chip sample of lamprophyric dike or possible alteration along adjacent felsic dikes. The rock is 90% biotite. There is weak limonite paint on fractures and sparse quartz veinlets.
OH-8	"	22	"	Rock chip sample of the Precambrian Pinal schist. Trace to sparse hematite on fractures, no ore minerals, no sulfide cavities.
OH-9	"	36	"	Rock chip sample of weakly chloritized Pinal schist. Sparse hematite on fractures and schistosity, sparse carbonate veins.

ATTACHMENT C



Apache Mines Area -
Geology by C. F. Barter
U. of A. Master Thesis
1962

Scale
1:62,500 1 in.= 1 mi.

LEGEND

Sedimentary Rocks

QTs — Partially Consolidated and Unconsolidated Alluvium

Tp — Pantano Formation

pEm — Mescal Limestone (marble)

pEds — Dripping Spring Quartzite

Igneous Rocks

QTba — Basalt Dikes

QTt — Tuff, Tuffaceous Sandstone, Flows

QTb — Basalt Flows

Ta — Andesite and Basalt Flows, Ignimbrites and Tuffs

Td — Quartz Diorite and Diorite Dikes

pEqd — Antelope Quartz Diorite

pEo — Owl Head Intrusives

pEg — Durham Granite

Metamorphic Rocks

pCp — Pinal Schist

pEb — Gneiss

Quaternary

Tertiary

Younger Precambrian

Older Precambrian

Contact - Dashed Where Questionable

Fault - Dashed Where Probable (U, D, 50)

30 — Strike and Dip of Bedding

40 — Strike and Dip of Foliation

55 — Strike and Dip of Volcanics

a b f — Gravity Profile Points

Shaft

Pit

Prospect

Tunnel

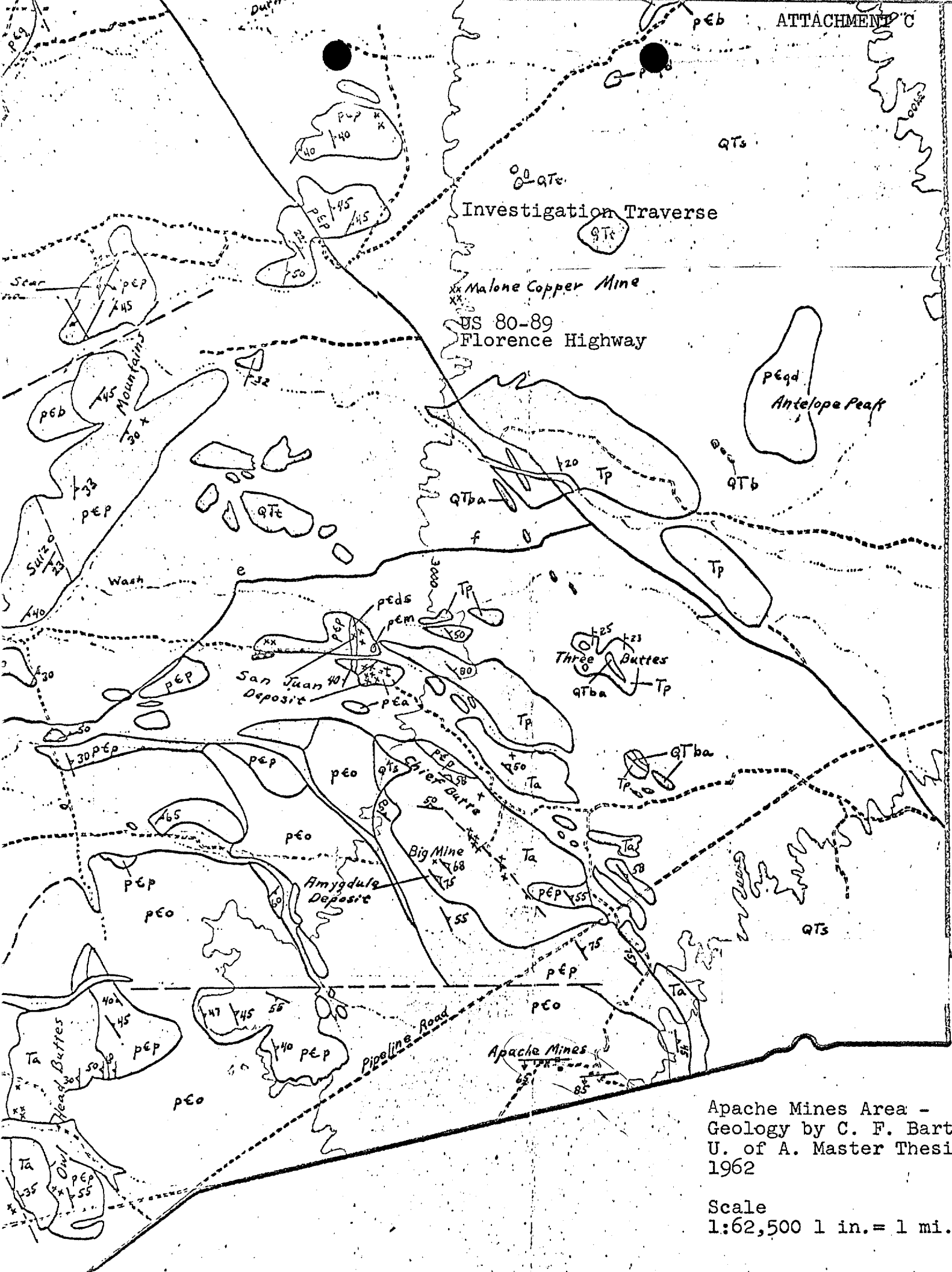
Well

U.S. 5 — Primary Road

Secondary Road

Intermittent Stream

Contour Line



Apache Mines Area -
Geology by C. F. Barter
U. of A. Master Thesis
1962

Scale
1:62,500 1 in.= 1 mi.

WES

J.H.C.
Ra-16 A.15.0
AUG 21 1967
File: "Owl Head Dist."

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

August 18, 1967

W.E.S.
AUG 21 1967

TO: J. H. COURTRIGHT

FROM: JAMES A. BRISCOE

APACHE MINES AREA
OWL HEAD MINING DISTRICT
PINAL COUNTY, ARIZONA

General

During October of 1966 while quail hunting, I noticed some small shafts on the north edge of the Tortolita Mountains. These were interesting in that considerable work had been done but the usual copper oxide material found around most mines in the area was absent.

For this reason I took two high-graded samples of vein material from two different dumps and had them assayed for silver and gold. The first sample assayed a trace gold, 9.81 ounces silver and 0.15% copper, while the second showed a trace of gold, 6.44 ounces silver, and 0.11% copper.

Because of these encouraging results, the area was again visited on July 25, 1967, by Wayne G. Farley and myself. Two additional dump samples and ten geochemical samples (Ap-4 - Ap-14) were taken. The sample locations and results are shown on ATTACHMENT A & B respectively.

On the way to the Apache Mines a small outcrop of copper bearing biotite rock was found. This outcrop is about two miles east of the Apache Mines, along the power-line road, and is apparently unrelated to the Apache deposit. It will be referred to below as the Biotite Copper Showing, and discussed separately.

Summary and Conclusions

Apache Mines

Two altered areas -- the Apache Mines themselves, and a second area a short distance to the northwest -- contain fair grade (3 to 10 ounces) silver values localized by quartz-carbonate-galena veins.

While the altered zones are large enough to be interesting, geochemical and assay samples show that silver values are confined entirely to the narrow quartz-carbonate veins and the area therefore has no potential.

Biotite Copper Showing

Biotized Precambrian Oracle granite contains up to 0.90% copper. The outcrop is small but the most strongly altered part dips under alluvium to the north and east possibly concealing an area of economic interest. Because of the high magnetite content of the rock, a ground magnetic survey over the alluvium would quickly determine the extent of the mineralization covered by alluvium.

Apache Mines

Location, Access and History

The Apache Mines are located just off the northern edge of the Tortolita Mountains on the southern edge of the Owl Head Mining District. Access to the mines is along the Florence highway to the transformer station several miles northwest of Oracle Junction. From here either the power line access road or the El Paso Natural Gas line access road (both unimproved dirt roads) can be taken westward to unimproved ranch roads, leading to the mine area.

The Apache Mines were worked by gambocinos, Indians and roving prospectors, who removed about $130,000 worth of silver prior to 1900 (Barter, C. F., 1962 p52). "The property then came into the possession of Captain Jeffords, sometimes known as the "White Chief" of the Apache Indians. About 1894 Jeffords gave some 20 claims to Count and Mme. Morajeska, who then resided in Red Rock, Arizona."" Little work has been done on the claims since 1912 (Barter. Pp 53).

Geology

Rocks exposed in the Apache Mines area consist of the Precambrian Oracle granite and Pinal schist, overlain by a thin patchy blanket of Tertiary? andesite, and Tertiary to Quaternary alluvium. The andesites described by Barter (1962) appear very similar to the Picacho Peak volcanics and also to the Cloudburst formation of the San Manuel area. Both of the latter formations are felt to be of pre-porphyry copper mineralization-Laramide age (Briscoe, 1966, Watson, 1967). A Laramide age for the andesite may therefore be postulated.

The Apache Mines are wholly enclosed in the Precambrian Oracle granite which is cut by several poorly exposed diabase dikes, possibly also of Precambrian in age.

Mineralization

There are two zones of alteration in the Apache Mines area. The first - the Apache Mines as shown by Barter (ATTACHMENT C) - is a generally east-west trending zone containing veins which strike west-northwest and northeast and dip steeply to the south (ATTACHMENT A). The zone is about 400 to 600 feet wide and 5,000 feet long and is composed of veins an inch to a few inches wide with interspersed weakly chloritized but barren granite and some diabase.

The second zone lies north-northwest of the first zone. It trends to the northeast and is approximately 3,000 feet long by 400 to 600 feet wide. Veining and alteration is similar to that in the main area.

The old workings are localized along quartz-carbonate veins which contain minor copper and lead and up to nine or more ounces of silver. Ore minerals seen in the veins were chalcopyrite and galena with gaugue minerals being pyrite, siderite?, calcite, and quartz. The galena is apparently strongly argentiferous as samples M-1 and Ap-8 (ATTACHMENT B) indicate. Some of the silver may also be associated with the carbonate and/or the quartz.

The main area appear to contain more carbonate material in the veins along with more chalcopyrite while in the northwest area the veins are more siliceous and contain only galena.

Potential

Geochemical camples taken in chloritized country rock between the veins (Ap 4, 6, 7, 9, 11, 12, 14)show subeconomic silver content. As the veins on the surface are not wide enough to sustain large scale mining, this area shows little potential.

Biotite Copper Showing

Geology

The mineralized outcrop consists of apparently biotized Precambrian Oracle? granite near a contact with the Pinal schist. The biotitization fades into unaltered granite to the south and west while it increases and is covered by alluvium to the north and east.

Weakly silicified and chloritized Pinal schist containing about 1% magnetite along schistosity planes composes the hill to the west of the biotite outcrop (ATTACHMENT A).

Mineralization and Alteration

The exposed outcrop is about 40 feet wide and 65 feet long. Biotite and magnetite replace the fabric of the granite until the rock consists of biotite (25-30%) magnetite (30-40%) and remnant feldspars (15-30%). Biotite can be seen invading and replacing the remaining feldspars along minute cracks and fissures.

Green oxide copper is deposited along cracks and fissures and on biotite leaves, however, no copper sulfides, or sulfides cavaties can be seen. There is very little limonite and all copper oxide is leached from the weathered surface. Exposure of a fresh surface, however, reveals good green copper oxides. A fifteen pound sample taken from various portions of the outcrop assayed 0.90% copper.

Potential and Recommendations

The outcrop area is small, however, the most strongly altered part of the exposure dips under alluvium to the north and east. The alluvium could, therefore, cover an economic body of the material.

Since the copper is apparently associated with strong magnetite, a ground magnetic survey over the area would determine in a short time whether more of the copper bearing material lies below the alluvium.

James A. Briscoe

JAMES A. BRISCOE

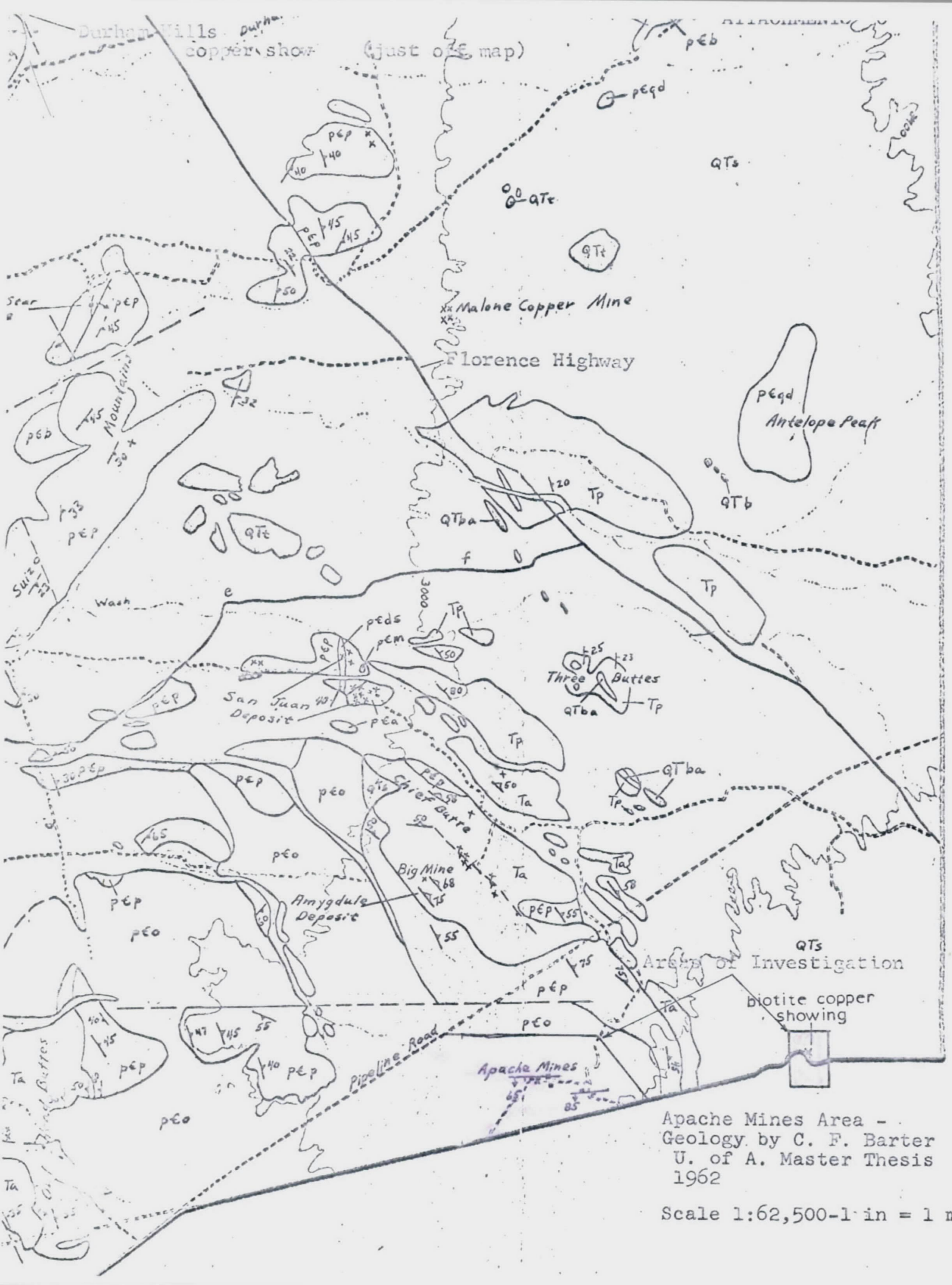
JAB/mcg
Attachments
cc: WGFarley

REFERENCES

1. Barter, C. F., 1962, Geology of the Owl Head Mining District, Pinal County, Arizona. Unpublished Masters Thesis, University of Arizona.

2. Briscoe, J. A., 1966, Geology of the Picacho Peak Area, Pinal County, Arizona. Unpublished Masters Thesis, University of Arizona.

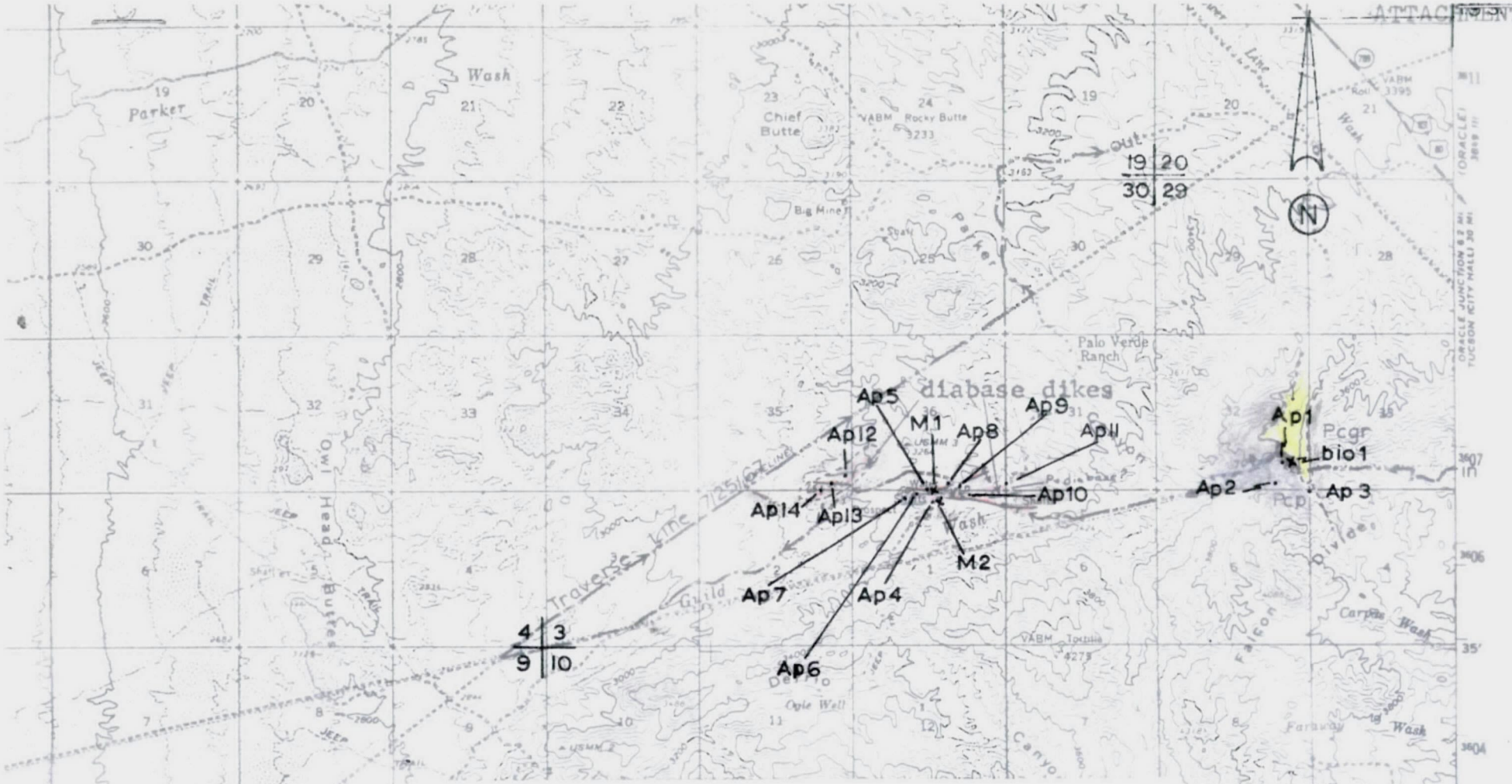
3. Watson, B. N., August 11, File Memorandum, Cloudburst Formation, San Manuel Area, Pinal County, Arizona, ASARCO Files. (Aa-16A.13.19B)



Apache Mines Area - Geology by C. F. Barter U. of A. Master Thesis 1962

Scale 1:62,500-1 in = 1 m

Sample No.	Au	Ag	Pb	Cu	Sample Description
			BIOTITE COPPER SHOWING AREA		
Ap-1	None	< 1 ppm			Pinal schist - Samples collected over 100' interval due west of the Biotite Copper Showing. The schist contains about 1% magnetite along schistosity planes.
Ap-2	No Assay	Nil	34ppm	18ppm	Pinal schist - Several samples taken over 100 foot interval - northerly from Ap-1.
Ap-3	"	Nil		84ppm	Sample taken along a silicified zone in Precambrian granite near the Pinal schist contact. Sparse pyrite casts were seen.
Bio-1		3ppm		0.90%	Approxiamtely 15 lbs of biotized Precambrian granite taken from small prospect pit on the outcrop.
			APACHE MINES AREA		
M -1	"	1.92 oz	0.09%	0.04%	Dump sample from 250'? shaft.
M -2	"	0.24 oz	0.05%	0.02%	Dump from +100' shaft, now used as a water well.
Ap-4	"	Nil	38ppm		Sample from dark unmineralized appearing but chloritized? Precambrian granite.
Ap-5	"	35ppm (Ap. 1 troy oz)	470ppm		Sample from the dump of a small incline driven along a quartz-carbonate vein.
Ap-6	"	Nil	48ppm		Sample from slightly chloritized Precambrian granite.
Ap-7	"	2ppm	32ppm		Sample taken adjacent to a quartz-carbonate stringer, one to two inches wide.
Ap-8	"	21ppm (Ap. 0.6 troy oz)	600ppm		Sample taken over 15-20 foot width of chloritized and veined material (possibly as altered diabase dike) exposed in a shallow pit, along which several other old workings were localized.
Ap-9	"	7ppm	96ppm		Sample taken from chloritized Precambrian granite between obviously mineralized structures.



SKETCH MAP OF THE APACHE MINES AREA
EXPLANATION

Symbols

- Veins
- Alteration
- Faults
- Traverse Line

Rock Types

- Alluvium
- Pe Diabase
- Pe Oracle Granite
- Pe Pinal Schist

T.10S.

LEGEND

Sedimentary Rocks

QTs — Partially Consolidated and Unconsolidated Alluvium

Tp — Pantano Formation

Igneous Rocks

QTba — Basalt Dikes

QTt — Tuff, Tuffaceous Sandstone, Flows

QTb — Basalt Flows

Ta — Andesite and Basalt Flows, Ignimbrites and Tuffs

Td — Quartz Diorite and Diorite Dikes

pEm — Mescal Limestone (marble)

pEds — Dripping Spring Quartzite

pEqd — Antelope Quartz Diorite

pEo — Owl Head Intrusives

pEg — Durham Granite

Metamorphic Rocks

pEp — Pinal Schist

pEb — Gneiss

Quaternary

Tertiary

Younger Precambrian

Older Precambrian

Contact – Dashed Where Questionable

U / D — 50 — Fault – Dashed Where Probable

30 — Strike and Dip of Bedding

40 — Strike and Dip of Foliation

55 — Strike and Dip of Volcanics

a b f — Gravity Profile Points

Shaft

Pit

x Prospect

Tunnel

Well

U.S. 5 — Primary Road

Secondary Road

Intermittent Stream

Contour Line

Aa-16A.15.0

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

J. H. C.

JUN 26 1967

June 26, 1967

To: W. G. Farley

From: S. I. Bowditch

Owl Head District
Pinal County, Arizona

A little while ago you asked me to look up the ownership of Section 3 and 4, Township 10 South, Range 12 East, Pinal County. On June 23 I looked up the records in Florence and found that this property has recently been sold by the Golders, who owned it when you were working in the area.

More importantly, I was able to run down the patents, and found that minerals are reserved to the Federal Government on both these sections.

For the record, the ownership now is:

Sec. 3: E 1/2 and E 1/2 E 1/2 W 1/2 - Richard H. & Eileen Davis
W 1/2 ~~W 1/2~~ and W 1/2 E 1/2 W 1/2 - Wm. C. & Elizabeth Davis
Both families listed as 5749 E. 6th St., Tucson.

Sec. 4: All-Otis B. and Sonya Miller
3822 E. River Road, Tucson.

S. I. Bowditch

SIB:bam
cc: JHCourtright ✓