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AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

J. E. K.
MAR 27 1968

March 22, 1968

Mr. C. P. Pollock, Vice President
ASARCO - New York Office

Picacho Project
Pinal County, Arizona

Dear Sir:

Attached is Mr. Farley's report on the results of geophysical surveys over the alluvial covered flank of the Picacho Mountains, situated 45 miles northwest of Tucson, near the main highway to Phoenix.

Two zones of anomalous I.P. response have been defined along the east side of the mountains (see attached map). Mr. Farley considers the response in both cases to be derived from sulphide mineralization in bedrock lying beneath 150 to 250 feet of alluvium and gravel.

Mr. Kinnison reports that minor copper mineralization occurs in widely separated fissures in the nearby granitoid gneiss outcrops but evidence of alteration is lacking and there are no Laramide intrusives present in the outcrops.

Although no geologic evidence was found suggesting the probability of a zone of alteration-mineralization occurring beneath the alluvial cover, the I.P. anomalies are of substantial size (4000' to 6000' in diameter) and the land situation is uncomplicated. It is concluded that the prospect merits a modest expenditure to sample bedrock beneath the cover.

Both anomalies lie on state-owned surface and mineral rights, but adjacent land is open to mineral location. Costs are estimated as follows:

Acquisition of prospecting permits on 7 State sections; $2.00 per acre rental for 2 years	$ 9,000.00
Staking of Federal claims on 3 sections	1,000.00
Four rotary holes @ 600' each, @ $5.00/ft.	12,000.00
Sampling, assaying and supervision	5,000.00
Total	$27,000.00

It is recommended that a mining authorization in the amount of $27,000 be requested.

Yours very truly,

J. H. Courtright

JHC:lmi
enclosure
cc: RJLacy, w/encl.
WESaegart
JRWojcik
WGFarley
JEKinnison

J. H. C.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

MAR 19 1968

March 18, 1968

TO: Mr. J. H. Courtright

FROM: W. G. Farley

Preliminary Report
I.P. and Resistivity
Picacho I.P. Anomalies
Pinal County, Arizona

During the fourth quarter of 1967 and the first quarter of 1968, an I.P.-resistivity survey was carried out on the Red Rock, 15 quad. from the Samaniego Hills north to the flanks of the Picacho Mountains. Two significant I.P. anomalies were discovered on the pediment along the SW flank of the Picacho Mtns. The location of these anomalies with the Wenner 1000 ft. "a" electrode configuration are shown on Figure 1. These anomalies have been labeled the "North Picacho I.P. Anomaly" and the "South Picacho I.P. Anomaly".

North Picacho I.P. Anomaly

North-south and east-west sectional representations of this anomaly are shown on Figures 2 and 3. Vertical dimensions are not true to scale. The anomaly reaches a peak of 8.7 m.v.lv. with the Wenner 2000 ft. "a" electrode configuration. Background I.P. in this area is 3 to 4 m.v.lv. The strike of the anomaly is north-south. The 6.0 m.v.lv. contour has dimensions of 4500 feet east-west by 7000 feet north-south. The depth to the top of the polarizer is 200 to 250 feet. The I.P. anomaly occurs in a resistivity area ranging from 100 ohm.feet on the east to 400 ohm.feet on the west. These resistivities indicate the polarizer to be coming from a bedrock source. A east-west resistivity low of about 100 ohm.feet extends from the west side of the I.P. anomaly towards the center of the I.P. anomaly. One-half mile to the west of the edge of this I.P. anomaly and along the strike of the resistivity low is the Gold Bell Mine. This Mine occurs in the nearest bedrock in proximity to the North Picacho I.P. Anomaly. The Asarco files contain a field trip report on this Mine under the title, "Pennie Claims - Picacho", R. F. Welch, 1962. (The Mine was reportedly opened in 1932 for gold content. No records are available of any shipments that may have been made. The Pennie claims embrace several east-west bull quartz veins 2 to 5 feet wide. Some show post-mineral slipping and iron stains in recemented gouge with occasional stain of secondary copper minerals. By carefully selecting specimens, 2 to 3% copper assays can be obtained with silica in excess of 90%. The veins on strike are discontinuous, lenticular, and the copper showing is sporadic. The vein system occurs in gneissoid granitic type country rock and the veins carry no alteration or impression of intense mineralization.)

In February, 1968, R. H. Luning and the author sampled these quartz

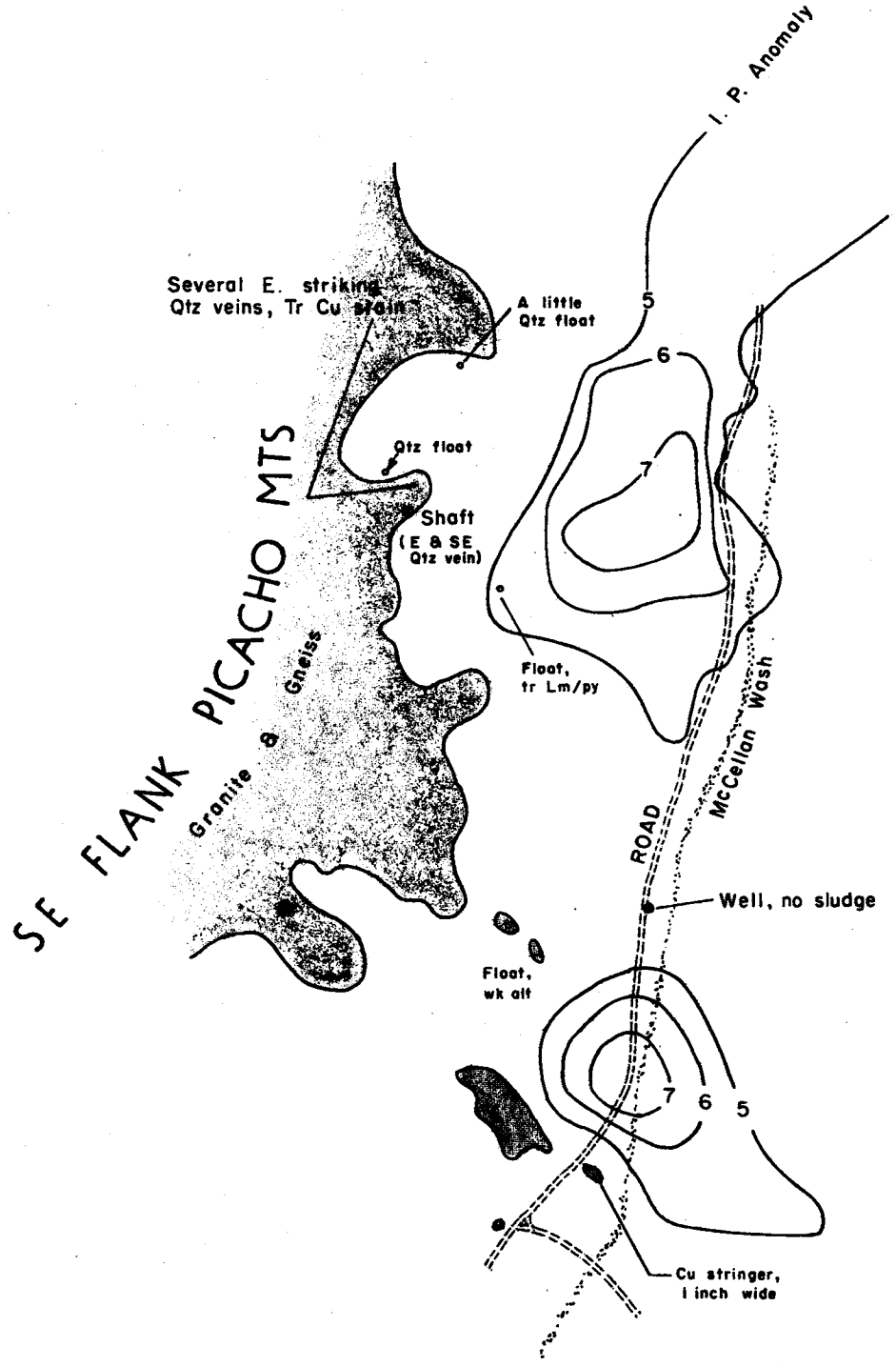
veins for gold and silver. A character sample of quartz fault breccia cemented by limionite indicated a trace of gold and 0.02 ozs. of silver. A 4-foot interval across the mined quartz vein indicated a trace of gold and 0.09 ozs. of silver. A few particles of iron sulfide were noted in the quartz on the dump. I.P. response near the Gold Bell Mine was 5.6 m.v.lv. with the Wenner 2000 foot "a". It is believed by the author that the east-west quartz veins extend under cover eastward to the North Picacho I.P. Anomaly. Here the overall I.P. pattern and major surface drainage pattern suggest north-south structures. The center of the I.P. anomaly is believed to be a brecciated and mineralized zone at the intersection of these structures. I.P. on the North Picacho I.P. Anomaly indicates an average sulfide content of about 2%. It is possible for an enriched blanket to have a greater percentage of sulfides. This anomaly appears to have a good chance of containing an economic copper-gold-silver mineral deposit. I recommend it be initially tested by a minimum of two drill holes within the 6.0 m.v.lv. I.P. contour. A ground magnetic survey now in progress over the I.P. anomaly may aid in the exact placement of these holes.

South Picacho I.P. Anomaly

A north-south sectional representation of the South Picacho I.P. Anomaly is shown on Figure 4. The peak response on this anomaly was 7.8 with a Wenner 1000 ft. "a". Background I.P. response in this area is 2 to 3 m.v.lv. The strike of this anomaly is northwest-southeast. The 6.0 m.v. contour has dimensions of 4500 feet northwest-southeast by 3500 feet northeast-southwest. The depth to the top of the polarizer is about 165 feet. Resistivities in the anomalous I.P. area range from 200 to 600 ohm.feet, indicating a bedrock source. A resistivity low of about 100 ohm.feet occurs at the center of the I.P. anomaly. A ground magnetic survey has just been completed over this anomaly. A northwest-southeast 150 gamma high occurs on the west side of the I.P. anomaly and a north-south 150 gamma high on the east side of the anomaly. A north-south magnetic low cuts through the center of the I.P. anomaly coincident to a deep, straight wash which appears to reflect a buried fault zone. It is believed by the author that the South Picacho I.P. Anomaly is coming from a brecciated, mineralized zone at the intersection of north-south and northwest-southeast structures. I.P. indicates an average sulfide content of about 2%. Two narrow northwest-southeast copper stringers occur in the gneiss outcrop just south of the I.P. anomaly. It is believed by the author that this I.P. anomaly has a good chance of containing an economic copper-gold-silver mineral deposit. I recommend initial testing by a minimum of two drill holes within the 6.0 m.v.lv. I.P. contour. One hole should be in a magnetic high area and the other hole in a magnetic low area. Further drilling, if any, will depend on the results obtained in the first holes.

Airborne magnetics have recently been flown by Asarco over this entire area on one-half mile spacing. A preliminary map shows a magnetic high coincident to the South Picacho I.P. Anomaly. A report on the ground and airborne magnetics will be made when the field surveys and reduction are completed.

cc: RJLacy JEKinnison W. G. Farley
WESaegart JJCollins



1 inch = 1 mile

NOTE:

Outcrop shaded gray: unaltered granite or gneiss
Weak mineralization, as indicated

I. P. anomalies from W. G. Farley

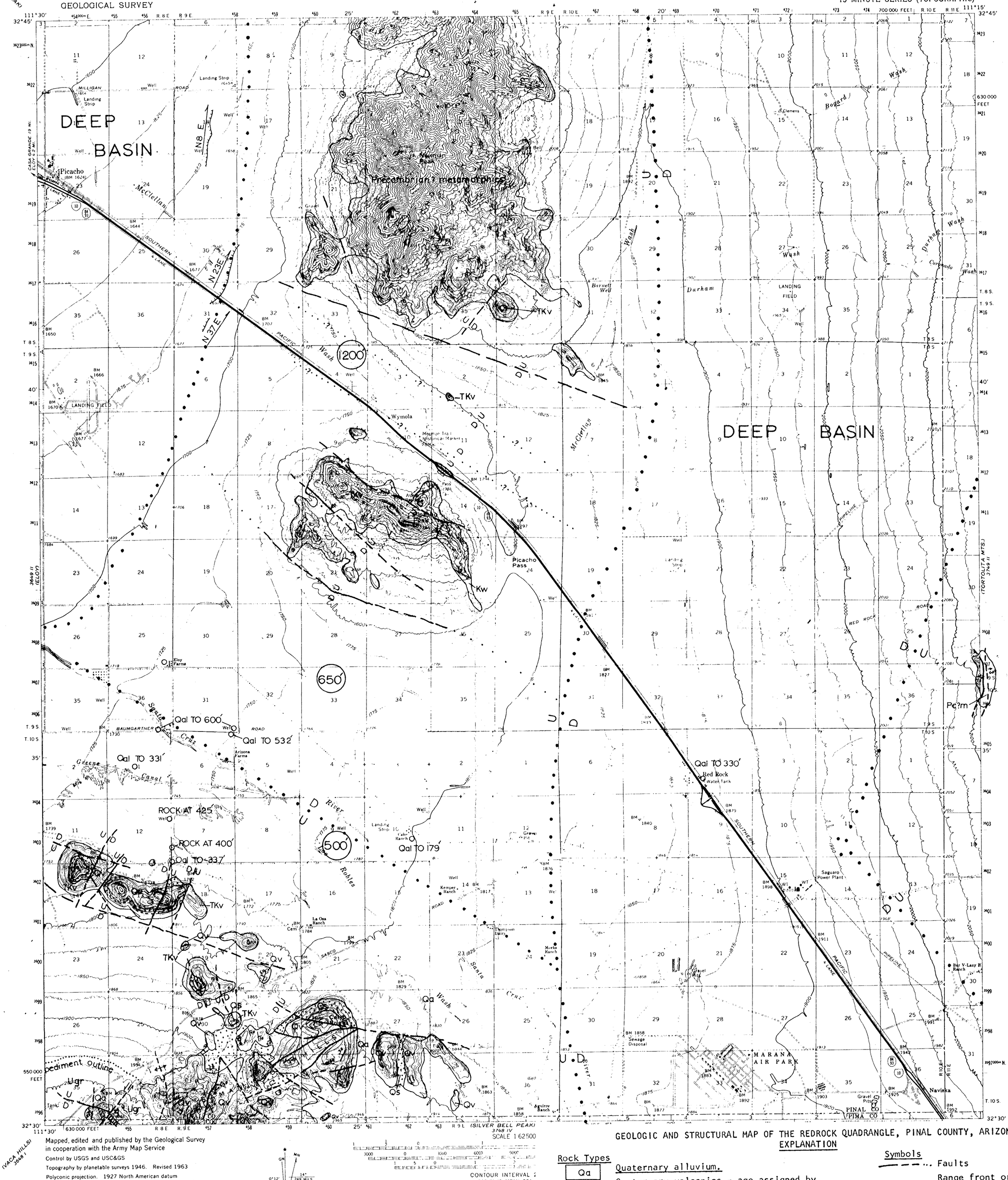
Geologic Sketch
SE PICACHO MTS

J.E.K.

Feb., '68
2064

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RED ROCK QUADRANGLE
ARIZONA
15 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited and published by the Geological Survey
in cooperation with the Army Map Service

Control by USGS and USC&GS

Topography by planetable surveys 1946. Revised 1963

Polyconic projection. 1927 North American datum
10,000-foot grid based on Arizona coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks,
zone 12, shown in blue

Where omitted, land lines have not been established

UTM GRID AND 1963 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:62500

CONTOUR INTERVAL 2
DATUM IS MEAN SEA

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER ...
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SY...

GEOLOGIC AND STRUCTURAL MAP OF THE REDROCK QUADRANGLE, PINAL COUNTY, ARIZONA

EXPLANATION

Rock Types

Qa — Quaternary alluvium.

Qv — Quaternary volcanics - age assigned by Feth 1951. These volcanics are probably Mid-Tertiary in age, equivalent to the Hieroglyphic Hill volcanics near Silver Bell.

Qs — Quaternary sediments - age relationships as explained above.

TKv — Tertiary-Cretaceous volcanics - at Picacho Peak andesitic flows and flow breccias intercalated with volcanic sediments. Elsewhere?

Kw — Cretaceous Wymola conglomerate - contains fragments of Precambrian Apache Group sediments, Pinal Schist and Precambrian granite.

Pcm — Undifferentiated metamorphic rocks - for the most part gneissic granite.

Ugr — Undifferentiated granite.

Geology by: J.H. Feth, U.S.G.S., 1951 with revisions of the Picacho Peak area and addition of the range front faults by J.A. Bricsoe, Sept. 1967.

Symbols

- Faults
- U / D — Range front or other faults general location interpreted from gravity data.
- Subsidence cracks in alluvium, hachures show down side, arrow indicates general strike.
- 500 — Depth to bedrock interpreted from gravity data.
- ROCK AT 400 — Water well location note indicating bedrock depth or amount of alluvium penetrated.

1980

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

February 21, 1968

J. E. K.

FEB 27 1968

TO: J. H. Courtright

FROM: J. E. Kinnison

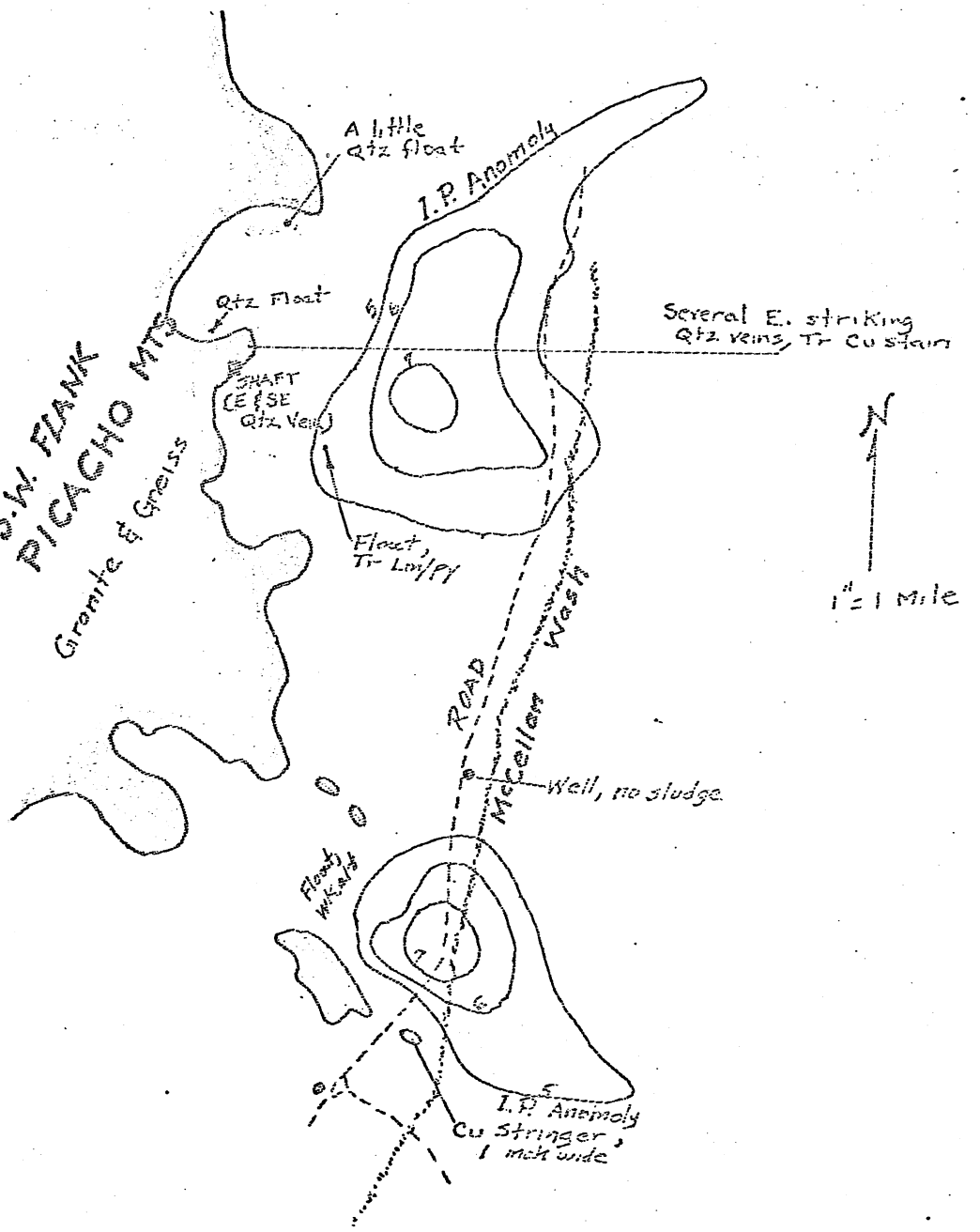
Geologic reconnaissance
Pichacho Mountains
Pinal County Arizona

Mr. Cummings and I spent the day of February 7 in a brief reconnaissance on the subject area, as shown on the attached sketch map. This memorandum confirms my verbal report to you. This portion of the mountains faces the two I.P. anomalies recently discovered by Mr. Farley. I conclude that there is no alteration in any of the outcrops near these anomalies which would reflect the presence of burried alteration zone of significant size.

It is true that narrow stringers containing traces of copper are present at scattered points through the area covered during the reconnaissance, but these are too weak to offer a positive lead into either of the I.P. anomalies.

John E. Kinnison

JEK:ir
cc: W. G. Farley



Note

Outcrop shaded gray: unaltered granite or gneiss.
Mn mineralization, as float.
Preliminary I.P. anomalies from U. S. Turley

GEOLOGIC SKETCH
SW PICACHO MOUNTAINS
J.E.K.
Feb, 1968

Aa 16a.16.16

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

September 20, 1967

J. E. K.

SEP 21 1967

TO: J. H. COURTRIGHT

FROM: JAMES A. BRISCOE

Exploration Potential
in the pediment area between
the North Silver Bell and
Picacho Mountains,
Picacho Mining District,
Pinal County, Arizona

Summary and Conclusion

The alluvium covered land between the north end of the North Silver Bell Mountains and the south end of the Picacho Mountains is a relatively shallow pediment with bedrock actually forming one continuous north-northeast trending mountain range composed of the Samaniego Hills, Picacho Peak and the Picacho Mountains. Deep alluvial filled basins bounded by range front faults lie on the east and west sides of this range (ATTACHMENT A). Picacho Peak which lies between the Samaniego Hills and the Picacho Mountains range, is composed of Cretaceous andesitic to basaltic flows, flow breccias and intercalated sediments, probably equivalent to the Cloudburst formation of the San Manuel area, and is cut by northwest trending faults. This northwest trend can be seen in the Tucson - Tortolita Mountain area to the southeast and the Casa Grande - Silver Reef Mountain area to the northwest, thus defining a small scale lineament feature. This lineament parallels structures in the Silver Bell area to the south (ATTACHMENT B).

The rocks composing Picacho Peak show pervasive propylitic alteration similar to that seen north of San Manuel in the Cloudburst formation, and north of the alteration zone at Silver Bell. Quartz and calcite veins showing copper mineralization, barite, and sparse amounts of lead, silver, and gold are common throughout the range (ATTACHMENT C). Because of these features it is proposed that Picacho Peak represents part of the propylitic alteration halo emanating from alluvial covered porphyry copper mineralization. This mineralization may lie anywhere on the pediment area surrounding the Peak but the area south of the Peak, between the Peak and the Samaniego Hills, because of structural similarity to the Silver Bell zone, is thought to be most favorable. This pediment area should be explored by various geological and geophysical techniques including geologic mapping, geochemical water well sampling, gravity, magnetic, and induced polarization surveying.

General

During the mapping of Picacho Peak which was done as the author's Master of Science thesis problem, it was found that the peak is composed of andesitic to basaltic extrusive flows and flow breccias with intercalated conglomeratic units containing fragments of Older Precambrian basement and Younger Precambrian sedimentary rocks. Rocks exposed in the range have undergone weak but pervasive propylitic alteration with attendent epidotization, argillization, and sericitization of feldspars, alteration of mafics to chlorite, and introduction of quartz and calcite. Veins trend generally east-west to west-northwest, minerals associated with them being copper (visable as copper oxides), barite and traces of lead, silver and gold as revealed by geochemical sampling (ATTACHMENT C). This weak mineralization has been exploited by small pits and adits scattered throughout the range, but no significant production has come from the area.

At the time I completed my thesis, I felt that the age of the Picacho Peak volcanic series was Cretaceous because of the probable Laramide alteration and copper mineralization. Some doubt was cast on this hypothesis by the possibility that the alteration and mineralization could have been Mid-Tertiary. My faith in the Cretaceous age for the Picacho series was reinforced by a recent field trip to examine the Cloudburst formation in the San Manuel area with Mr. Barry Watson. Examination of Cloud burst convinced me that it is equivalent to and probably co-relative of the Picacho Peak volcanics. During the trip we found granodiorite dikes, the probable source for the San Manuel deposit, cutting the Cloudburst formation and indicating its pre-mineral, Laramide age. In addition, both Mr. Watson and myself agree that prominent propylitic alteration and epidotization of the Cloud burst formation just north of the San Manuel deposit is due to that mineralization rather than the Mid-Tertiary vein mineralization of the also adjacent St. Anthony Mine. This alteration of the Cloudburst, although somewhat stronger, is of the same type as that seen in the Picacho Peak volcanics.

No intrusive rocks which might be a source for the mineralization and alteration are exposed in the Picacho Peak area. Because the alteration is similar to alteration in the Cloudburst formation at San Manuel, and also to alteration in the Silver Bell andesite at Silver Bell, I propose that the alteration at Picacho Peak represents part of a propylitic halo of a buried Laramide intrusive which may contain commercial porphyry copper type mineralization. Because of a structural environment similar to that of Silver Bell this body may be localized under the alluvial cover between Picacho Peak and the North Silver Bell Mountains. Pediments which possibly surround Picacho Peak on the north, west, and east sides should also be considered as a possible locus for the source of alteration however.

Geology and Structure

Examination of the U.S.G.S. relief map of Arizona suggests that the Silver Bell Mountains, Picacho Peak and the Picacho Mountains are actually one continuous range with the low areas of Picacho Pass and the Santa Cruz River being inundated by alluvial fill encroaching from the deep basins to the east and west. The U.S.G.S. gravity contour map (ATTACHMENT B) which outlines the deep basins and mountain ranges shows that the bedrock pediment does, indeed exist. In addition, the existence of a pediment shelf to the northwest of Picacho Peak is substantiated by subsidence cracks in alluvium over the locus of the edge of the deep basin to the west. This northeast trending range, with deep alluvial filled basins to the east and west, forms the major structural element in the Redrock quadrangle. Northwest trending horst and graben structures cut the range at almost right angles, with the graben forming the alluvium covered pediments, between the outcropping horsts.

The northeastern end of the range (the Picacho Mountains) is structurally higher than the southwestern end (the Samaniego Hills). Further to the southwest, off the quad sheet, Precambrian granite is exposed. This gives the Santa Cruz Valley a graben structure, with Precambrian exposed on the north and south sides. The environment appears very similar to that at Silver Bell where the alteration zone is structurally below the Precambrian basement on the south side of the Watermans and the Precambrian basement to the north of the Ragged Top fault (ATTACHMENT B).

A structural condition similar to that of the Picacho - Silver Bell Mountain mass is seen to the northwest in the Silver Reef - Casa Grande Mountains and to the southeast in the Tucson - Tortolita Mountains. Both of these pairs of ranges are connected by a low lying pediment which is defined by northwest trending graben? faults. These faults, form a zone, starting at the Tucson - Tortolita Mountains and run through the Picacho Peak area and on through the Silver Reef - Casa Grande Mountains forming a small northwest trending lineament paralleling structures in the Silver Bell area (ATTACHMENT B).

Rocks exposed in the Redrock quadrangle range in age from Precambrian to recent.

The Picacho Mountains are composed of Precambrian metamorphics, granitic gneiss for the most part, except for a small plate of Cretaceous Picacho Peak volcanics lying on an erosion surface on the Precambrian in Section 36, R9E, T8S, (ATTACHMENT A).

To the southwest, lies Picacho Peak which, as was previously described, is composed of weakly altered and mineralized Cretaceous volcanic flows and intercalated sediments.

Further southwest, across the Santa Cruz River drainage lie the Samaniego Hills. They are composed of Cretaceous volcanics (probably equivalent to the Picacho volcanics) overlain by Mid-Tertiary? sediments which are in turn overlain by Mid-Tertiary? volcanic flows.

The pediment between Picacho Peak and the Samaniego Hills is proably cut on Picacho volcanic-type rocks. There is, however, a possibility that the pediment may consist of Precambrian sediments, diabase and/or basement schist, and granite as all of these rock types (the diabase excepted) are found in the Cretaceous Wymola conglomerate at Picacho Peak.

Available gravity data indicates the bedrock is probably a maximum of 650 feet in depth between the Silver Bell Mountains and Picacho Peak. This corresponds closely to water well-depth-to-bedrock data plotted on Feth's 1951 geology map. This depth is certainly within the range for porphyry copper exploration.

Suggestions for Exploration

Using a working hypothesis that covered porphyry copper type mineralization exists somewhere between the Picacho Mountains and the Samaniego Hills, several geologic and geophysical tools can be used to more closely define a target. These could be performed simultaneously or in sequence and are as follows:

1. Additional gravity work to more accurately determine depth to bedrock and outline pediment areas. This is presently being done by Mr. Wayne Farley.

2. Geologic reconnaissance mapping in the Samaniego Hills area. Emphasis would be placed on searching for alteration in the Cretaceous volcanics, for Laramide dike rocks, and fragments of capping material in the Tertiary sediments (similar to the occurrence at Hieroglyphic Hill east of Silver Bell.

3. Reconnaissance of the water wells in the pediment area to examine the cuttings for signs of mineralized bedrock. Water geochemical samples should also be taken to determine the presence or absence of a copper and/or molybdenum anomaly.

4. Logs of the water wells can be examined at the U.S.G.S. office and the data plotted on the base map.

5. A low level air-magnetic survey over the alluvium could be run. A magnetic low might outline an altered porphyry body while a high could reflect altered Precambrian or Paleozoic sediments.

6. If any of the above techniques should delineate a target, an I. P. survey could be concentrated in this area. If no target is located by the preceding techniques a general I. P. survey should be run over the whole pediment area.

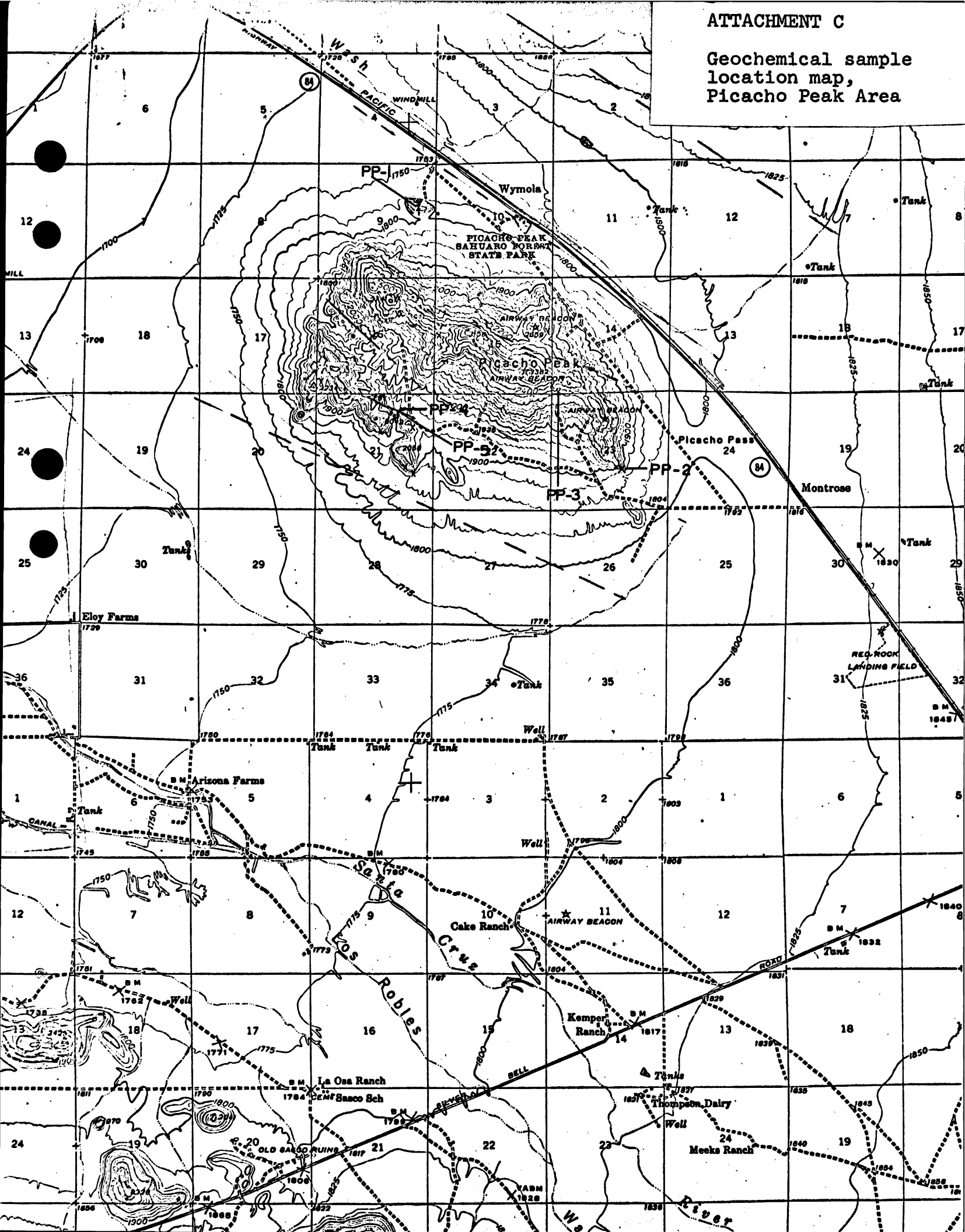
James A. Briscoe

JAMES A. BRISCOE

JAB/mcg
Attachments
cc: JEKinnison w/attachments
WGFarley w/attachments

ATTACHMENT C

Geochemical sample location map, Picacho Peak Area

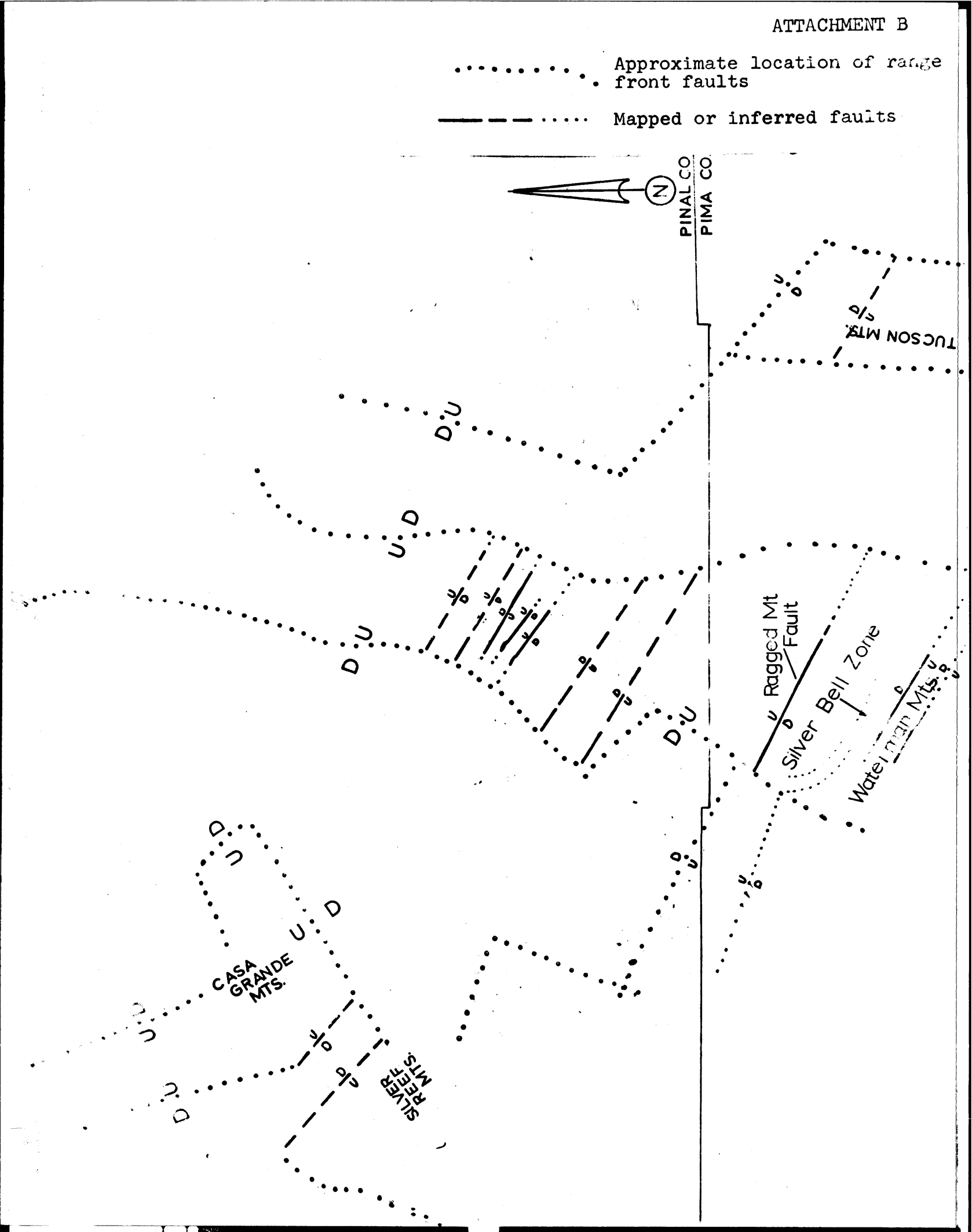


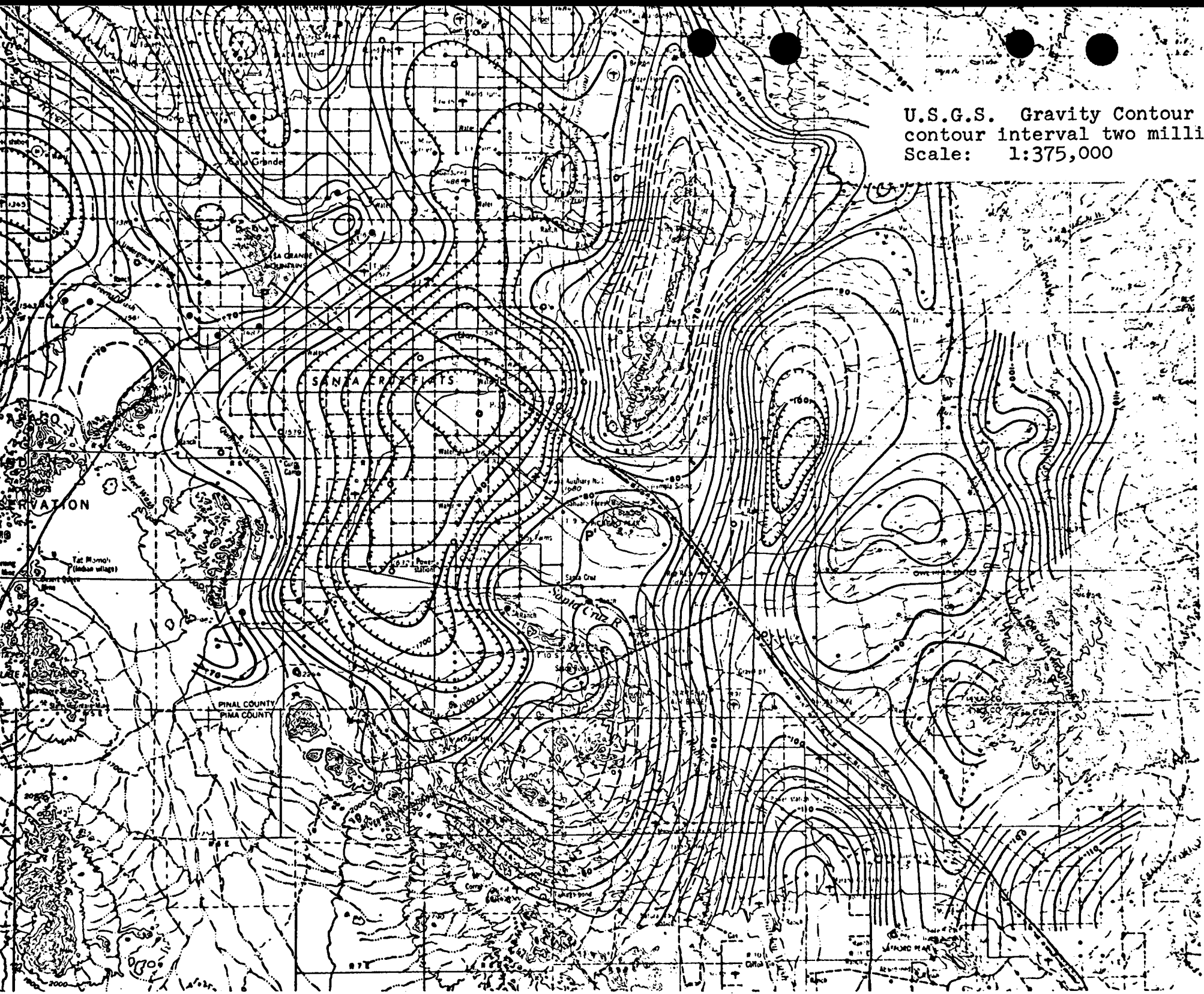
ATTACHMENT C

Description of Geochemical Samples taken from the
Picacho Peak Area, Pinal County, Arizona

Sample No.	Copper	Lead	Silver	Gold	Sample Description
PP-1	224ppm	No assay	18ppm	None	Sample taken from quartz and carbonate veins in and around a 75 ft prospect shaft sunk on a narrow carbonate stringer. Weak argillic alteration.
PP-2	0.92%	No assay	0.04oz.	Trace	Sample taken from copper stained vein material in small prospect pit, and argillized andesite flow material adjacent to quartz-carbonate pegmatitie dike.
PP-3	390ppm	No assay	7ppm	None	Sample of andesite and silicified breccia material from around portal of NW trending adit. Weak argillic alteration.
PP-4	204ppm	236ppm	2ppm	None	Sample of propyllitized andesite adjacent to but about 10 feet away from a fault zone containing oxide copper. This sample contained 1/2% or less hydrothermal magnetite.
PP-5	2.57%	0.56%	0.59 oz.	0.07oz.	Material from the above fault zone containing strong oxide copper, magnetite, and possible traces of galena.

ATTACHMENT B




U.S.G.S. Gravity Contour Map
contour interval two milligals
Scale: 1:375,000
SANTA CRUZ FLATS
PINAL COUNTY
PIMA COUNTY
Santa Cruz R.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RED ROCK QUADRANGLE
ARIZONA
15 MINUTE SERIES (TOPOGRAPHIC)

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Topography by planetable surveys 1946. Revised 1963

Polyconic projection. 1927 North American datum
10,000-foot grid based on Arizona coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks,
zone 12, shown in blue

Where omitted, land lines have not been established

UTM GRID AND 1963 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

(SILVER BELL PEAK)
3748 IV
SCALE 1:62500

CONTOUR INTERVAL 25 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Unimproved dirt
Interstate Route — State Route

ARIZONA
QUADRANGLE LOCATION

RED ROCK, ARIZ.
N3230—W11115/15

1963

AMS 3749 III—SERIES V798

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A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

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