CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

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A PORPHYRY COPPER PROSPECT
IN
THE VULTURE MINING DISTRICT
MARICOPA COUNTY, ARIZONA

A PORPHYRY COPPER PROSPECT
IN
THE VULTURE MINING DISTRICT
MARICOPA COUNTY, ARIZONA

by

Donald C. Elkin
Consulting Geologist

April 25, 1970

Farrow and Associates
Moab, Utah

CONTENTS

ILLUSTRATIONS

SUMMARY AND CONCLUSIONS

The subject prospect is located in low lying hills on the eastern slope of Vulture Ridge, approximately eight miles south-southwest of Wickenburg, Arizona. Rocks outcropping in the area are a basement Precambrian granite-gneiss complex, Cretaceous - Early Tertiary rhyolite and andesite flows and near-surface intrusives, and Quaternary basalt. A younger intrusive may be present within the Precambrian complex, although no clear-cut supporting evidence has been found. Recent alluvium obscures some portions of the property.

The most striking feature of the prospect is a zone of abundant hematite mineralization that everywhere coats fractures and in some areas completely permeates the rock. Within this zone the host granites and rhyolites are locally silicified and altered to sericite and clays. Numerous "copper oxide" shows are present, and in many areas remnant sulphide boxworks occur along fractures and throughout the rock itself.

Along the western side of the prospect there is a structural intersection between a strong northwest trending lineation and several younger east-west wrench fault zones. As a result, the wide-spread brecciation in the country rock would have provided an adequate plumbing system for migrating mineral solutions.

Rock chip samples taken at random located an anomalous molybdenum zone in the southwest corner of Section 4, Township 6 North, Range 5 West. No attempt at follow up was made, although a grid rock-chip sampling program should delineate this anomaly.

In the last few months considerable unsolicited exploration interest has been aroused in the property. A Texas firm has been conducting a grid geochemical sampling program, and an induced polarization survey has been run in portions of Sections 10, 15 and 22.

The property represents a reasonable geological exploration target based upon the strength of the mineralization, alteration, and structural features, which, while not at all conclusive, could possibly represent the surface expression of a buried "porphyry copper" ore body.

Donald C. Elkin
Consulting Geologist

INTRODUCTION

Work commensurate to this report was carried out over the last ten months as time away from consulting projects permitted. After the initial property examination was completed, a limited geochemical sampling program was conducted, and a land status determination was made. A photo-geologic map was then compiled and field mapping and alteration studies completed the project.

The accompanying geologic map is very general, in as much as no attempt was made to sort out the many rock types occurring within the areas mapped as rhyolite and andesite. Similarly, the Precambrian complex has not been detailed as more emphasis has been placed on rock alteration rather than rock type.

The subject prospect is located in the Vulture Mining District, in Township 6 North, Range 5 West, approximately 8 miles south-southwest of Wickenburg, Arizona (see Figure # 1).

Access is from Wickenburg by five miles of paved and graded gravel roads and then roughly 3 miles of jeep trails and sand wash bottoms (see Enclosure # 1).

LAND STATUS

The property is a composite of 306 contiguous unpatented mining claims contained in seven ownership blocks (see Figure # 2). The names and addresses of the claim owners as shown in the division of ownership table are as follows:

John B. Yongue
2nd South, 2nd East
Moab, Utah

Timothy R. Pogue, Sr.
345 East 1st North
Moab, Utah

Benjamin L. Ortega
510 W. Apache
Wickenburg, Arizona

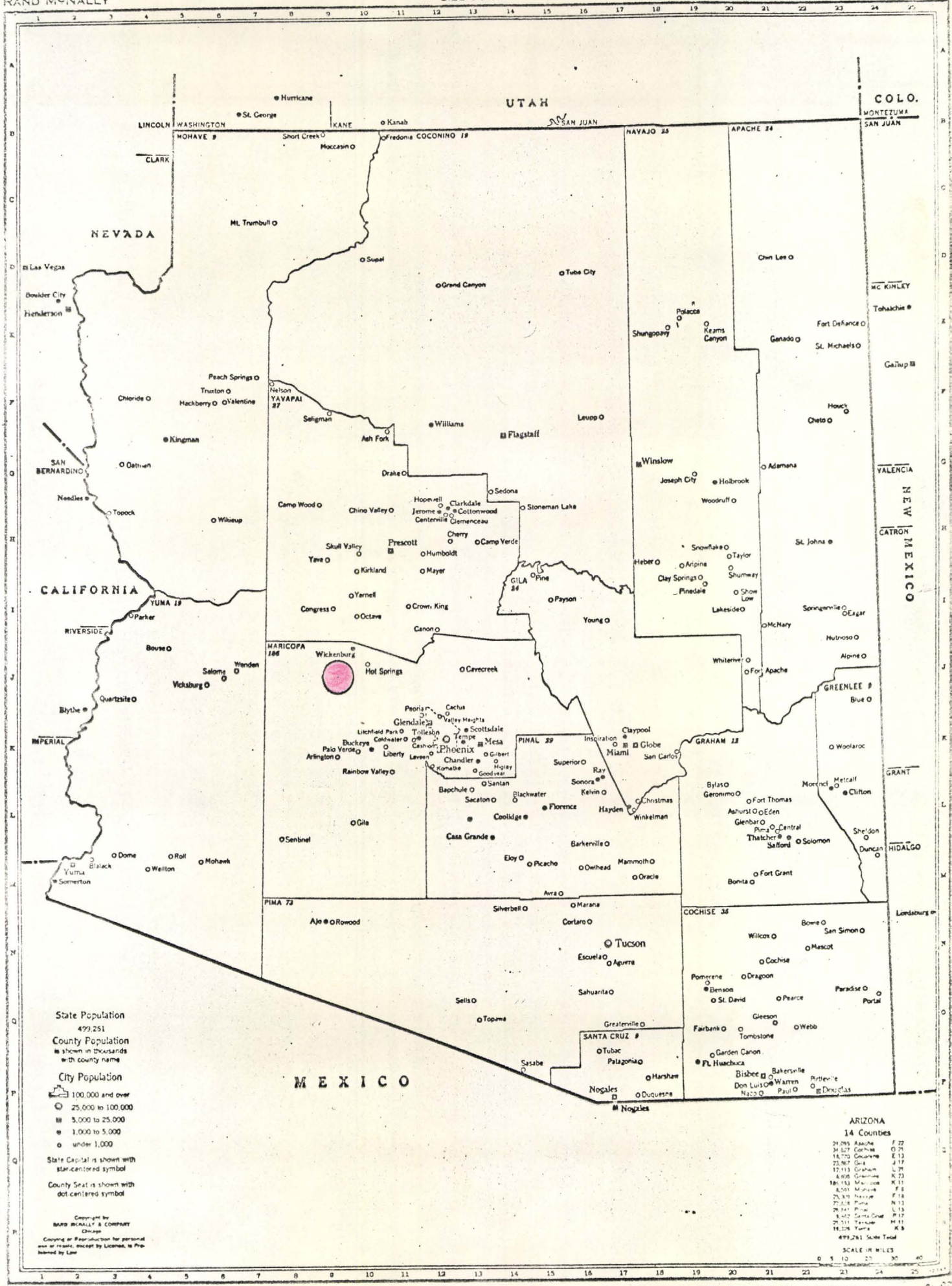
R.E. Billingsley
207 Mesquite
Wickenburg, Arizona

RAND McNALLY

CITY-COUNTY STATE MAP

SIZE 8½ X 11

ARIZONA



State Population
499,261

County Population
as shown in thousands with county name

City Population
- 100,000 and over
- 25,000 to 100,000
- 5,000 to 25,000
- 1,000 to 5,000
- under 1,000

State Capital is shown with star-centered symbol

County Seat is shown with dot-centered symbol

ARIZONA
14 Counties

24,085	Apache	F 22
34,627	Cochise	O 25
18,770	Coconino	E 13
23,067	Gila	J 17
12,113	Graham	L 21
8,008	Greenlee	K 23
18,153	Maricopa	K 11
8,501	Mohave	F 8
29,329	Navajo	F 18
77,658	Pima	N 13
29,747	Pinal	L 15
8,402	Santa Cruz	P 17
29,511	Yavapai	H 11
98,526	Yuma	K 5
499,261	State Total	

SCALE IN MILES
0 5 10 20 30 40

MADE IN U.S.A.

Specially engraved and indexed for use with the Rand McNally Commercial Atlas and Marketing Guide.

This Map is also available in size 17 X 22

CL 0

Figure No. 1

George Bodiroga
365 North Jackson
Wickenburg, Arizona

Chester E. Farrow
131 South 2nd East
Moab, Utah

Donald C. Elkin
244 Tusher
Moab, Utah

During the land study an effort was made to uncover any previous valid claims within the property boundary. Several patented gold claims exist on the west side of Vulture Ridge in Section 16, Township 6 North, Range 5 West, also there is a single unpatented gold claim in the east-central portion of Section 4, Township 6 North, Range 5 West. Other than these, none were found but it is possible that a few claims of unknown ownership do exist. If a conflict should arise, prior ownership rights will have to be recognized. Also, a few fractions do occur between individual claims and claim groups because of angular intersections and surveying techniques of an approximate nature.

Farrow and Elkin have an agreement with the other property owners whereby they arrange the sale or lease of the properties.

DIVISION OF OWNERSHIP

Claim Groups:	Percent Ownership by:		
	Yongue Pogue Ortega	Billingsley Bodiroga	Farrow Elkin
Green Knight # 1 - 30	75%	-	25%
Rat # 1 - 32	75%	-	25%
Long Stake # 1 - 74	75%	-	25%
Long Stake # 75 - 96	50%	-	50%
Caballeros # 1 - 92	-	75%	25%
Ipan # 1 - 47	-	50%	50%
PC # 1 - 10	-	50%	50%

Figure # 2

GENERAL GEOLOGY

Precambrian granites, granite-gneisses, and schists form the bulk of the rocks outcropping on the prospect. Erosion had previously stripped Late Precambrian, Paleozoic and Early Mesozoic formations from the area and the Precambrian is now directly overlain by Late Cretaceous rhyolitic and andesitic flows and near-surface intrusives. These younger rocks are relatively thin bedded in the prospect area but become considerably thicker to the east and north. The western edge of the property is bounded by Vulture Ridge, a silicic, fine-grained intrusive of probable Larimide age. This may be the youngest of the Late Cretaceous acidic rocks in the area, although all of the intrusives and flows are thought to be roughly contemporaneous. The possibility exists that some of the granitic mass mapped as Precambrian may in fact be a younger intrusive. This argument is based solely on the considerably different megascopic character of the rock as no supporting field evidence has been uncovered. Several small hills of Quaternary basalt outcrop in Sections 22 and 27, Township 6 North, Range 5 West, and appear to be somewhat aligned with an east-west trending fault zone. Recent alluvium covers many portions of the prospect but is probably not more than 10 or 20 feet thick, as rock-in-place can usually be found in the dry wash bottoms. An exception to this would be in the extreme southern end of the area where valley fill depths could be considerable.

STRUCTURE

The dominant topographic feature in the area is Vulture Ridge, a north-northwest trending intrusive zone that is probably an old deep-seated structure. Attitudes of the bedding and schistosity planes in the Precambrian adjacent to this structure are chaotic, with near vertical dip angles common. Intersecting, and in places offsetting the Vulture Ridge intrusive are a series of younger east-west fault zones. These zones are characterized by intense

brecciation as is the prospect area in general. Movement within these zones appears to be predominantly in the strike-slip direction, suggesting wrench faulting with probable attendant tension fracture development. The overall importance of this structural intersection and the associated brecciation is that it could have provided the conduit for porphyry type igneous intrusions and ascending hydrothermal mineralizing solutions.

ALTERATION AND MINERALIZATION

Within the prospect area hydrothermal alteration has effected only portions of the granites, gneisses, and rhyolites (see Enclosure # 2). This alteration, although widespread in areal extent, varies in intensity due in part to the degree of fracturing in the rock. In the granites and gneisses the most prominent alteration products are silica and sericite with lessor amounts of clays and epidote. In the rhyolites the clays are most abundant with some sericite also present. Remnant sulphide boxworks are common along fractures and in the rock itself where they form epicenters for limonite and hematite halos. Coincident with the zone of alteration is an area of strong hematite mineralization that fills fractures and floods out through the rock. The hematite is not implaced as specularite but is more of an earthy variety mixed with limonite. Old "copper oxide" workings are common throughout the property, and recent bulldozer cuts have uncovered many new chrysocolla shows.

GEOCHEMISTRY AND GEOPHYSICS

A random geochemical sampling program was conducted over the property with eleven "grab" rock chip samples being collected and analyzed for copper and molybdenum. An attempt was made to take representative specimens of the altered rock, so the samples were selected for their lack of any obvious mineralization. The original intent was

to possibly turn up values which would be high enough to be considered anomalous under any circumstances, and in this respect the survey was successful. Two samples taken from a small hill in the southwest corner of Section 4, Township 6 North, Range 5 West ran 113 and 232 ppm Mo (see Enclosure # 3 for location and Figure # 3 for assays). These values should prove significant in as much as they are at least twenty to forty times the molybdenum background while the corresponding copper values of 45 and 70 ppm are probably at best not more than two to four times the copper background. The hill itself is intensely altered and mineralized as are exposures in the surrounding hills and dry wash bottoms.

A Dallas, Texas firm, Geochemical Surveys, Inc., has been conducting a regional geochemical exploration program in the Southwest for a major company. They have grid sampled the property extensively and left small wooden stakes and flagging to mark their sample positions. Also an induced polarization survey has been run in the last month in portions of Sections 10, 15, and 22 (see Enclosure # 3). This has possibly been done as a follow up to the previously mentioned geochemical work, as at least some of the I.P. lines pass through geochemical sampling positions. The lines shown in Enclosure # 3 are as they were laid out in the field. Whether or not the I.P. survey was conducted over all these lines is problematical, but at least three of the lines are known to have been run.

Figure No. 3

Rocky Mountain Geochemical Corporation

P. O. BOX 2217
SALT LAKE CITY, UTAH 84110

CERTIFICATE OF ANALYSIS

Date: March 30, 1970 Page 1 of 1

Client: Chester E. Farrow
Arches Building
Moab, Utah

On: 8 samples
Submitted by: C. E. Farrow
Received: March 23, 1970
Analysis: Copper & Molybdenum
Remarks: Molybdenum analyses determined colorimetrically. All other analyses determined by atomic absorption.
Job No. 70-8-6SL

cc: Enc.
File (2)

LRR:pba

Sample No.	ppm Copper	ppm Molybdenum
WB 1	25	7
WB 2	45	113
WB 3	20	6
WB 4	70	232
WB 5	30	20
WB 6	20	6
WB 7	10	2
WB 8	5	1

By Lawrence R. Reid Lawrence R. Reid

...e reported in parts per million unless specified otherwise. A minus sign (—) is to be read "less than" and a plus s...) "greater ...es in parenthesis are estimates. This analytical report is the confidential property of the above mentioned clie... and ... protection ... and ourselves we reserve the right to forbid publication or reproduction of this report or any part thereof without w... ermission.

1 ppm = 0.0001% 1 Troy oz./ton = 34.28 ppm % Mo x 1.6... = %MoS_2

Rocky Mountain Geochemical Corporation

P. O. BOX 2217
SALT LAKE CITY, UTAH 84110

Phone 322-4[illegible]
Area Code: 801

CERTIFICATE OF ANALYSIS

Date April 21, 1970

Client Farrow and Associates
11 Arches Building
Moab, Utah

Report on: 3 samples

Submitted by: D. C. Elkin

Date Received April 10, 1970

Analysis: Copper & Molybdenum

Remarks Molybdenum analyses determined colorimetrically. All other analyses determined by atomic absorption.
Job No. 70-9-34SL

cc: Enc✓
File (2)

LRR:pba

Sample No.	ppm Copper	ppm Molybdenum
RAT 13-1	5	15
RAT 13-2	70	-1
RAT 13-3	25	1

By Lawrence R. Reid
Lawrence R. Reid

All values are reported in parts per million unless specified otherwise. A minus sign (—) is to be read "less than" and a plus sign "greater than." Values in parenthesis are estimates. This analytical report is the confidential property of the above mentioned client and for the protection of this client and ourselves we reserve the right to forbid publication or reproduction of this report or any part thereof without written permission.

ND=None Detached 1 ppm = 0.0001% 1 Troy oz./ton = 34.28 ppm % Mo x 1.6683 = %MoS$_2$

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

VULTURE MOUNTAINS QUADRANGLE
ARIZONA
15 MINUTE SERIES (TOPOGRAPHIC)

PROPERTY BOUNDARY

ENCLOSURE NO. 1

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1951 and 1960. Field checked 1961

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

UTM GRID AND 1961 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:62500

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U.S. Route — State Route

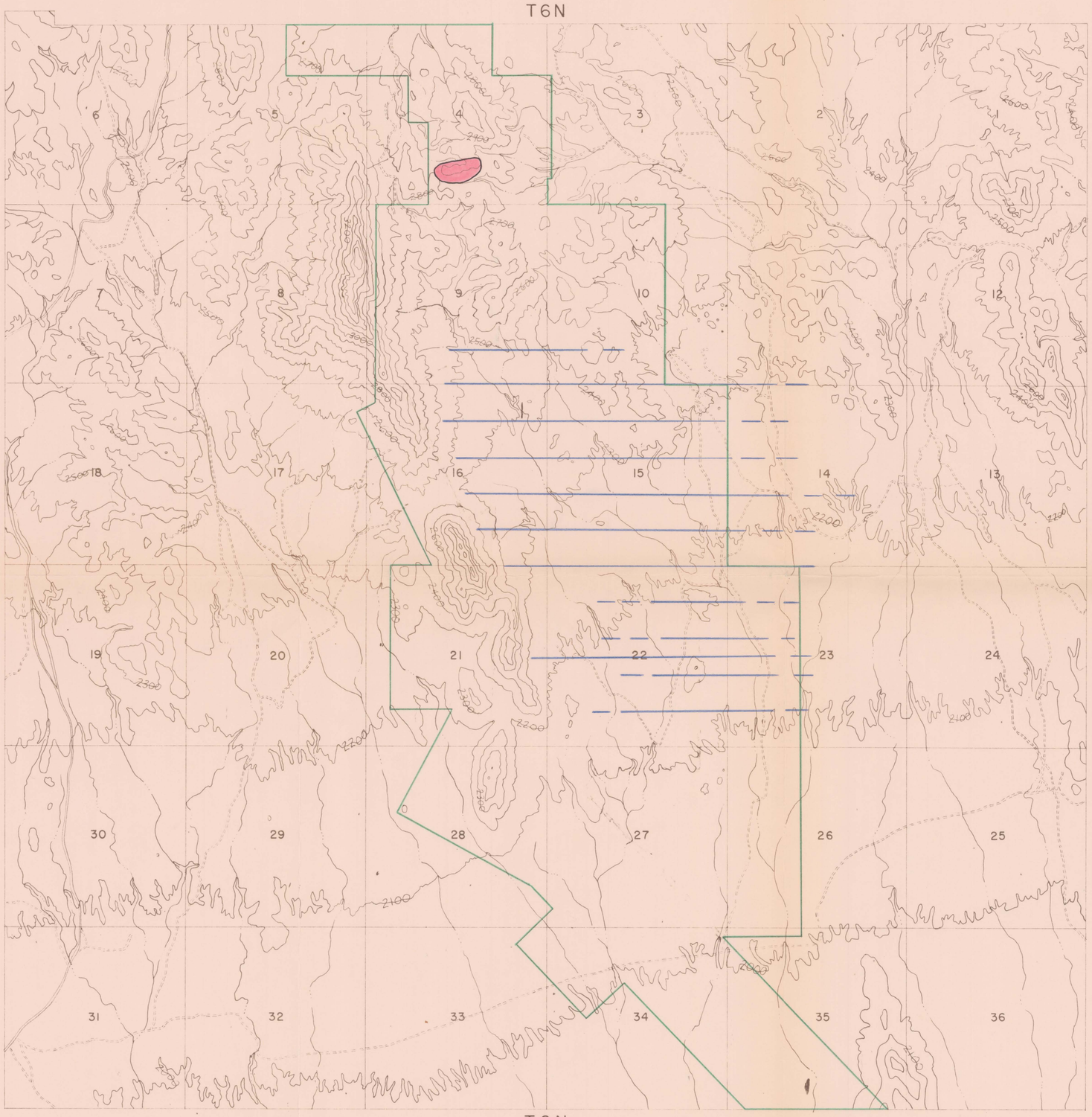
ARIZONA
QUADRANGLE LOCATION

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

VULTURE MOUNTAINS, ARIZ.
N3345—W11245/15

1961

AMS 3451 IV—SERIES V798



PORPHYRY COPPER PROSPECT

VULTURE MINING DISTRICT

T6N-R5W

MARICOPA COUNTY, ARIZONA

Zone of Anomalous Molybdenum Geochemical Values

Induced Polarization Survey Lines

Property Boundary

N

0 1/2 Miles

0 1000 3000 5000 Feet

Scale : 1 inch = 2,000 feet

Contour Interval : 100 feet

Farrow & Associates
Consulting Geologists
Moab, Utah

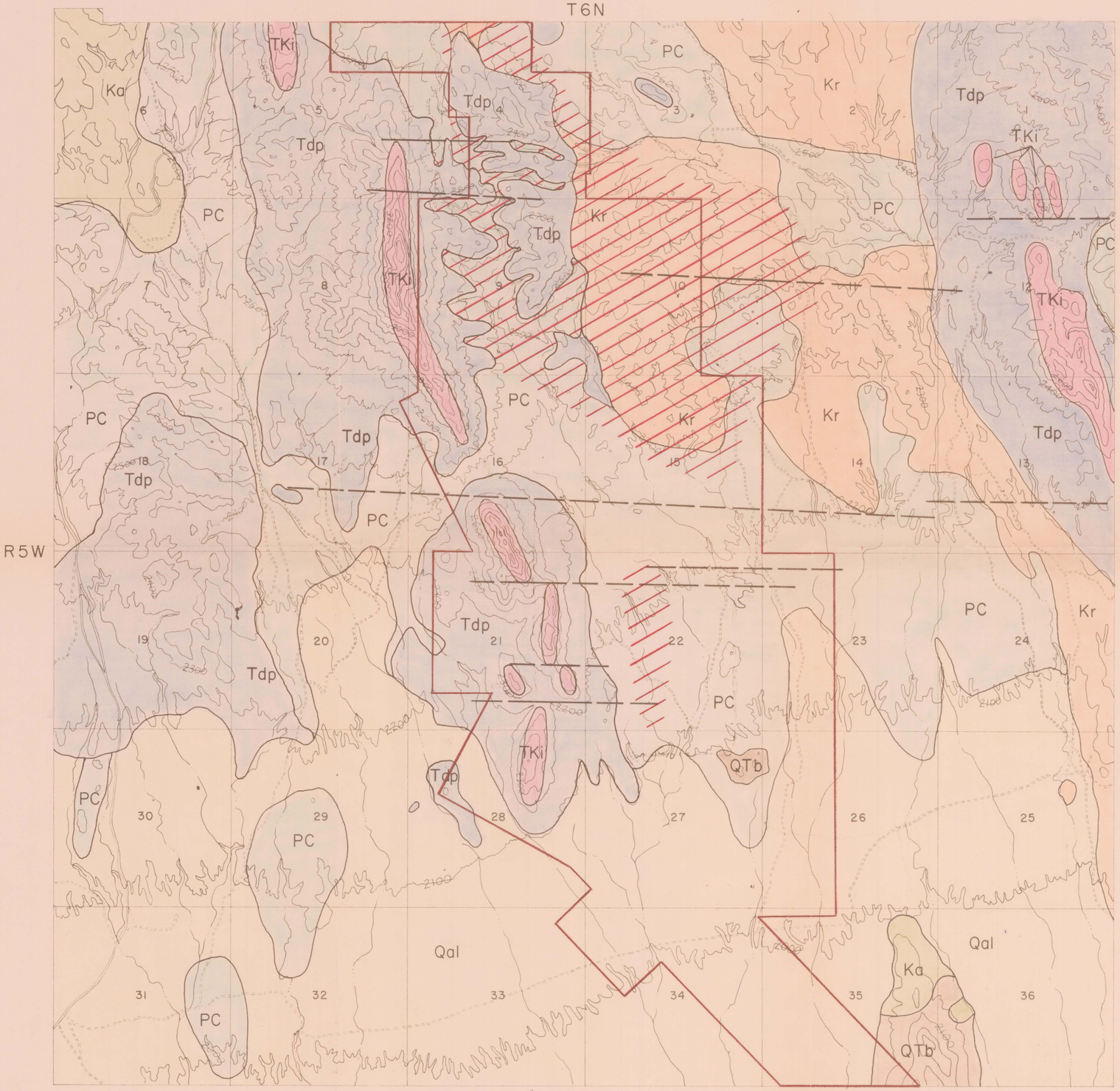
Enclosure No. 3

PORPHYRY COPPER PROSPECT

VULTURE MINING DISTRICT

T6N - R5W

MARICOPA COUNTY, ARIZONA



QUATERNARY		Qal	Alluvium
TERTIARY		QTb	Basalt
		Tdp	Dacite porphyry
LARAMIDE		TKi	Fine-grained acidic intrusive
CRETACEOUS		Ka	Andesite
		Kr	Rhyolite
PRECAMBRIAN		PC	Mainly granite and granite-gneiss, locally includes chlorite schist

Faults

Zone of Alteration and Hematite Staining

Property Boundary

N

0 1/2 1 Miles

0 1000 3000 5000 Feet

Scale: 1 inch = 2,000 feet

Contour Interval: 100 feet

Farrow & Associates
Consulting Geologists
Moab, Utah

Enclosure No. 2

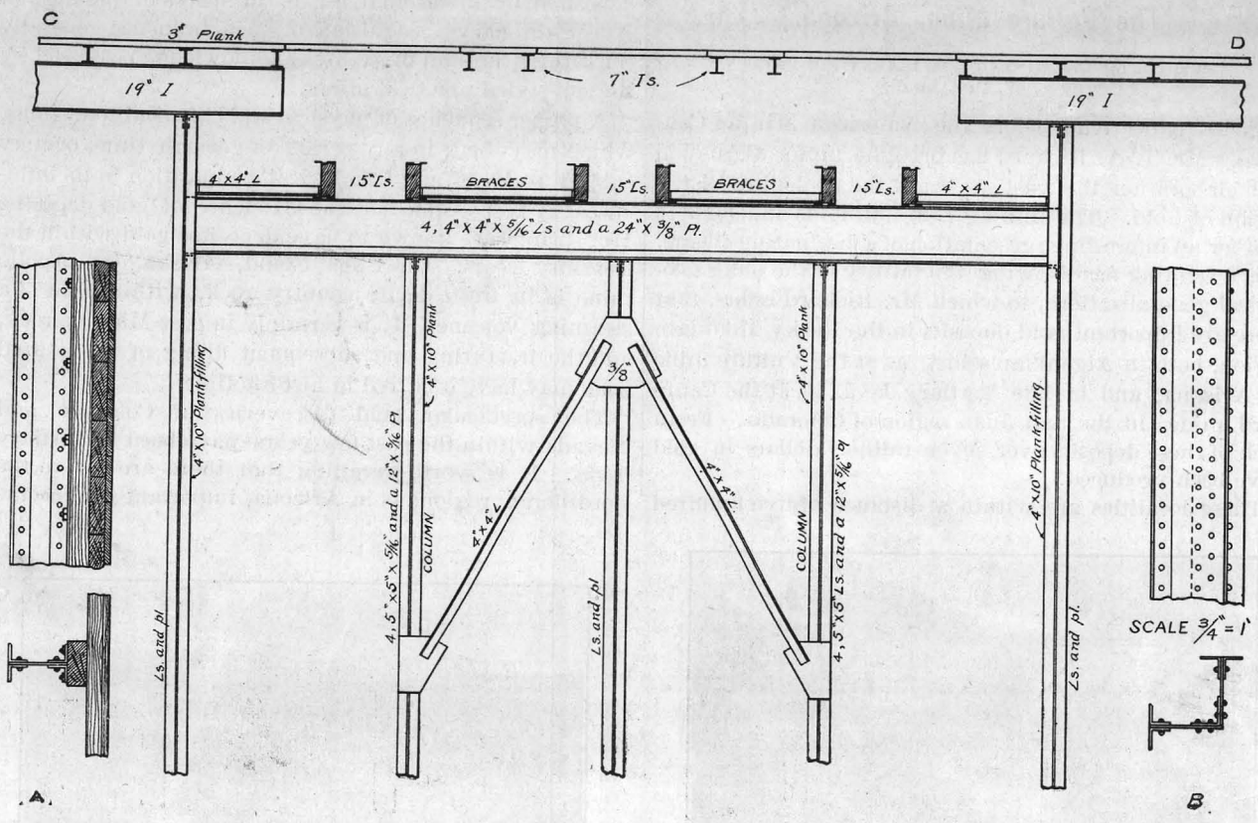


Fig. 5. Details of Crusher Support.

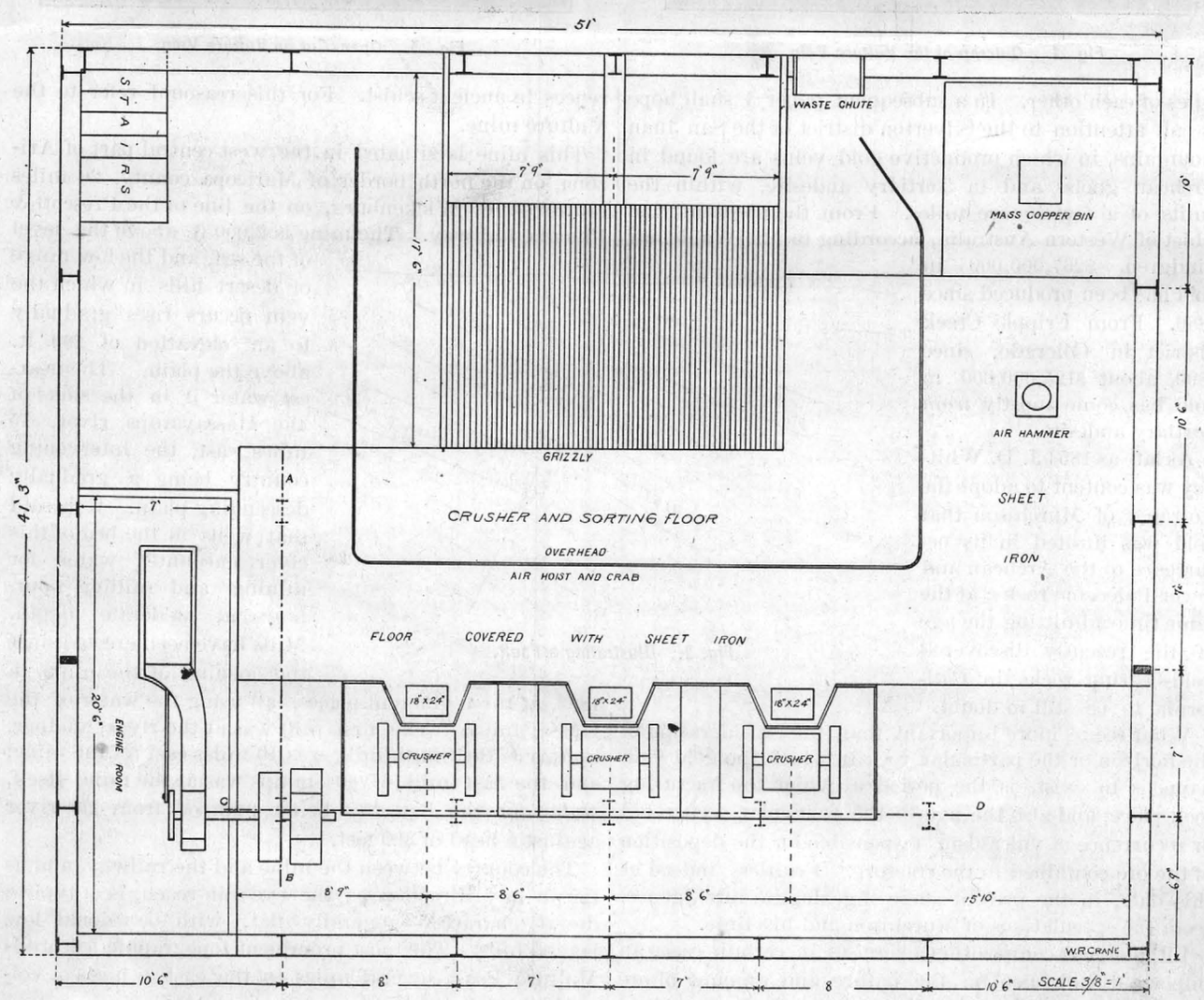


Fig. 4. Plan of Crusher Floor.

The Vulture Mine, Arizona.

Written for the MINING AND SCIENTIFIC PRESS
By C. W. PURINGTON.

In his paper read before the American Mining Congress,* Mr. T. A. Rickard has brought up for discussion and elaboration the vast subject of the geological distribution of gold. The mining community is indebted to him for an interesting presentation of a fascinating theme. It is a striking fact showing the futility of the older geological generalizations, to which Mr. Rickard refers, that there are important gold deposits in the Rocky Mountain region, both in Algonkian schist, as at the Vulture mine in Arizona, and in late Tertiary lava, as at the Camp Bird mine, in the San Juan region of Colorado. From each of these deposits over seven million dollars in gold have been produced.

These localities are within a distance of five hundred miles of each other. In a subsequent paper I shall hope to call attention to the Silverton district of the San Juan mountains, in which productive gold veins are found in Archean gneiss and in Tertiary andesite, within the limits of a few square miles. From the pre-Cambrian schist of Western Australia, according to Mr. Waldemar Lindgren, $267,000,000 in gold has been produced since 1886. From Cripple Creek district in Colorado, since 1890, about $125,000,000 in gold has come mostly from Tertiary andesite.

As late as 1854 J. D. Whitney was content to adopt the dogma of Murchison that gold was limited in its occurrence to the Archean and lower Paleozoic rocks; at the same time admitting the age of the recently discovered gold-bearing rocks in California to be still in doubt.

What seems more important than the consideration of the horizon or the particular rock in which the gold vein happens to exist, is the period at which the fracturing took place; and also the age of the particular occurrence or recurrence of vulcanism responsible for the deposition of the ore contained in the fracture. Fruitless indeed at this date, in the present stage of geological intelligence, seem the speculations of Murchison and his time.

Lithological composition exercises in certain cases an important influence on the nature and amount of ore deposited by metasomatism, or in spaces of dissolution. A certain hazy recognition of such influence generally constitutes the sum of geological knowledge possessed by the self-styled practical miner.

A proper sequence of physical and chemical conditions, which may occur in any period of geologic time, or may subject rocks of any lithological composition to its influences, is responsible for the existence of gold deposits. Hot springs are known to have deposited gold within the last fifty years. On Unga island, Alaska, the Apollo mine is in fresh dacite country rock, within sight of a steaming volcano. It is certainly in post-Miocene rock, and the fracturing and subsequent filling of its fissured zone may have occurred in historic time.

The spectacular gold discoveries of Colorado and Nevada within the past few years have been in Tertiary lavas. It is worth recalling that there are also in the Cordilleran region, as in Arizona, important gold occurrences in ancient schist. For this reason I refer to the Vulture mine.

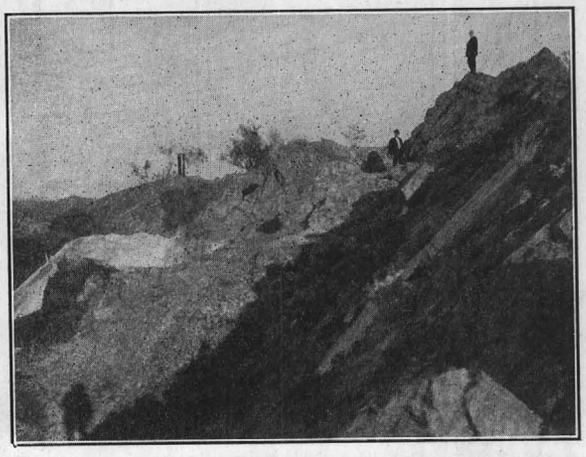


Fig. 1. Outcrop of the Vulture Vein.

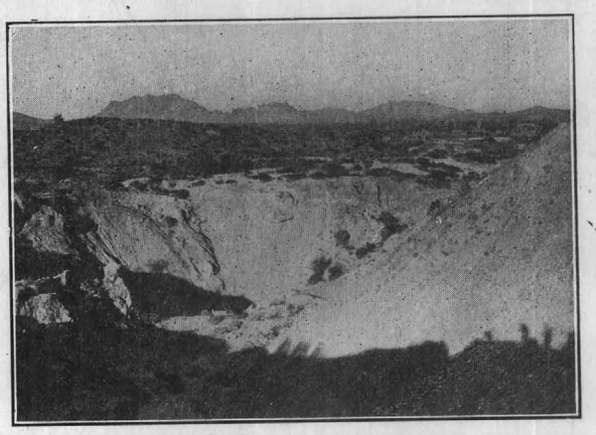


Fig. 3. Open-Cut on Vulture Vein.

This mine is situated in the west central part of Arizona, on the north border of Maricopa county, 20 miles southwest of Wickenburg, on the line of the Prescott & Phœnix Railway. The mine is 2,000 ft. above the level of the sea, and the low range of desert hills in which the vein occurs rises gradually to an elevation of 200 ft. above the plain. The nearest water is in the sinks of the Hassayampa river, 15 miles east, the intervening country being a gradually descending plain. It is said that wells in the bed of this river encounter water for mining and milling purposes at moderate depth. Mills have been erected since the opening of the mine in 1863, at three different places, all using the water of the Hassayampa. The first mill was at the river; another, known as the Smith mill, was 10 miles east of the mine; and the last mill of 80 stamps was at the mine itself, water for the batteries being pumped from the river against a head of 500 feet.

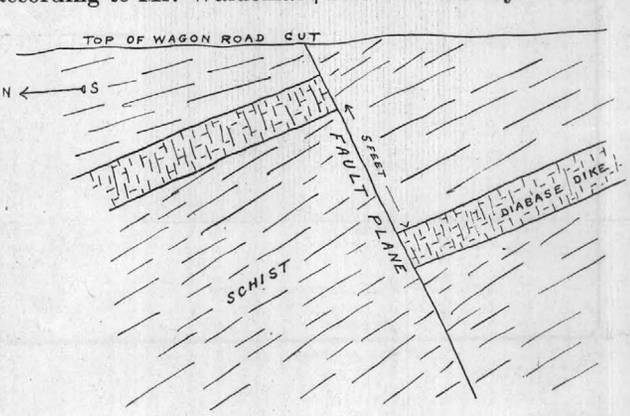


Fig. 2. Illustrating a Fault.

The country between the mine and the railway, and as far in any direction as the eye can reach, is of typical desert character—generally flat, with occasional low jagged hills. The most prominent topographic feature is Vulture Peak, several miles to the east, a mass of volcanic rock.

What little can be learned concerning the history of the

*The paper mentioned appeared in the MINING AND SCIENTIFIC PRESS of October 20, 1906.

mine is of sinister character. Discovered by Americans in 1863, the account of its riches spread through the Southwest. Some of the pioneers of quartz-mining faced the difficult problems connected with its operation. Swarms of nondescript laborers, desperate and adventurous nomads of the West whose origin and careers are alike shrouded in oblivion, made for a time a settlement in that awful desert. For twenty years the Vulture vomited its golden stream. Dim rumors of pillage and of tragedy sift through the years. Popular account says that the Indians shot down men at the stamp batteries.

As nearly as can be learned, 700,000 tons of ore were mined and treated from the Vulture, from which an average of $10 per ton in gold was recovered. The ore was of variable tenor, rich pockets occurring in all parts of the workings, and the mine was finally abandoned not because the ore became too low-grade at the moderate depth attained, but for the reason that the orebody was completely lost. A six foot sample taken from a pillar, in 1906, at 300 ft. down in the west incline gave 0.9 oz. gold. The year 1873 seems to have marked the cessation of deep exploration, and from about this time until 1885 the large mill at the mine was run on the low-grade ore that had been left in the upper workings by the earlier operators. Since 1885 only small attempts have been made to operate the mine under lease, and the tailing at the mills has yielded a small return by cyanidation.

The country rock is sericite schist of probable Algonkian age. It is certainly pre-Cambrian. It forms a low ridge with east and west trend about one mile in length. It extends five miles east and five miles west, and distances of at least one mile to the north and to the south of the Vulture mine. The strike of the schist is north 75° west, dip 35° northeast. The main Vulture lode is a quartz vein six feet wide intercalated with the schist. Other smaller veins, also intercalated, and intermediate mineralized country rock, make a mass of lode-matter, which was worked as ore from 10 to 30 ft. in width. There is no reason to doubt that similar intercalated veins exist in the schist, buried beneath the desert alluvium both to the north and to the south.

The hand specimen of the schist taken from the hanging wall of the lode shows an intimate fine-grained mixture of sericite and chlorite, with numerous almost microscopic crystals of a dark silicate, which I take for garnet. There is also magnetite in considerable quantity. The white silvery mica is the predominating constituent. The character of the ore taken from the outcrop shown in the photograph, Fig. 1, is a dark fine-grained aggregate of quartz, penetrated with a net-work of secondary glassy quartz stringers. The dark primary quartz carries fine, almost microscopic, sulphides. Small vugs contain crystals of wulfenite. I understand that lead, molybdenum, vanadium, and copper in rare compounds and in a fine state of division have been recognized in the concentrate. A secondary silicification is very apparent, and seems to have affected alike the original vein-filling and the adjacent country-rock. The appearance of the ore suggests that secondary enrichment of the gold has occurred, but my inspection of the old workings, to the 350-ft. level on the incline, did not establish the fact that the lower limit of this enrichment had been reached.

The structural features of the deposit are interesting. The case of a well-defined lode of quartz intercalated in sedimentary schist lying in inclined position is to some extent similar to the occurrence of the Main Reef on the Rand. The geological conditions are complicated at the Vulture by faulting. Previous to the faulting, diabase dikes were intruded in the schist, parallel with it in strike but slightly less steep in dip. Cutting the schist, the dikes, and the Vulture vein are narrow fissures some of which are filled with quartz while others are unfilled. These strike north 50° east, and are either vertical or inclined steeply to the southeast. Reverse faulting has occurred along these fissures, the north portion of the vein and beds being in every case lifted up to the north, with a throw of moderate degree. The sketch, Fig. 2, shows an observed case, about 500 ft. southwest from the outcrop of the vein. There are many evidences of this faulting, and detailed study of the mine workings would probably establish the fact that the orebody has been successively lifted to the north. A series of such faults close together would result in a total throw of considerable magnitude. Rumor concerning the former work says that the orebody was lost in depth. If the ore deposit persists in depth, cross-cutting to the north would find it, as there can be no question that the vein itself continues downward. The deepest point now accessible is the so-called 400-ft. level of the west incline, below which water stands in the mine. Even at this level it is apparent that the main vein lies in the north or hanging wall of the incline.

In 'Mineral Resources West of the Rocky Mountains,' 1874, it is stated: "Up to the time that operations stopped on the Vulture (sinking operations on the east end, above referred to, about 1872) prospecting in the lower shaft was carried on with as much energy as circumstances would permit, and from the work done it is clear that the Vulture is a true fissure vein of large proportions. The depth attained on the mine is 312 ft. below the surface of the mesa, or fully 390 ft. below the croppings of the lode. At a depth of 232 ft. below the surface of the mesa the fissure was found to change from a dip of 45° north-northeast to an almost vertical position." * * * * "It may be here mentioned that the best body of ore which was taken from the mine was found just above where the fissure changed its dip." * * * * "After sinking 50 ft. behind the foot-wall, from the 232-ft. level the fissure was cross-cut and found to be 47 ft. in width and having on the hanging wall a seam of blue clay some 12 or 15 in. thick. Outside of this was the hanging-wall rock peculiar to the mine above, but the fissure throughout its width was found to be filled with a hard black rock full of iron pyrites, and some galena." * * * * "The shaft was then sunk 30 ft. farther, and a cross-cut was again made." * * * * "The vein-stuff had again changed somewhat, this time for the better; a little more quartz, from which some fine gold was taken, having made its appearance." "As soon as the vertical fissure was struck, water also began to make its appearance, and it increased steadily, though slowly." "This cap, to judge from developments made above, rises gradually toward the east, and dips westerly along the line of the fissure, with the same inclination that way as that which the pay-shoots of ore had above. They were all found to run diagonally west across the dip of the vein."

The above language, being interpreted, means that near the east end of the deposit, about 1,200 ft. east of the incline-shaft before referred to, exploration in depth got off the main vein, and followed instead one of the vertical veins of later age, which have been responsible for the faulting of the main orebody. It does not appear that any more work has been done at the east end since the cessation of that above described. There was no change of dip from "45 degrees" to vertical, but the vertical shaft encountered an entirely different vein, the main Vulture lode lying still farther to the north.

For a length of over 1,500 ft., a width varying from 10 to 30 ft. and to a depth on the dip of the vein of from 300 to 400 ft. the orebody was stoped out, large pillars being left for support. Since 1885, the date of the last extensive work, two enormous caves from surface have occurred,

so that the mine now has the appearance of a series of great open-cuts, their walls honeycombed with a network of lateral chambers. A sense of awe strikes the beholder who looks on this scene of utter desolation and decay.

The Algonkian schist occurs in patches far to the eastward and to the north. In the vicinity of Jerome, 100 miles to the northeast of the Vulture, similarly intercalated veins in schist pass upward, according to T. A. Jaggar and Charles Palache, into overlying horizontal Carboniferous rocks. The age of these veins is consequently post-Carboniferous. At the Congress mine, 35 miles to the north, an intercalated vein in schist has been worked for gold to the depth of 4,000 ft. on the incline. I cannot say whether it is conformable in dip and strike with the Vulture occurrence. I have examined a portion of the Pinal schist area in the Globe district, 150 miles to the east of the Vulture, and find a considerable similarity in appearance.

Sericite is abundant, although there is a greater amount of elongated quartz nodules. The Globe schist is called pre-Cambrian by F. L. Ransome. It contains visible flakes of copper pyrite, and certain belts of it are mined as copper ore. Assays of $3 in gold can be obtained in places, as at the Cole & Goodwin mine. It is probably safe to refer the first mineralization of the Vulture lode to Permian age while it is almost certain that a second series of nearly vertical veins cutting the schist was subsequently formed, and by the agency of their filling the older veins were enriched.

In general, attention should be called to the fact that the pre-Cambrian schist of Arizona has a wide distribution and contains notable orebodies. A geological map of Arizona showing this distribution may some day prove an important guide to the sensible prospector. We are indebted to Mr. Rex Beach for an Alaska "sour-dough's" rendition of the legend of the Golden Fleece, in which he asserts that the "Augernots" abandoned their search for gold when they found the "formation was like Texas, not right for mineral," so they went into the "sheep business." The prospector should realize that "mineral" will "live" in old formations as well as new, and that gold may be awaiting him encased in Algonkian schist as well as in "phonerlite" or in rhyolite.

SODIUM TRANSMISSION LINES.—The use of sodium for overhead transmission is attracting the attention of electricians. It is said to be cheap and a good conductor of electricity, but as its marked affinity with oxygen causes it to ignite when placed in contact with water, its employment in the form of a conductor would be limited, probably, to overhead transmission lines or feeders for railway work. The general process of constructing sodium conductors is to take standard wrought-iron pipes and heat them to a point well above the melting temperature of sodium. The sodium is then melted in special kettles and is run into the the pipes, solidifying when cool. There is said to be no marked depreciation of either the sodium or the pipe if the latter be properly protected by a coat of weather-proof paint. For the same conductivity the price of the complete sodium conductor is much below that of copper cables, being in small sizes not more than 50% and in large sizes not more than 20% of the cost of copper. For instance, a half-inch wrought-iron pipe filled with sodium has a capacity of 109 amperes, and costs about 3½c. per ft., against 8½c. for a copper line of the same capacity. A 6-in. sodium conductor would carry 8,130 amperes, the cost of the line being about $1.40 per linear foot, as compared with $6.30 per foot for copper. These figures were estimated on the basis of 7½c. per lb. for sodium and 16c. per lb. for copper.

Decisions Relating to Mining.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

The locators of a mine, on the day of a location, posted notices thereof, set stakes at the northeast and southwest corners of the claim and remained thereon until twelve o'clock midnight of the same day and immediately left the claim and never did anything further in the way of taking possession thereof. Three months thereafter another person made a new location of such claim. Under these facts it was held that the first locators did not proceed far enough to acquire rights sufficient to make the claim abandoned property within the meaning of the statute, and that the re-location was sufficient, though the certificate did not state that the whole or any part of the new location was located on abandoned property, where it further appeared that the re-locators complied with the requirements of the statute by sinking a discovery shaft upon the lode.

Paragon Min. &c. Co. *v.* Stevens, Co. &c. Co., (Wash.) 87 Pac. 1,068.

Two persons owned an undivided half-interest in a mining claim. One of such owners continued a tunnel driven on the claim through such claim to another mine owned by him, and thereafter worked his mine and attempted to convey the output through such tunnel, basing such right on the fact of his joint ownership of such mine. In a controversy over such right it was held that the owner of an undivided interest in a mining claim had no right to use a tunnel driven on the claim to convey ore from an outside claim.

Laesch *v.* Morton, (Colo.) 87 Pac. 1,081.

Where a purchaser of coal refused to take the quantity specified in the contract, and where it appeared that a custom among coal dealers made it necessary that such a contract be made, and the mining company in reliance on such contract only contracted with others for the balance of its output, it was held that in an action for the breach of such contract, that the damages should be computed by deducting from the contract price of the undelivered coal the original cost of the coal and the expense of mining it.

Thistle Coal Co. *v.* Rex Coal &c. Min. Co., (Iowa) 109 N. W. 1,094.

It is said that the locator of a mine, without obtaining a patent, acquires the possessory title thereto against all the world, and as against the Government so long as he performs the annual amount of work required thereon; and he may transfer this possessory right or title to a purchaser, who may, as the apparent owner, hold it against unrecorded equitable claims, without notice. The purchaser of the legal title of a locator has a prior and superior equity over a claimant of a prior equitable interest only.

Reed *v.* Munn, 148 Fed. 731.

The United States statute requiring the notice of the location of a claim to contain a description by reference to some natural object or permanent monument as would identify the claim, was held to be sufficiently complied with under a system of locating placer mining claims upon a gulch or creek, and calling the first 'Discovery Claim,' and then numbering the others from this first claim up or down the gulch or stream, and giving to the side or bench claims the same number as those upon the creek, with the addition of a letter of the alphabet. And that a recorded notice of the location of a claim in such locality, describing it as "13 A. Below Discovery on Cleary Creek," was held sufficient.

Smith *v.* Cascaden, 148 Fed. 792.

A person residing in a tent on one of a number of adjoining mining claims owned by him, and who had commenced the sinking of a shaft thereon, was held to have sufficient possession to entitle him to maintain an action against an adverse claimant of the ground.

Lange *v.* Robinson, 148 Fed. 799.

MINERAL
INVESTIGATIONS

EVALUATION
EXPLORATION

CHESTER E. FARROW
CONSULTING GEOLOGIST
INTERNATIONAL
11 ARCHES BUILDING
MOAB, UTAH, U.S.A.
TELEPHONE (801) 253-7921

wrote him 2/24/71 re. report. Telno. etc.

February 22, 1971

Mr. Fremont F. Clarke
P.O. Box 403
Wickenburg, Arizona 85358

NORANDA Inc 623-2505
225 West Pima
Tucson.

Dear Mr. Clarke:

I appreciate Ron Karvinon discussing our mining claims east of Vulture Ridge with you. I have not talked with Ron recently, so I have no way of knowing what he may have told you.

My partners and I have a block of 309 contiguous claims situated east of Vulture Ridge. My associate, Mr. Donald C. Elkin and I believe these claims to cover a major disseminated (porphyry) copper prospect based on the following criteria:

1. Widespread hematite mineralization
2. Favorable geologic structure
3. Extensive hydrothermal rock alteration
4. Rock shattering (brecciation) which provided an adequate plumbing system
5. Geochemical anomaly. Geochemical analysis of selected rock samples yielded anomalous molybdenum content. Copper mineralization is visible at many places on the property. Rock samples taken contained no obvious copper or molybdenum mineralization.

We consider the zone of oxidation to be deep and believe it will take a rather extensive exploration program to adequately test the prospect. We have therefore contacted only major companies in our efforts to lease the property, but because our terms have been hard we have failed to get satisfactory proposals except from three companies. One of these companies was Noranda.

We had what I thought was a firm commitment from Noranda to take the property, which included a letter of intent, jointly with Sierra Minerals Management, and subsequently a lease agreement which was worked out with their management in Denver and their attorney and my attorney and was signed by all the Lessors. This was then rejected by Noranda's Toronto management, for what exact reason, I do not know.

WICKENBRUG COPPER PROSPECT

PROPOSED ACQUISITION TERMS

1. Lease with Purchase Option.

2. Purchase price is $16,000,000. Purchase must be finalized by the end of the 10th year from the date of signing of the original agreement.

3. If the interested company elects not to purchase but prefers to operate on a production royalty basis, then this will be at the rate of 5% of the Net Smelter Returns.

4. An initial payment of $50,000 is due at the time of signing of the option agreement. This will be considered as advanced minimum royalty recoverable out of production royalties as will other minimum annual royalty payments. All advanced royalty payments can be applied to the purchase price of the property.

5. A second advanced minimum annual royalty will be due in the amount of $100,000 at the beginning of the second year.

6. A third advanced minimum annual royalty will be due in the amount of $100,000 at the beginning of the third year.

7. A fourth advanced minimum annual royalty will be due in the amount of $100,000 at the beginning of the fourth year.

8. A fifth advanced minimum annual royalty will be due in the amount of $100,000 at the beginning of the fifth year.

9. A sixth advanced minimum annual royalty will be due in the amount of $200,000 at the beginning of the sixth year.

10. A seventh advanced minimum annual royalty will be due in the amount of $200,000 at the beginning of the seventh year.

11. An eighth advanced minimum annual royalty will be due in the amount of $200,000 at the beginning of the eighth year.

12. At the beginning of the ninth year from the anniversary date of the lease purchase agreement the decision must have been made by the Lessee to purchase the property and at that time the full purchase price must be paid less the advanced minimum royalties or the buyer may elect to make payment in three installments.

The first will be due at the beginning of the ninth year in the amount of 28% of the agreed to sales price, less credits, (advanced minimum royalties). The second installment will be made one year later in the amount of 50% of the unpaid balance and the third payment for the balance of the purchase price will be due one year later. Full purchase must be completed by the end of the 10th year. The full purchase price can be made at any time after a decision has been made to purchase the property. This could be within the first eight years of the agreement.

13. The Lessee-Purchaser must take care of all obligations to keep the mining claims valid including assessment work, filing of affidavits of labor and proper posting of notices of labor in the field.

14. Work Commitments: There will have to be assurance in any agreement entered into that the acquiring or leasing company will conduct a thorough exploration program.

15. Should the Lessee or purchasing company abandon the property at any time, then all geological, drilling and other exploration data will be given to the owners at no cost to them.

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14. Work Commitments: There will have to be assurance in any agreement entered into that the acquiring or leasing company will conduct a thorough exploration program.

15. Should the Lessee or purchasing company abandon the property at any time, then all geological, drilling and other exploration data will be given to the owners at no cost to them.

AGREEMENT dated December 29, 1970 by and among the persons whose names and addresses are set forth on Schedule 1 hereto, ("Lessors") and NORANDEX INC., a Delaware corporation ("Lessee").

Lessors are the owners of 309 claims ("Claims") more or less situated in the Wickenburg, Arizona area and described in Exhibit A hereto.

Lessors desire to lease the Claims to Lessee and Lessee is desirous of leasing the Claims from Lessors.

Lessors desire to grant to Lessee an option to purchase the Claims and Lessee desires to acquire such option from Lessors.

NOW, THEREFORE, in consideration of the premises, the parties hereto, intending to be legally bound, agree as follows:

1. Lease of Claims and Grant of Option.

(a) In consideration of the agreements of Lessee hereinafter set forth, Lessors hereby grant and lease to Lessee the Claims and all possessory, surface, mining, and other rights now or hereafter acquired by any of the Lessors in the property covered by the Claims and contiguous to or within a distance of two miles from any of the Claims ("Lease"), for the purposes of investigating, exploring, prospecting, drilling, trenching, stripping, excavating, testpitting, mining, producing, treating, removing and disposing of copper ores and all other minerals or products

in the county or counties in which the Claims are located, or in any appropriate office of the United States Government or anywhere else where Lessee deems appropriate in order to protect its interests hereunder.

(f) This Agreement may be executed in any number of counterparts which together will constitute one and the same Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the day and year first above written.

NORANDEX INC.

By _____

By _____

_____
CHESTER E. FARROW

_____
BETTY T. FARROW

_____
R. E. BILLINGSLEY

_____
MARGARETTA A. BILLINGSLEY

_____
GEORGE BODIROGA

_____
HELEN I. BODIROGA

_____
DONALD C. ELKIN

_____
LINDA C. ELKIN

_____
BENJAMIN L. ORTEGA

_____
EVA ORTEGA

_____
TIMOTHY R. POGUE, SR.

_____
ALTA POGUE

_____
JOHN B. YONGUE

MINERAL
INVESTIGATIONS

EVALUATION
EXPLORATION

CHESTER E. FARROW
CONSULTING GEOLOGIST
INTERNATIONAL
11 ARCHES BUILDING
MOAB, UTAH, U.S.A.
TELEPHONE (801) 253-7921

March 2, 1971

Mr. Fremont F. Clarke
P.O. Box 403
Wickenburg, Arizona 85358

Dear Mr. Clarke:

I have enclosed a copy of our report on our copper prospect for your consideration. I have also enclosed copies of the Letter of Intent from Norandex and Sierra Minerals Management and a copy of a part of the Lease-Purchase Option agreement negotiated with Norandex which fell through. Our proposed terms to Norandex are also enclosed.

We have presented this prospect to most of the major mining companies, three of which are still considering the project, but I have no assurrance that it will proceed beyond this point with any of the companies.

I am not familiar with Mountain States Mineral Enterprises, Inc. and would appreciate receiving an annual report, prospectus or other specific information concerning the company.

I appreciate your interest and will look forward to hearing from you.

Sincerely,

Chester E. Farrow

CEF:mo

Enclosures

NORANDEX INCORPORATED
EXPLORATION DIVISION
345 SOUTH UNION BOULEVARD · SUITE 109
DENVER, COLORADO 80228

TEL. (303) 985-8714

LETTER OF INTENT December 9, 1970

Subject: East Vulture, Farrow Property; Wickenburg, Arizona

A meeting was held December 9, 1970 between Chester Farrow, R. F. Hewlett, and R. J. M. Miller to discuss the possible terms of an agreement on the above-named property.

The terms discussed are as follows:

Initial payment on signing Agreement, $50,000; if to continue,
One year later, $100,000; One year later, $100,000;
One year later, $100,000; One year later, $100,000;
At the beginning of the sixth year, $200,000;
One year later, $200,000; One year later, $200,000;
One year later, $200,000 and each year thereafter
$200,000;or royalties as per the schedule below,
whichever is the greater to replace the above payments
after the first year.
Work committment to be as follows:

For the first year, $50,000; for the second year,
$100,000. The Optionee firmly commits to spend
$50,000.

Royalties (See Appendix)

When production is started, a royalty will be paid based on Net Smelter Returns of 5% if production is 10,000 TPD or less; 4% if production is between 10-25 thousand TPD; 3% of production is 25 thousand TPD or over.

It is agreed that Chester Farrow will check the royalty

arrangement with his principals.

The above Letter of Intent is a binding proposal from Sierra Mineral Management to Farrow and Partners subject to their approval.

The term of this Letter of Intent for signing this Agreement and making the first payment is 45 days from this date.

Dated and signed this 9th day of December, 1970.

Richard F. Hewlett, Pres.

Richard F. Hewlett for
SIERRA MINERAL MANAGEMENT

We have helped draft the above terms and will attempt to get Norandex Inc. and Chester Farrow and Partners to approve them.

Robert J. M. Miller for
Norandex Inc.

Chester Farrow for
Chester Farrow and Partners

NORANDEX INCORPORATED
EXPLORATION DIVISION
345 SOUTH UNION BOULEVARD - SUITE 109
DENVER, COLORADO 80228

TEL. (303) 985-8714

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It is agreed that Chester Farrow will check the royalty

A REGIONAL GEOLOGICAL INTERPRETATION OF SOUTHERN ARIZONA

The purpose of this study is to isolate favorable areas for the occurrence of disseminated copper deposits in southern Arizona.

Most of the concepts discussed in this interpretation are not new. They are the culmination of the thinking of many noted people in the profession, and many of these ideas have been previously applied in the search for ore deposits. What is being advanced here, I believe, is a significant retreatment of some of the established thinking, and whereas many of the previous applications were very general and vague as to specific locations, this program, through careful detailing, will attempt to select promising areas on a much more exacting basis. Extensive use has been made of recently available space photography and space photomaps, without which detailing could not be accomplished. It should be pointed out that this study is by no means complete, and although certain areas have already been selected in southern Arizona, considerable work will be needed to delineate others. This method of investigation is not limited in application to southern Arizona and certainly could be used to predict other areas of favorability within the "Porphyry Copper Province" which previously may not have been considered attractive.

The approach taken is as follows: (1) To trace the development of depositional trends, major zones of structural weakness such as the Texas Lineament and the overall structural system in the Southwest. (2) To propose a change in thinking as to the positioning of several major lineament zones and to try to accurately determine their location during the Laramide Revolution. (3) To show that northeast trending tension faults and fractures were important in localizing

intrusive and mineral deposits during the Laramide. (4) To then conclude that northeast tension zones, the repositioned major lineament zones, and especially the intersections between the two types are the most favorable prospect areas.

The basic concept applied in this investigation is that certain deep-seated structures, active during the Laramide Revolution, provided the conduit for the emplacement of intrusive masses and associated mineral deposits. Although major belts of structural deformation or tectonic lineaments operative since Precambrian time controlled considerable igneous activity, northeast trending tension fault and fracture zones appear to have contributed equally to the localization. This can be graphically demonstrated on an occurrence plot of Laramide intrusive outcrops and the reasoning should become clear after a brief discussion of the geologic development of the Southwest.

In Older Precambrian time a broad geosyncline existed diagonally northeastward across Arizona. The accumulation of sediments and volcanics in this trough may have reached a total thickness of over fifty thousand feet. The Mazatzal Revolution terminated this period of deposition and imposed a structural pattern which influenced all subsequent crustal movements. Compression from the northwest and southeast produced a system of northeast trending folds, foliation, and high and low angle thrust faults; shear faults striking approximately north-south and east-west; and steep northwest faults. Granitic and basic igneous intrusions were widespread and the pre-existing rocks were locally metamorphosed to schists and gneisses.

This mountain-building period produced a northeast trending land mass roughly coincident with the older geosynclinal trough. Although prominent regional structural lineaments were undoubtedly active during this time, there is no way to accurately determine their position.

The Mazatzal Revolution was followed by a period of erosion, geosynclinal warping and Younger Precambriam deposition. The Proterozoic was then terminated by the Grand Canyon Disturbance, a period of deformation with the same structural pattern as the Mazatzal Revolution only considerably less intense. The significance of this disturbance is that the applied compressional and tensional forces re-established and strengthened the existing structural pattern.

At the beginning of the Paleozoic Era the setting was as follows: a remnant of the old northeast trending Precambrian land mass occupied east-central Arizona and to the southwest in what is presently Old Mexico there was an established northwest trending land mass. Both of these areas remained relatively stable and at least partially above sea lavel through Paleozoic time. Southern Arizona then became the transition zone between these two positive areas and was occupied by the southeastern end of the Cordilleran Geosyncline. The northwest trending axis of this trough became the zone of structural unrest now termed the "Texas lineament." A second northerly trending zone of weakness, the Wasatch-Jerome lineament, developed in western Arizona. By the end of the Permian Period southern Arizona had developed a strong northwest structural grain which persisted through the Mesozoic. This existing structural trend then influenced the deformational pattern of the Laramide Revolution.

During the Laramide, compressional forces from the northeast and southwest produced northwest trending folds and thrust faults, north-south and east-west trending shear faults, and northeast trending tensional faults. These open tension faults were undoubtedly oriented along the old Precambrian structures and therefore were deep enough to tap the magma chambers and, being

open, were able to channel the intrusives upward. The deep-seated Texas zone, being one of the major axes about which Laramide deformation took place, also provided a conduit for ascending magma. Thus the primary controls for the emplacement of the intrusives and mineral deposits have been established.

Work maps tracing the present positions of the controlling structures have been compiled utilizing space photographs and space photomaps, and several favorable areas have been delineated. It is anticipated that field checking of these areas will require slow and careful work and ample time should be alloted for this.

This presentation is not intended to represent the "last word" in prospecting techniques for porphyry copper deposits. Many other factors must have affected the positioning of these ore bodies but as work progresses, a refinement of ideas and the development of new thinking should expand the concept considerably.

Donald C. Elkin
Farrow and Associates
Moab, Utah

SUGGESTED FACTORS TO BE CONSIDERED
UNDER A SPONSORSHIP ARRANGEMENT

1. We desire to continue the studies under the sponsorship of a responsible, adequately financed, progressive company.

2. We desire this to be done under a management-consulting contract, similar to ones we have operated under in the past.

3. The contract would be for a minimum of one year, renewable at the option of both parties.

4. I have at this time, mostly in salary to Mr. Elkin, about $14,000 in the project. I would like to recover this as some compensation for work already done.

5. We will require an over-riding royalty of 1.5% of the Net Smelter Returns on minerals produced from any property acquired and developed as a result of our work. We would have the right to sell this royalty interest to third parties.

6. If we recommend an area and the acquisition of properties therein, which we consider favorable as a result of our work, and the Sponsor elects not to acquire the lands, we would like the right to do so for our own interests.

7. If as a result of our contacts in the industry, mineral properties within the area of study are submitted to us which we consider to have merit and believe should be acquired, the Sponsor will have the right of First Refusal.

8. Unless the Sponsor requires our exclusive services, I would like the right of continued individual property investigation, examination and exploration for clients within the area of study, so long as there is not a conflict of interest.

9. All information generated by the study including maps compiled would be considered confidential by both parties and would be the exclusive property of the Sponsor.

10. All information so far developed including those specific zones considered favorable for field investigation and further research would constitute the initial acquisition of the Sponsor.

11. The basic management-consulting fee on other projects has been $1,500 per month. This has included five days of my time, plus secretarial expense, some drafting and office. Additional of my time would be charged at $150 per day.

12. Mr. Elkin will be on the project 22 days per month at a fee of $2,200.

13. All reasonable costs incidental to the project will be paid by the Sponsor. This will include transportation, meals, lodgings, field supplies, maps, additional personnel, etc.

Chester E. Farrow

AGREEMENT dated December 29, 1970 by and among the persons whose names and addresses are set forth on Schedule 1 hereto, ("Lessors") and NORANDEX INC., a Delaware corporation ("Lessee").

Lessors are the owners of 309 claims ("Claims") more or less situated in the Wickenburg, Arizona area and described in Exhibit A hereto.

Lessors desire to lease the Claims to Lessee and Lessee is desirous of leasing the Claims from Lessors.

Lessors desire to grant to Lessee an option to purchase the Claims and Lessee desires to acquire such option from Lessors.

NOW, THEREFORE, in consideration of the premises, the parties hereto, intending to be legally bound, agree as follows:

1. Lease of Claims and Grant of Option.

(a) In consideration of the agreements of Lessee hereinafter set forth, Lessors hereby grant and lease to Lessee the Claims and all possessory, surface, mining, and other rights now or hereafter acquired by any of the Lessors in the property covered by the Claims and contiguous to or within a distance of two miles from any of the Claims ("Lease"), for the purposes of investigating, exploring, prospecting, drilling, trenching, stripping, excavating, testpitting, mining, producing, treating, removing and disposing of copper ores and all other minerals or products

in the county or counties in which the Claims are located, or in any appropriate office of the United States Government or anywhere else where Lessee deems appropriate in order to protect its interests hereunder.

(f) This Agreement may be executed in any number of counterparts which together will constitute one and the same Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the day and year first above written.

NORANDEX INC.

By _____

By _____

Chester E. Farrow
CHESTER E. FARROW

Betty T. Farrow
BETTY T. FARROW

R. E. Billingsley
R. E. BILLINGSLEY

Margaretta A. Billingsley
MARGARETTA A. BILLINGSLEY

George Bodiroga
GEORGE BODIROGA

Helen I. Bodiroga
HELEN I. BODIROGA

Donald C. Elkin
DONALD C. ELKIN

Linda C. Elkin
LINDA C. ELKIN

Benjamin L. Ortega
BENJAMIN L. ORTEGA

Eva Ortega
EVA ORTEGA

Timothy R. Pogue Sr.
TIMOTHY R. POGUE, SR.

Alta Pogue
ALTA POGUE

John B. Yongue
JOHN B. YONGUE

February 3, 1971

nd Mining Co.

As requested following our conversation on Tuesday of last week, I am outlining our proposal for a sponsor for the continuation of the regional geological study we have undertaken to delineate areas which may be favorable for the occurrence of large disseminated type copper ore deposits in Arizona.

As I stated to you, this study has been underway for a little more than six months and was initiated for my own interests. Mr. Donald C. Elkin, whom you know, has been assigned this project and has devoted most of his time to this study. I have done additional work on it as time has permitted.

This study is a major undertaking directed toward the development of new ideas, concepts and criteria useful in prospecting for the large disseminated copper ore deposits. It includes an assimilation, study and reinterpretation of much of the past work in this field.

To continue the study as I believe should be done requires more time and money than I feel justified in my spending now. I am, however, hesitant to drop or delay the project because I consider it important and a sound approach in research and exploration. As an alternative, I have finally decided to seek a sponsor to be able to continue the work without serious interruption.

I have had Mr. Elkin prepare a very brief report covering the work to date for your consideration. Certain details have been omitted for obvious reasons.

We have work maps and ideas and rather than utilize time now in compiling maps in a finely drafted form, we prefer to devote our time to continued research.

Field work constitutes a major part of the study, not for geological mapping, but to investigate local structure and rock alteration which are critical to ore discovery. It will also be necessary to search for rock outcrops along arroyos cutting pediments and alluvium in certain favorable areas. Recommendations may be made to detail map certain favorable areas, but this is not considered a part of the original work.

It is planned that Mr. Elkin, with proper assistance, will do most of the field work. It is absolutely necessary that this field work be done by experienced, competent and conscientious geologists.

So far, the study has defined two large zones which are of interest, one in particular. Mr. Elkin has made a brief reconnaissance into a sector of what we now consider the more favorable zone, but it will take much field work and additional research to properly evaluate.

I have outlined my general thoughts with regard to our requirements of a sponsor and how we would like to continue the study. We have worked under management-consulting contracts in the past and one of these, properly modified for the protection of both parties, should be satisfactory.

I hope that your company will be interested in this project, and if so, please advise us as soon as possible of your interest before we become involved in other work or in contacting others with regard to this project.

It was good to see you again. My best regards.

Sincerely yours,

Chester E. Farrow

CEF:mo

MINERAL
INVESTIGATIONS

EVALUATION
EXPLORATION

CHESTER E. FARROW
CONSULTING GEOLOGIST
INTERNATIONAL
II ARCHES BUILDING
MOAB, UTAH, U.S.A.
TELEPHONE (801) 253-7921

February 11, 1971

SXM
FEB 16 1971
RECEIVED

Mr. Paul I. Eimon
Essex International, Inc.
1704 West Grant Road
Tucson, Arizona 85705

Dear Paul,

I have attached a copy of our report on our disseminated copper prospect near Wickenburg which I stated that I would send to you. We will be pleased to have you take a look at the property areas when you are in that vicinity.

I have also enclosed resumes for myself and Mr. Elkin should your company have need for consultants now or in the future.

I mentioned very briefly to you that I had had Mr. Elkin on a regional study relating to disseminated copper occurrences in Arizona for my own interest, stating that I may want to seek a sponsor to continue the work. At the request of one company I submitted a general proposal on this. I've not yet had time to receive a reply from them, but thought it may be worthwhile to send you a copy of this for yours and Mr. Lanier's consideration.

I want to thank you again for your suggestions on the Bramador Mines area. I have since done some literature research on the Carlin deposits and concur with your conclusion.

It was a pleasure visiting with you and I will look forward to seeing you again.

Sincerely yours,

Chester E. Farrow

Chester E. Farrow

CEF:mo

Enclosures

After receiving the letter of intent from Noranda, I notified the two other interested companies that I had worked out a satisfactory deal on the property. These companies have since moved on to other things as I found out when I contacted them again after Noranda decided not to follow through.

At the moment we are interested in arranging a lease agreement on the properties along lines similar to those we had negotiated with Noranda. The main objective, of course, is to get the property adequately explored. We do have to be able to recoup initially part of the monies we have in the project, be assured minimum annual royalties, etc. This can be accomplished by various means, and I am interested in reasonable proposals.

We have a report on the property. Ron, obviously, thinks well of the prospect.

Since I do not know you, I have no way of judging what your interest may be or in what way you may be able to help us on this matter.

I do appreciate your letter and if the property is of further interest after you have read the foregoing, perhaps we can pursue the matter further.

Sincerely,

Chester E. Farrow

Chester E. Farrow

CEF:mo

I-94

Copper Prospect

1970

Vulture Mining Dist

Wickenburg, Arizona

WICKENBURG COPPER PROSPECT

PROPOSED ACQUISITION TERMS

1. Lease with Purchase Option.

2. Purchase price is $16,000,000. Purchase must be finalized by the end of the 10th year from the date of signing of the original agreement.

3. If the interested company elects not to purchase but prefers to operate on a production royalty basis, then this will be 5% (percent) of the Net Smelter Returns.

4. An initial payment of $50,000 is due at the time of signing of the option agreement. This will be considered as advanced minimum royalty recoverable out of production royalties as will other minimum annual royalty payments. All advanced royalty payments can be applied to the purchase price of the property.

5. A second advanced minimum annual royalty will be due in the amount of $100,000 at the beginning of the second year.

6. A third advanced minimum annual royalty will be due in the amount of $100,000 at the beginning of the third year.

7. A fourth advanced minimum annual royalty will be due in the amount of $100,000 at the beginning of the fourth year.

8. A fifth advanced minimum annual royalty will be due in the amount of $100,000 at the beginning of the fifth year.

9. A sixth advanced minimum annual royalty will be due in the amount of $200,000 at the beginning of the sixth year.

10. A seventh advanced minimum annual royalty will be due in the amount of $200,000 at the beginning of the seventh year.

11. An eighth advanced minimum annual royalty will be due in the amount of $200,000 at the beginning of the eighth year.

12. At the beginning of the ninth year from the anniversary date of the lease purchase agreement the decision must have been made by the Lessee to purchase the property and at that time the full purchase price must be paid less the advanced minimum royalties or the buyer may elect to make payment in three installments.

A PORPHYRY COPPER PROSPECT

IN

THE VULTURE MINING DISTRICT

MARICOPA COUNTY, ARIZONA

by

Donald C. Elkin
Consulting Geologist

April 25, 1970

Farrow and Associates
Moab, Utah

CONTENTS

ILLUSTRATIONS

SUMMARY AND CONCLUSIONS

The subject prospect is located in low lying hills on the eastern slope of Vulture Ridge, approximately eight miles south-southwest of Wickenburg, Arizona. Rocks outcropping in the area are a basement Precambrian granite-gneiss complex, Cretaceous - Early Tertiary rhyolite and andesite flows and near-surface intrusives, and Quaternary basalt. A younger intrusive may be present within the Precambrian complex, although no clear-cut supporting evidence has been found. Recent alluvium obscures some portions of the property.

The most striking feature of the prospect is a zone of abundant hematite mineralization that everywhere coats fractures and in some areas completely permeates the rock. Within this zone the host granites and rhyolites are locally silicified and altered to sericite and clays. Numerous "copper oxide" shows are present, and in many areas remnant sulphide boxworks occur along fractures and throughout the rock itself.

Along the western side of the prospect there is a structural intersection between a strong northwest trending lineation and several younger east-west wrench fault zones. As a result, the wide-spread brecciation in the country rock would have provided an adequate plumbing system for migrating mineral solutions.

Rock chip samples taken at random located an anomalous molybdenum zone in the southwest corner of Section 4, Township 6 North, Range 5 West. No attempt at follow up was made, although a grid rock-chip sampling program should delineate this anomaly.

In the last few months considerable unsolicited exploration interest has been aroused in the property. A Texas firm has been conducting a grid geochemical sampling program, and an induced polarization survey has been run in portions of Sections 10, 15 and 22.

The property represents a reasonable geological exploration target based upon the strength of the mineralization, alteration, and structural features, which, while not at all conclusive, could possibly represent the surface expression of a buried "porphyry copper" ore body.

Donald C. Elkin
Consulting Geologist

INTRODUCTION

Work commensurate to this report was carried out over the last ten months as time away from consulting projects permitted. After the initial property examination was completed, a limited geochemical sampling program was conducted, and a land status determination was made. A photo-geologic map was then compiled and field mapping and alteration studies completed the project.

The accompanying geologic map is very general, in as much as no attempt was made to sort out the many rock types occurring within the areas mapped as rhyolite and andesite. Similarly, the Precambrian complex has not been detailed as more emphasis has been placed on rock alteration rather than rock type.

The subject prospect is located in the Vulture Mining District, in Township 6 North, Range 5 West, approximately 8 miles south-southwest of Wickenburg, Arizona (see Figure # 1).

Access is from Wickenburg by five miles of paved and graded gravel roads and then roughly 3 miles of jeep trails and sand wash bottoms (see Enclosure # 1).

LAND STATUS

The property is a composite of 306 contiguous unpatented mining claims contained in seven ownership blocks (see Figure # 2). The names and addresses of the claim owners as shown in the division of ownership table are as follows:

John B. Yongue
2nd South 2nd East
Moab, Utah

Timothy R. Pogue, Sr.
345 East 1st North
Moab, Utah

Benjamin L. Ortega
510 W. Apache
Wickenburg, Arizona

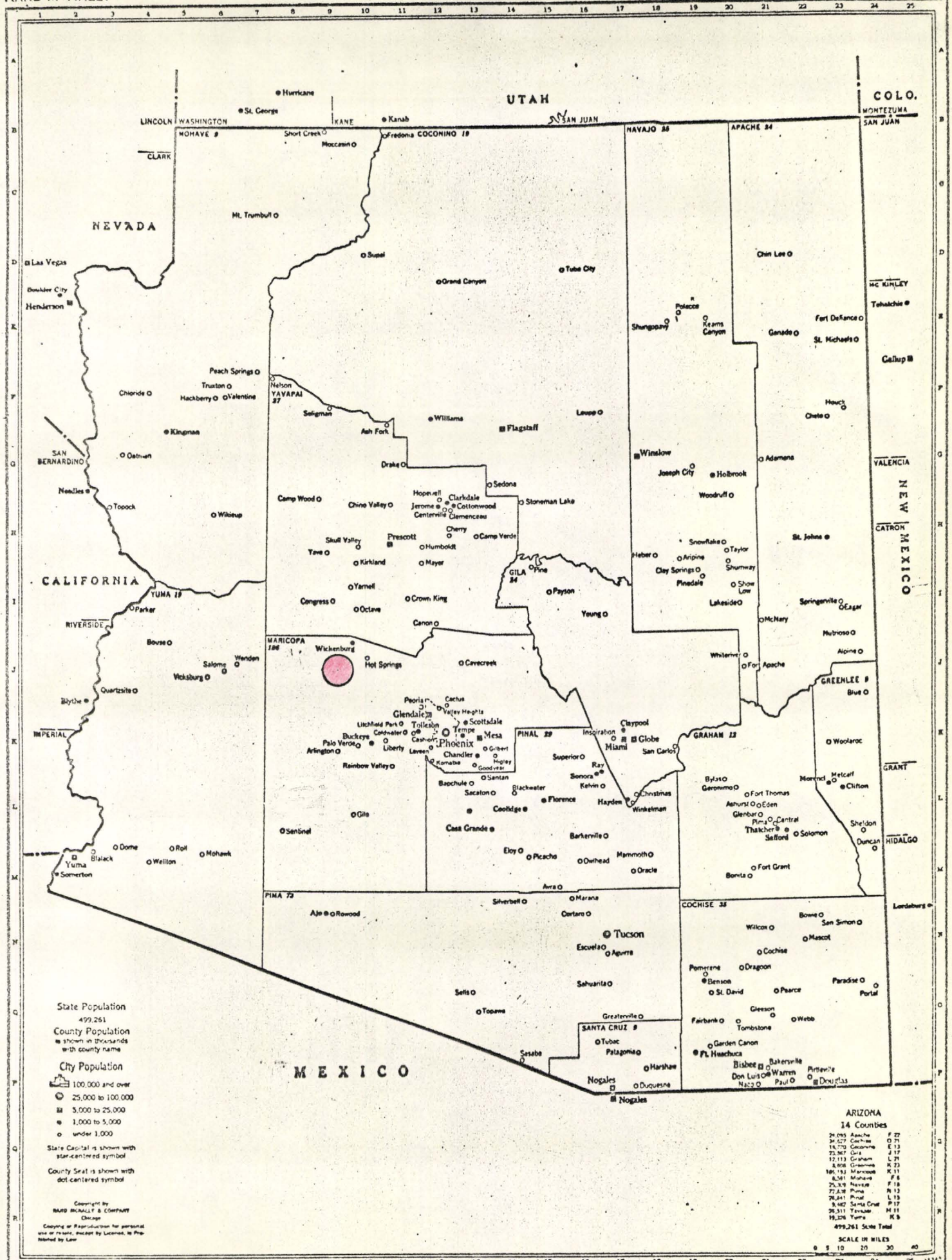
R.E. Billingsley
207 Mesquite
Wickenburg, Arizona

RAND McNALLY

CITY-COUNTY STATE MAP

SIZE 8½ X 11

ARIZONA



MADE IN U.S.A.

Specially engraved and indexed for use with the Rand McNally Commercial Atlas and Marketing Guide.

This Map is also available in size 17 X 22

CL 02

Figure No. 1

George Bodiroga
365 North Jackson
Wickenburg, Arizona

Chester E. Farrow
131 South 2nd East
Moab, Utah

Donald C. Elkin
244 Tusher
Moab, Utah

During the land study an effort was made to uncover any previous valid claims within the property boundary. Several patented gold claims exist on the west side of Vulture Ridge in Section 16, Township 6 North, Range 5 West, also there is a single unpatented gold claim in the east-central portion of Section 4, Township 6 North Range 5 West. Other than these, none were found but it is possible that a few claims of unknown ownership do exist. If a conflict should arise, prior ownership rights will have to be recognized. Also, a few fractions do occur between individual claims and claim groups because of angular intersections and surveying techniques of an approximate nature.

Farrow and Elkin have an agreement with the other property owners whereby they arrange the sale or lease of the properties.

DIVISION OF OWNERSHIP

Claim Groups:	Percent Ownership by:		
	Yongue Pogue Ortega	Billingsley Godiroga	Farrow Elkin
Green Knight # 1 - 30	75%	-	25%
Rat # 1 - 32	75%	-	25%
Long Stake # 1 - 74	75%	-	25%
Long Stake # 75 - 96	50%	-	50%
Caballeros # 1 - 92	-	75%	25%
Ipan # 1 - 47	-	50%	50%
PC # 1 - 10	-	50%	50%

Figure # 2

GENERAL GEOLOGY

Precambrian granites, granite-gneisses, and schists form the bulk of the rocks outcropping on the prospect. Erosion had previously stripped Late Precambrian, Paleozoic and Early Mesozoic formations from the area and the Precambrian is now directly overlain by Late Cretaceous rhyolitic and andesitic flows and near-surface intrusives. These younger rocks are relatively thin bedded in the prospect area but become considerably thicker to the east and north. The western edge of the property is bounded by Vulture Ridge, a silicic, fine-grained intrusive of probable Larimide age. This may be the youngest of the Late Cretaceous acidic rocks in the area, although all of the intrusives and flows are thought to be roughly contemporaneous. The possibility exists that some of the granitic mass mapped as Precambrian may in fact be a younger intrusive. This argument is based solely on the considerably different megascopic character of the rock as no supporting field evidence has been uncovered. Several small hills of Quaternary basalt outcrop in Sections 22 and 27, Township 6 North, Range 5 West, and appear to be somewhat aligned with an east-west trending fault zone. Recent alluvium covers many portions of the prospect but is probably not more than 10 or 20 feet thick, as rock-in-place can usually be found in the dry wash bottoms. An exception to this would be in the extreme southern end of the area where valley fill depths could be considerable.

STRUCTURE

The dominant topographic feature in the area is Vulture Ridge, a north-northwest trending intrusive zone that is probably an old deep-seated structure. Attitudes of the bedding and schistosity planes in the Precambrian adjacent to this structure are chaotic, with near vertical dip angles common. Intersecting, and in places offsetting the Vulture Ridge intrusive are a series of younger east-west fault zones. These zones are characterized by intense

brecciation as is the prospect area in general. Movement within these zones appears to be predominantly in the strike-slip direction, suggesting wrench faulting with probable attendant tension fracture development. The overall importance of this structural intersection and the associated brecciation is that it could have provided the conduit for porphyry type igneous intrusions and ascending hydrothermal mineralizing solutions.

ALTERATION AND MINERALIZATION

Within the prospect area hydrothermal alteration has effected only portions of the granites, gneisses, and rhyolites (see Enclosure # 2). This alteration, although widespread in areal extent, varies in intensity due in part to the degree of fracturing in the rock. In the granites and gneisses the most prominent alteration products are silica and sericite with lesser amounts of clays and epidote. In the rhyolites the clays are most abundant with some sericite also present. Remnant sulphide boxworks are common along fractures and in the rock itself where they form epicenters for limonite and hematite halos. Coincident with the zone of alteration is an area of strong hematite mineralization that fills fractures and floods out through the rock. The hematite is not implaced as specularite but is more of an earthy variety mixed with limonite. Old "copper oxide" workings are common throughout the property, and recent bulldozer cuts have uncovered many new chrysocolla shows.

GEOCHEMISTRY AND GEOPHYSICS

A random geochemical sampling program was conducted over the property with eleven "grab" rock chip samples being collected and analyzed for copper and molybdenum. An attempt was made to take representative specimens of the altered rock, so the samples were selected for their lack of any obvious mineralization. The original intent was

to possibly turn up values which would be high enough to be considered anomalous under any circumstances, and in this respect the survey was successful. Two samples taken from a small hill in the southwest corner of Section 4, Township 6 North, Range 5 West ran 113 and 232 ppm Mo (see Enclosure # 3 for location and Figure # 3 for assays). These values should prove significant in as much as they are at least twenty to forty times the molybdenum background while the corresponding copper values of 45 and 70 ppm are probably at best not more than two to four times the copper background. The hill itself is intensely altered and mineralized as are exposures in the surrounding hills and dry wash bottoms.

A Dallas, Texas firm, Geochemical Surveys, Inc., has been conducting a regional geochemical exploration program in the Southwest for a major company. They have grid sampled the property extensively and left small wooden stakes and flagging to mark their sample positions. Also an induced polarization survey has been run in the last month in portions of Sections 10, 15, and 22 (see Enclosure # 3). This has possibly been done as a follow up to the previously mentioned geochemical work, as at least some of the I.P. lines pass through geochemical sampling positions. The lines shown in Enclosure # 3 are as they were laid out in the field. Whether or not the I.P. survey was conducted over all these lines is problematical, but at least three of the lines are known to have been run.

Rocky Mountain Geochemical Corporation

P. O. BOX 2217
SALT LAKE CITY, UTAH 84110

Phone 322-2396
Area Code: 801

CERTIFICATE OF ANALYSIS

Date May 12, 1970

Client Farrow & Associates
11 Arches Building
Moab, Utah

Report on: 4 samples

Submitted by: D. C. Elkin

Date Received May 4, 1970

Analysis: Copper & Molybdenum

Remarks Molybdenum analyses determined colorimetrically. Copper analyses determined by atomic absorption.
Job No. 70-12-13SL

cc: Enc.
File (2)

LRR:pba

Sample No.	ppm Copper	ppm Molybdenum
BH 2	90	200
BH 4	90	166
R-1	10	24
D-1	20	51

By Lawrence R. Reid
Lawrence R. Reid

ND=None Detached 1 ppm = 0.0001% 1 Troy oz./ton = 34.28 ppm % Mo x 1.6683 = %MoS_2

Rocky Mountain Geochemical Corporation

P. O. BOX 2217
SALT LAKE CITY, UTAH 84110

Phone 322-2396
Area Code: 801

CERTIFICATE OF ANALYSIS

Date April 21, 1970

Client
Farrow and Associates
11 Arches Building
Moab, Utah

Report on: 3 samples
Submitted by: D. C. Elkin
Date Received April 10, 1970
Analysis: Copper & Molybdenum
Remarks Molybdenum analyses determined colorimetrically. All other analyses determined by atomic absorption.
Job No. 70-9-34SL

cc: Enc✓
File (2)

LRR:pba

Sample No.	ppm Copper	ppm Molybdenum
RAT 13-1	5	15
RAT 13-2	70	-1
RAT 13-3	25	1

By Lawrence R. Reid
Lawrence R. Reid

ND=None Detached 1 ppm = 0.0001% 1 Troy oz./ton = 34.28 ppm % Mo x 1.6683 = $\%MoS_2$

Figure # 3

Rocky Mountain Geochemical Corporation

P. O. BOX 2217
SALT LAKE CITY, UTAH 84110

Phone 322-2396
Area Code: 801

CERTIFICATE OF ANALYSIS

Date March 30, 1970

Client Chester E. Farrow
11 Arches Building
Moab, Utah

Report on: 8 samples

Submitted by: C. E. Farrow

Date Received March 23, 1970

Analysis: Copper & Molybdenum

Remarks Molybdenum analyses determined colorimetrically. All other analyses determined by atomic absorption.
Job No. 70-8-6SL

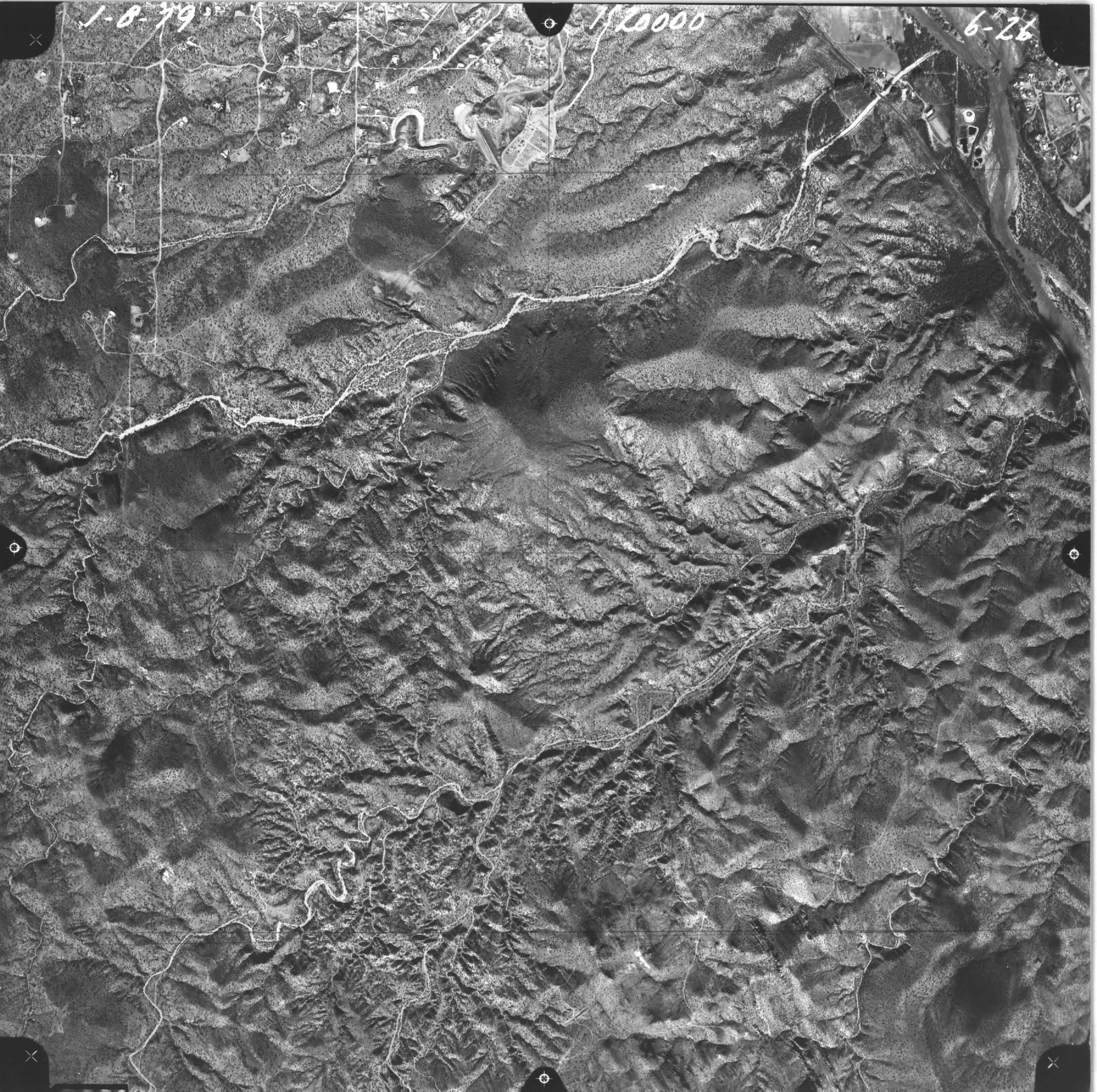
cc: Enc.
File (2)

LRR:pba

Sample No.	ppm Copper	ppm Molybdenum
WB 1	25	7
WB 2	45	113
WB 3	20	6
WB 4	70	232
WB 5	30	20
WB 6	20	6
WB 7	10	2
WB 8	5	1

By Lawrence R. Reid Lawrence R. Reid

ND=None Detached 1 ppm = 0.0001% 1 Troy oz./ton = 34.28 ppm % Mo x 1.6683 = $\%MoS_2$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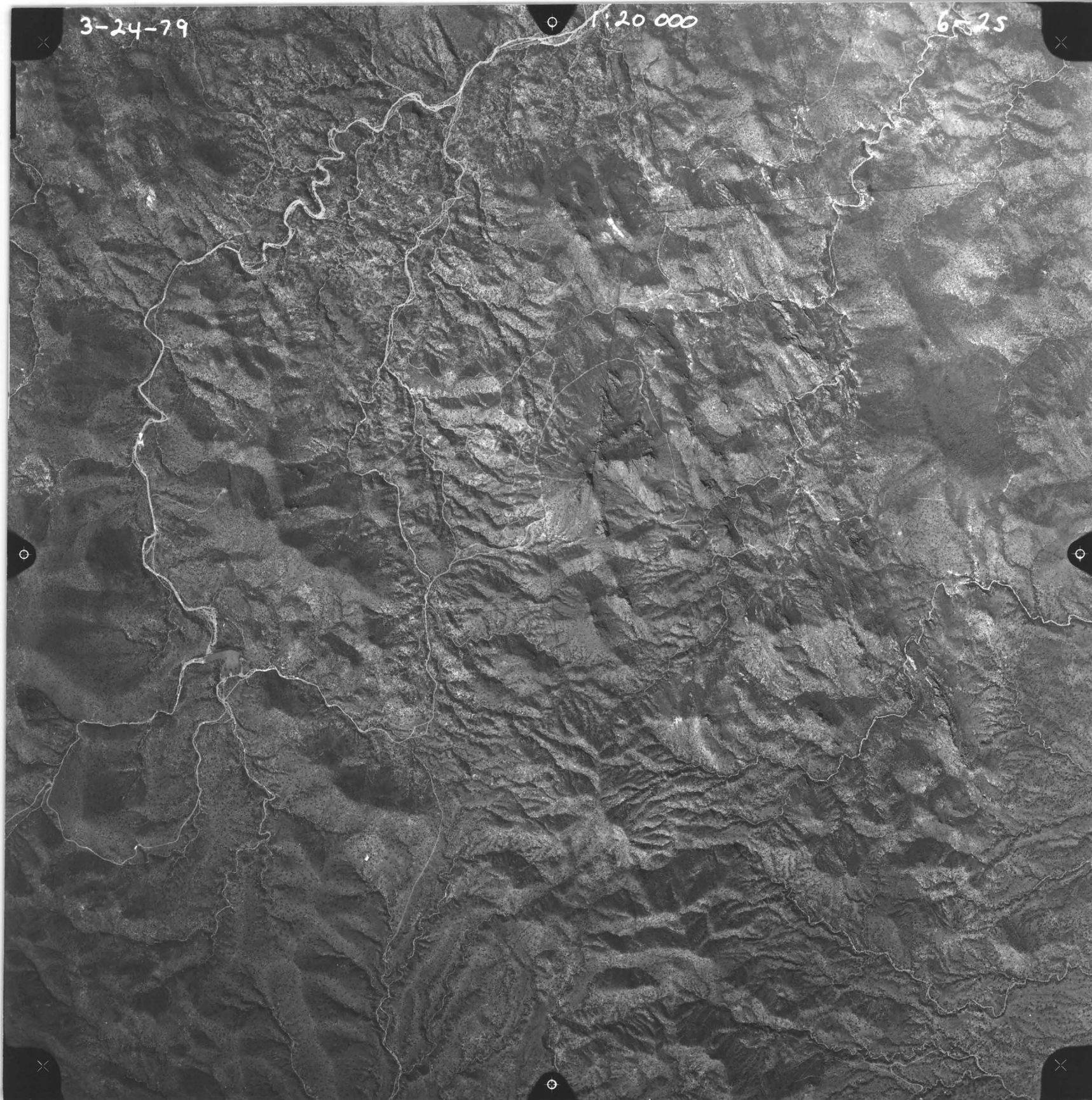

3-24-79
1:20 000
6-25

PORPHYRY COPPER PROSPECT

VULTURE MINING DISTRICT

T6N - R5W

MARICOPA COUNTY, ARIZONA

T6N

R5W

R5W

T6N

QUATERNARY	Qal	Alluvium
TERTIARY	QTb	Basalt
	Tdp	Dacite porphyry
LARAMIDE	TKi	Fine-grained acidic intrusive
CRETACEOUS	Ka	Andesite
	Kr	Rhyolite
PRECAMBRIAN	PC	Mainly granite and granite-gneiss, locally includes chlorite schist

Faults

Zone of Alteration and Hematite Staining

Property Boundary

N

0 1/2 1 Miles

0 1000 3000 5000 Feet

Scale : 1 inch = 2,000 feet

Contour Interval : 100 feet

Farrow & Associates
Consulting Geologists
Moab, Utah

Enclosure No. 2

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

VULTURE MOUNTAINS QUADRANGLE
ARIZONA
15 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1951 and 1960. Field checked 1961

Polycentric 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

UTM GRID AND 1961 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:62500

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U. S. Route — State Route

ARIZONA
QUADRANGLE LOCATION

PROPERTY BOUNDARY

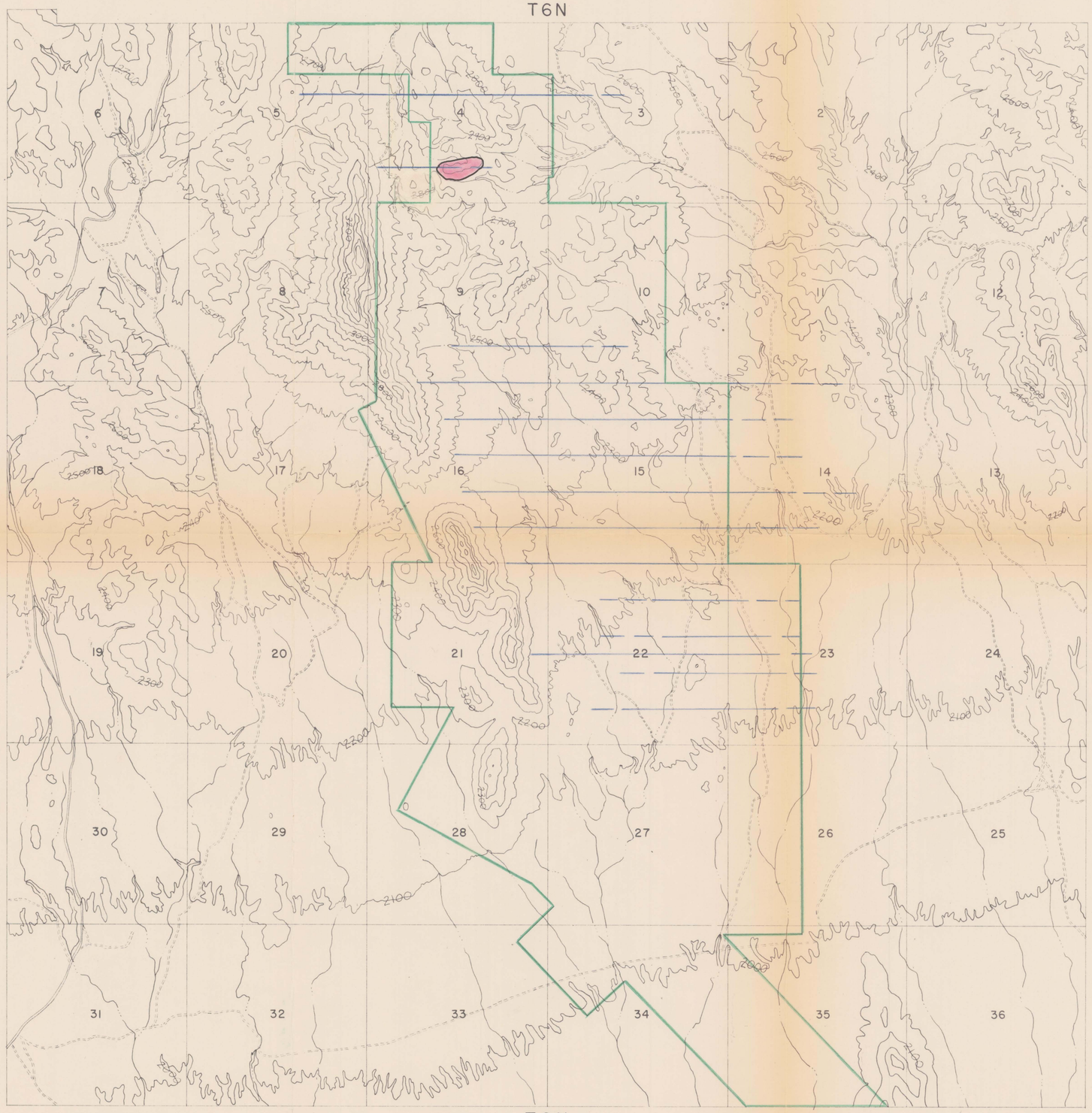
ENCLOSURE NO. 1

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

VULTURE MOUNTAINS, ARIZ.
N3345—W11245/15

1961

AMS 3451 IV—SERIES V798



PORPHYRY COPPER PROSPECT

VULTURE MINING DISTRICT

T6N-R5W

MARICOPA COUNTY, ARIZONA

Zone of Anomalous Molybdenum Geochemical Values

Induced Polarization Survey Lines

Property Boundary

N

0 1/2 1 Miles

0 1000 3000 5000 Feet

Scale : 1 inch = 2,000 feet

Contour Interval : 100 feet

Farrow & Associates
Consulting Geologists
Moab, Utah

Enclosure No. 3