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

The following file is part of the John E. Kinnison mining collection

ACCESS STATEMENT

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

CONSTRAINTS STATEMENT

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

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

QUALITY STATEMENT

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

NOTE FILE ON "PORPHYRY COPPER"

JEK

Location: Black Hills, 3 miles NW of San Manuel Mine

Property
Area
District Old Hat
Mt. Range Black Hills
State Arizona

Field Check by: J. E. Kinnison, February 1971
Sample Collection by P. S. Strobel

Date Nov., Dec. 1971

Recommended Company Interest Classification:

- ☐ Active
- ☐ Inactive
- ☒ None
- ☐ Scientific

Conclusion: Post-ore (?) volcanics overlie a low-angle post-ore fault, and conceal a potentially mineralized foot wall. Geochem sampling, however, suggests that no mineralization of consequence is actually thus concealed.

Notes on Reconnaissance: See sketch maps attached.

Basis for reconnaissance: Creasy has mapped a thrust plate of cloud-burst formation (volcanics and conglomerate) NW of San Manuel, overlying pE granite. Area thus concealed adjacent to a major porphyry copper deposit warrants consideration for satellitic or recurrent deposits. My field inspection confirmed Creasy's work and indicated the fault to be post-ore and either flat or very low-dipping east. Granite footwall, however, not visibly mineralized.

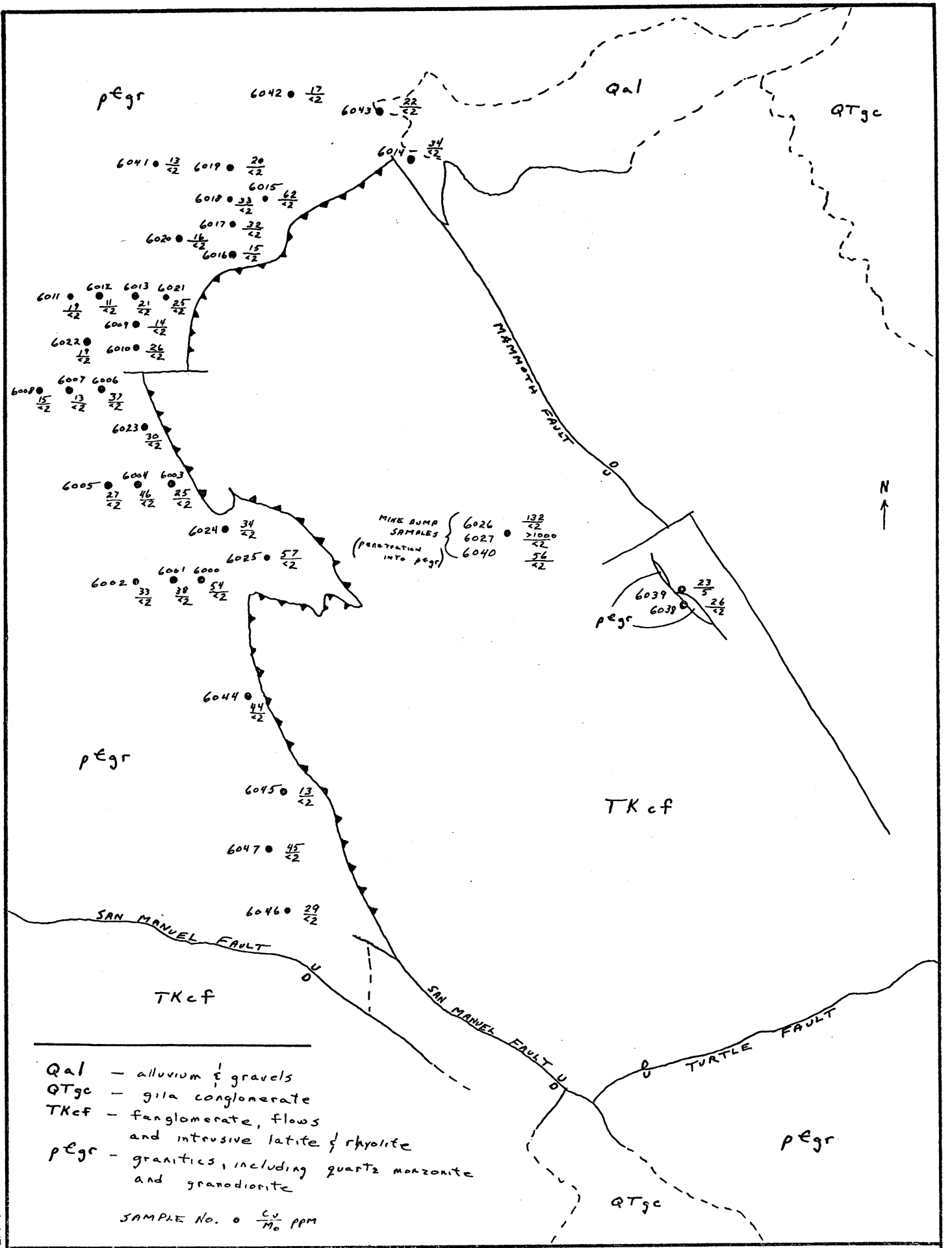
Geo-chem traverses by Paul Strobel failed to indicate anomalous Cu or Mo along outcrop of fault trace. Mine shaft in center of volcanic plate reached underlying granite, w/anomalous Cu in essentially fresh granite. Discounted since vein in volcanic (mid-T mineralization) may account for Cu in footwall. Sample 6039, from "horse" in a strand of Mammoth fault, must be taken lightly, since this is a NW extension of Mammoth-Collins fault and vein at Tiger (also mid-T).

Results probably not conclusive regarding potential east of Mammoth fault, but no encouragement is furnished.

John E. Kinnison

JEK/bl
c.c. J. J. Durek

Date January 7, 1972 By John E. Kinnison

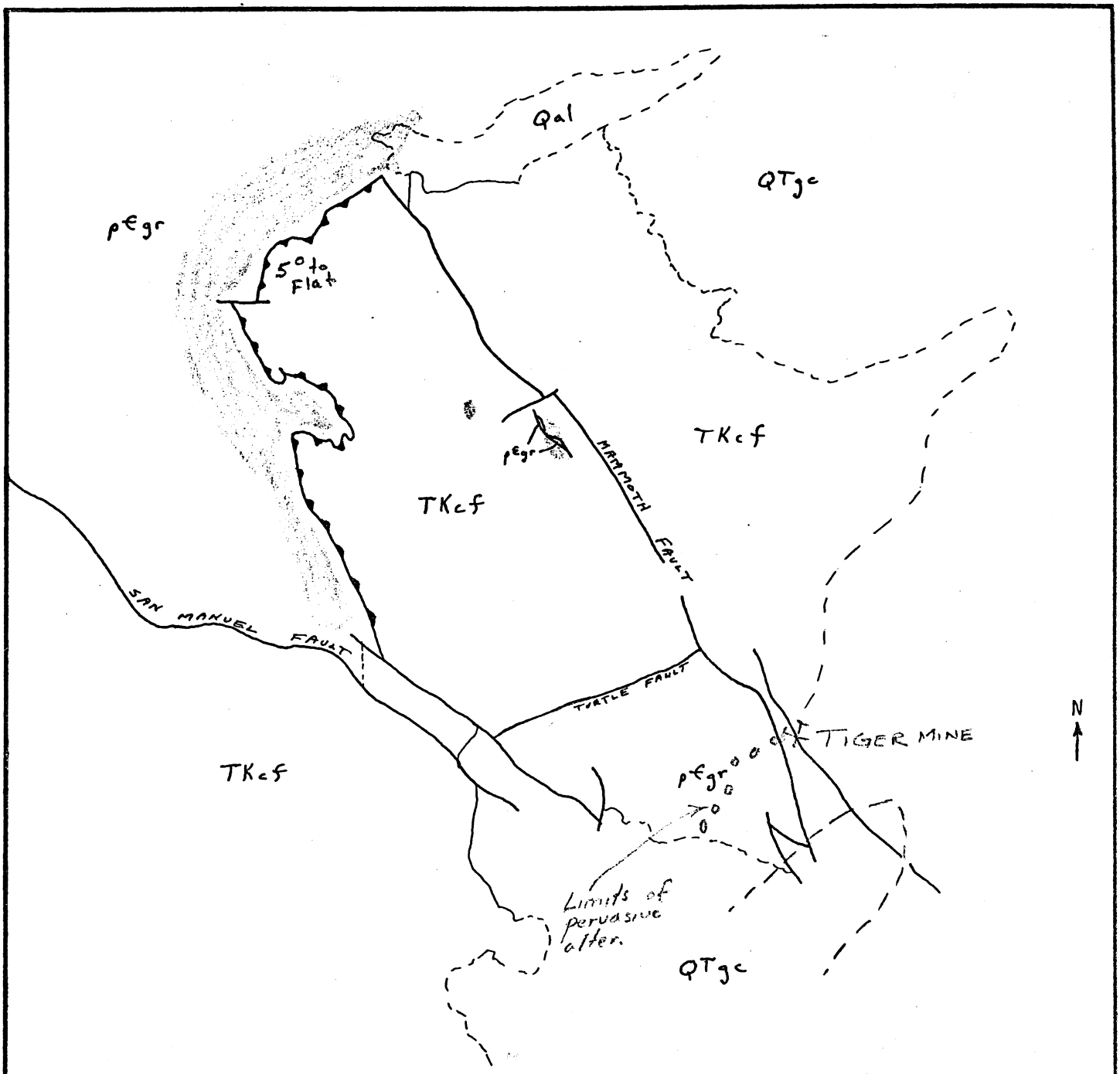


KAISER EXPLORATION & MINING COMPANY
OAKLAND, CALIFORNIA

GEOCHEMICAL STUDY OF pE GRANITICS
BLACK HILLS AREA — MAMMOTH QUADRANGLE
PINAL COUNTY — ARIZONA

SCALE: 1" = 2000' BY P. J. DATE 12/27/71 DWG. NO. 1

KACC 5419 (12/70)



Qal – alluvium & gravels

QTgc – gila conglomerate

TKcf – fanglomerate, flows and intrusive latite & rhyolite

pEgr – granitics, including quartz monzonite and granodiorite

– areas of geochemical sampling

– approx. limit of SAN MANUEL ore zone

KACC 5419 (12/70)

KAISER EXPLORATION & MINING COMPANY

OAKLAND, CALIFORNIA

GENERALIZED GEOLOGY
BLACK HILLS – SAN MANUEL MINE AREA
Modified from Creasy

SCALE: 1 in. = 4000 ft. BY P.S. DATE 12/28/71 DWG. NO. 2

NOTE FILE ON "PORPHYRY COPPER"

Location: R 13 E, T 14 S — Sections 17, 18, 19, 20

PROPERTY: Old Pueblo
DISTRICT: Amole
Mt. RANGE: Tucson Mts.
COUNTY: Pima
STATE: Arizona

Source of Information
- [X] Field Observations
- [ ] Publications
- [ ] Company Files
- [X] Other

Explantion: Field work consisted of a brief property examination and the collection of 21 rock-chip samples on a 400' grid pattern. The core logs of the 9 holes drilled by Cominco were obtained from the property owner, after Cominco dropped their option.

Reviewed by: Melville See Date October 29, 1971

Recommended Company Interest Classification:
- [ ] Active
- [ ] Possible
- [ ] None
- [X] Scientific

Qualifying Remarks: The property has much scientific interest in that analogous deposits may have escaped detection in the Southwest. It is similar to a porphyry copper deposit, having disseminated low grade Copper values with chalcocite enrichment. However, it has the following unusual characteristics: limited pervasive alteration, a low Py content, and a lack of diagnostic leached capping or live limonite.

MINERALIZATION

Alteration and Metallization: The host rock is an andesite porphyry (Short's Ranch andesite). Alteration consisted mainly of intense silification in the form of silica veinlets along fractures, and weak argillization of the feldspar phenocrysts. The areas of best mineralization are characterized by copper paint along fractures at the surface. At several feet depth, chalcocite and chrysocolla occur as the most abundant Copper minerals. Oxidation of the chalcocite by descending meteoric waters with attendant solution of silica could have produced the chrysocolla. Small amounts of pyrite, chalcopyrite, and bornite have been observed in the core. Mineralizatio depth generally terminates at the andesite - Cat Mt. rhyolite contact.

Leached Outcrops: The outcrop of the mineralized andesite is not characterized by gossan formation and is leached only at the immediate surface. A geochemical survey of rock-chip samples outlined the area of mineralization with values ranging from 500 to 1000 ppm. Limonite is very sparse and has a transported texture.

Enrichment: Enrichment appears to have been an important factor in upgrading what must have been a lean protore. Since in the deposit, only relatively small amounts of primary sulphides remain, it is theorized that lateral migration of ferric sulphate solutions from oxidizing pyrite zones in the adjacent rhyolite may have been the agent for the enrichment of the protore. Polished section work has revealed chalcocite replacing cores of bornite. A cross section across the deposit indicates a thin enriched chalcocite blanket dipping eastward. It is possible that some chalcocite may be hypogene.

STRUCTURE

Fissures: The Short's Ranch andesite is a well fractured host rock. The andesite is bounded on the north, west, and south by a strong fault contact with the rhyolite. The andesite appears to be a down-dropped or graben-like structure, into which lateral migration of acidic groundwaters could have occurred.

Intrusives: The Short's Ranch andesite may be a sill-like intrusive. There is some variation in texture from a coarse porphyry to a finer equigranular texture near the center of the deposit.

Breccia Pipes: No breccia pipe has been observed, though breccia textures occur in the andesite. It is possible that this is collapse breccia texture, which may have formed during the subsidence of the graben structure.

Cover Rocks: None

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.:

Four drill holes assayed an average of .15% Cu for an average depth of 625', giving a tonnage calculation of 37,500,000 tons of .15% Cu. A leach operation, using oxide material from open cuts, has been attempted but no information is available as to its success. Five other drill holes, surrounding the four better holes, intersected only weak Cu mineralization (<.1%), suggesting that the deposit has been adequately explored.

MS/bl (10-29-71)

NOTE FILE ON "PORPHYRY COPPER"

Location: Three miles east of Klondike

Property: Quinn Mine
County: Graham County
District: Aravaipa
Mt. Range: Santa Teresa
State: Arizona

Field Check by: John E. Kinnison

Date: April 23, 1971

Recommended Company Interest Classification:

Active
Inactive
X None
Scientific

Conclusion: The copper mineralization is confined to a shear zone. Further exploration is not warranted.

Notes on Reconnaissance:

The property was presented as possibly the outermost fringe of a porphyry copper zone of alteration-mineralization. See report by Eric Lindvall.

Examination revealed a 10' wide shear zone, in andesite of Silver Bell type (as defined by Richard and Courtright), with brecciation and weak alteration in the walls on either side for a short distance. Refer to my field modifications of Lindvall's map. This zone cuts across a porphyry contact, it is very feebly mineralized in the porphyry. No mineralization whatever is present in the porphyry outside the Bx limits.

Geochem results were negative; the andesite immediately adjacent to the valley alluvium being only 34 ppm Cu.

Aerial reconnaissance, April 28, showed no evidence of extension of any mineralization to the northeast.

Even though this prospect is on a direct projection of the San Manuel-Copper Creek trend, mineralization is insufficient to promote exploration under alluvium adjacent to the Quinn.

JEK
5-14-71

TORTILLA MOUNTAIN RECONNAISSANCE

BLACK HILLS

On April 20, 1971, a small color anomaly, spotted previously by John Kinnison from aerial reconnaissance, was examined on the ground with negative results. The area of anomalous color lies about one mile east of Camp Grant wash in the Black Hills at the southern edge of the Tortilla Mountains, Pinal County. The anomalous red color was traced to outcrops of soil derived from the weathering of fresh pre-Cambrian granite. The soil contains numerous particles of biotite, which have broken down and oxidized, imparting a strong red (Fe) color to the soil.

Melville See

Melville See

MS/bl
4-27-71

KELVIN PROSPECT

On April 23, 1971, a reconnaissance examination was made of the Tipperary Kelvin copper prospect and adjacent ground in Pinal County, Arizona. The results were negative.

At the Tipperary prospect, several Laramide dikes of quartz monzonite composition have intruded pre-Cambrian granite along an east-west axis. Narrow shear zones up to several feet across and faulting also occur in the granite, striking east-west. The dike-granite contacts and the shear zones have been weakly mineralized with copper and molybdenum. Total sulphides appear to have been less than 1%. Although the granite near the dikes evidences silicification and development of secondary orthoclase feldspar, the alteration rapidly gives way to fresh granite away from the dikes.

Two holes were drilled to explore an IP anomaly found in the center of the property. The first hole was drilled near a quartz monzonite porphyry dike to a depth of 1400 feet, ending in pre-Cambrian granite. The quartz monzonite porphyry was encounteredt at 225 feet and continued to 918 feet, but was largely unmineralized except for a zone 720 feet to 785 feet which average approximately 0.2% copper and 0.1% molybdenum. The pre-Cambrian granite was reported to evidence propylitic alteration, but was only weakly mineralized.

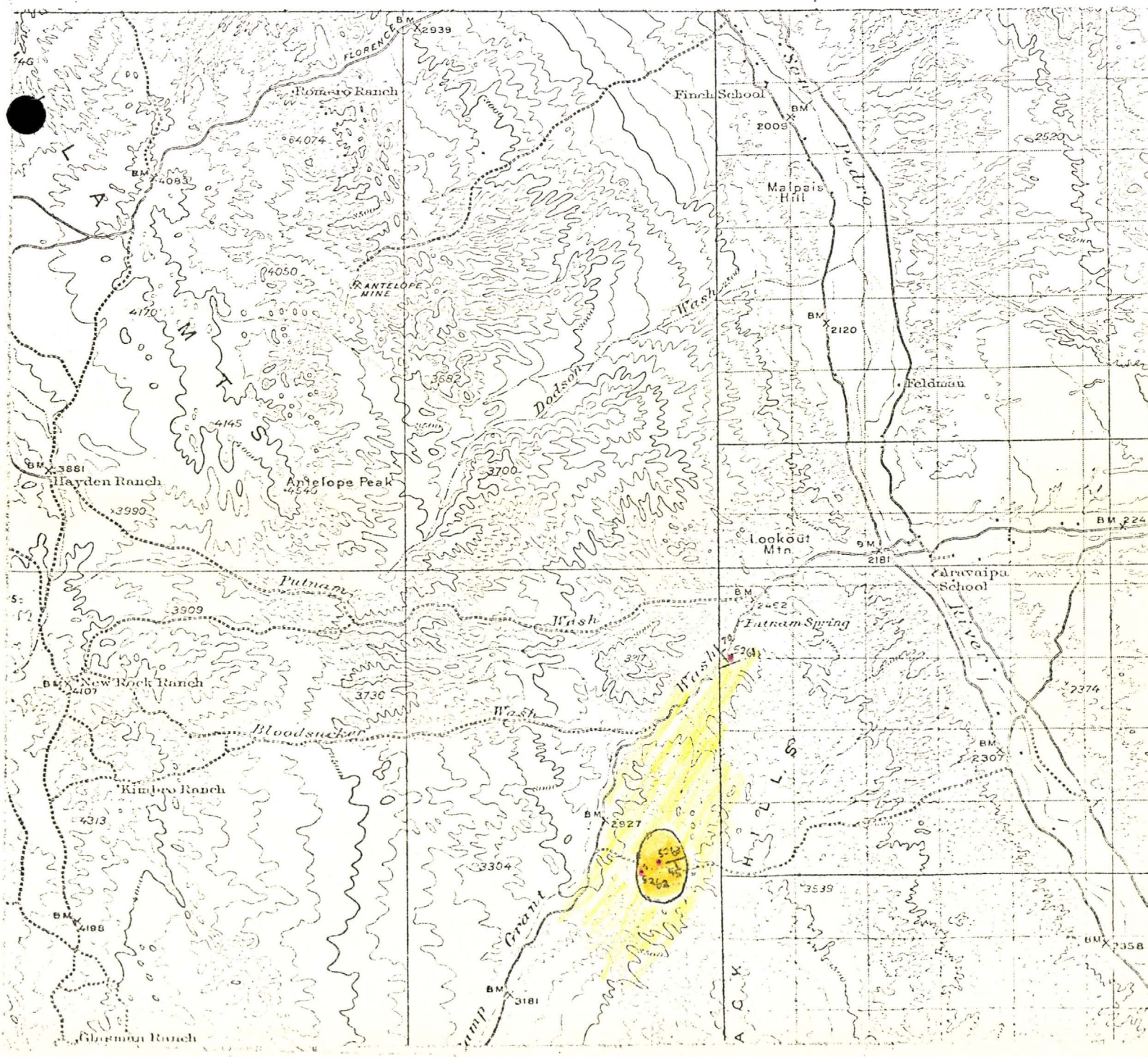
One-thousand two-hundred feet to the north, the second hole was drilled to 1625 feet in altered (propylitic) pre-Cambrian granite. Mineralization was subeconomic. Near this hole at the surface, sparse pyrite and chalcopyrite were observed in a narrow shear zone in the pre-Cambrian granite. These weak, but near-surface sulphides may have produced the IP anomaly.

The lack of pervasive alteration, the low total sulphides with incomplete leaching, and the strong structural control of the mineralization all indicate that the possibility of encountering a supergene enriched ore body at depth is extremely remote. The drilling done indicates the primary mineralization encountered is clearly subeconomic.

Since the best shows were drilled, and no new alteration areas were found adjacent, the property does not warrant further attention.

MS/bl
4-27-71

Location Map: Camp Grant Wash Color Anomaly



EXPLORATION NOTE FILE

SUMMARY REPORT OF DATA

Office Compilation by Melville See

Location: Near the village of Trinidad
11 kilometers from Santa Rosa
224 kilometers southeast of Hermosillo
157 kilometers east of Guaymas

Property: Dios Padre Mine
District: Yecora
County: Sahauripa
State: Sonora
Country: Northwest Mexico

Review of Examinations by: G. L. Holbrooke, October 16, 1964
David Robertson, March 1965
MacKay and Schnellman, November 1966

Type of Deposit: Disseminated Ag - Pb - Cu in a vertical chimney or pipe.

Qualifying Remarks: The deposit has some similarities to the porphyry copper deposits of the Southwest United States. They are: the presence of a porphyry intrusive, alteration and mineralization of the porphyry, widespread shearing and fracturing of the porphyry host, and a moderately large low-grade tonnage potential. Dissimilarities are: the high ratio of Ag - Pb to Cu and the vertical zoning character of the deposit. The mineralization has not been drilled at depth, thus the total geological picture has not been developed.

Conclusions and Recommendations: The tonnage and grade of the deposit has yet to be proven by thorough exploration. The reports estimate that a potential of six-million tons exists, based on sampling of those workings not flooded. Grade estimation (MacKay and Schnellman) of this mineralization is 5 oz. to 15 oz. Ag/ton, .5% Cu, and 1% - 3% Pb. This is a guess and must be regarded as such. Mineralization continues in depth beyond the lowest level (now inaccessible) and virtually nothing is known regarding the extent or grade of such extension. MacKay and Schnellman suggest that the mineralization potential may be larger than recognized in earlier work, and could be as high as eighteen-million tons.

Mineralization: Mineralization is structurally controlled, parallel to the north-north-west trending major axis of a large regional anticline. Mineralization has been most intense along strongly sheared zones in the porphyry. The ore in the upper levels of the mine consisted of argentiferous galena, with lesser amounts of tetrahedrite, chalcopyrite and sphalerite. With depth, the galena diminished and mineralization was characterized by an increase in chalcopyrite-tetrahedrite with associated pyrite and arsenopyrite.

Geology: The deposit is capped by a thin basalt flow on an irregular surface of Tertiary conglomerate. The conglomerate overlies andesite porphyry, which is the host rock for mineralization. The andesite porphyry may be a tongue of a small granite stock, which has intruded a series of Cretaceous sandstones, arkoses and volcanics. The porphyry intrusive was later sheared and fractured along a northwest axis, and then mineralized along breakage zones.

Outcrops: Basalt, conglomerate, andesite porphyry

Enrichment: None indicated

Intrusives: Andesite porphyry

Cover Formations: Basalt conglomerate

Development: Four levels with cross-cuts, comprising approximately 6000' of workings, and a main shaft - 219 feet deep. Two diamond drill holes put down by the Cananea Copper Company in 1946-47, penetrated the deposit to a depth of 700' and it is reported they were still in mineralization when stopped. Approximately 500,000 tons of Ag ore mined prior to 1910.

See Attachments

We believe that in Mexico a company enjoys a tax holiday till the 'pay-back' period has elapsed and that thereafter the aggregate of production and "export" tax incidence will amount to c. 38% of profits.

For the purpose of this exercise for simplicity we will allow a flat 30% for tax reducing the a/m profit to an arbitrary $7.00/tonne @ 600 tpd @ 356 days/year = $1,484,000 profit/year net. Multiply by 4.65 which is the factor for discounting to present value @ 20% for 25 years and the total value of the project is $7,345,800.

Kettering Investments and associates own 39% of the project so their share we deem to be worth $2,865,800 U.S. or about £1,000,000 sterling, discounting any premium for control.

As far as cash flow is concerned the would-be purchaser of this 39% would have to find theoretically

a) £1,000,000 to purchase 39% equity and
b) £400,000 share of $3,000,000 plant etc capital investment

VIII. CONCLUSION.

1. Exercising considerable reservation and caution there would appear to be a good viable mining project here.

2. The proven/indicated reserve would be about 6,000,000 tonnes. The potential could be thrice as much.

3. Ignoring Gold, Zinc and Cadmium the average grade would, on the evidence available intelligently projected, be 420 gms silver/tonne, 3.08% lead and 0.55% copper. Mineralisation on the potential could however differ.

4. This using the parameters assumed for this exercise is better than "$20 ore" and as such even taking into account Mexican exigencies and logistics must constitute "a mine".

5. Again with the parameters postulated (in the absence of any fixed policy from either yourself or present operators) we put a value of c. $7,400,000 on the project, a value of c. £1,000,000 on Gale et alia's share thereof and a probable cash disbursement to the purchaser of the latter of c. £1,500,000.

6. The operation hitherto has been run wastefully, inefficiently, and with a lamentable lack of policy and direction. In this context

it must be emphasised that any future operation based on "high grading" will fail disastrously. The corrollary of this is that a convincing promotion deal per se cannot honestly be seen.

7. Despite feeling to the contrary it would appear that operation in Mexico is little if any worse than that in any other foreign country, recognising the disabilities of Mexicanisation with the concomitant hazard of finding a National of integrity as a "front".

It is significant we feel that American operators notoriously sensitive to politics, economics and otherwise are increasingly active in the country (e.g. Anaconda, Asarco, Tidewater Oil, Newmont).

8. The crying need here is a coherent policy.

IX. RECOMMENDATIONS

Policy.

1. Should the parameters we have chosen be acceptable to you, you should negotiate for the purchase of Kettering Investment's interest for not more than £1,000,000.

2. If 1) is implemented successfully you should ensure in the course of negotiation that you have due weight in management to ensure that the project is run efficiently as we have considerable misgiving on this score in practise if not in principle.

Technical.

3. The deposit must be proven from a tonnage and grade standpoint at a higher level of credibility than the present status.

4. A mining method must be selected on the basis of the findings of 3) above. We feel that an open pit mine is indicated and to this end "down the hole" holes should be put down on the face of the hill at approximately 60m horizontal and 20m contour intervals. Should these indicate "pay-ore" within 20m of the surface, the project is an opencast one and these holes would probably serve as development for laying out benches. This presupposes a correlated, accurate surface to underground survey which does not at present exist.

If open-pit indications are proved incorrect, then a block caving project must be laid out.

5. This mill flowsheet must be established on the basis of the average grade of the ROM (i.e. the whole stockwork virtually)

and not on the basis of selective mining. (high grading).

6. A resident manager (not a contractor) of high calibre must be employed who will have full authority over the operations, logistics and consultants and concomitantly full responsibility for the operation.

7. Sahauripa should be furnished with a viable executive board of directors to whom the resident manager will be solely responsible.

8. All thoughts of high-grading should be dismissed.

/s/ E. LEDGERWOOD

Mr I.H. McLean. Mr E. Ledgerwood
Mackay and Schnellmann Ltd.,

London
November 1966.

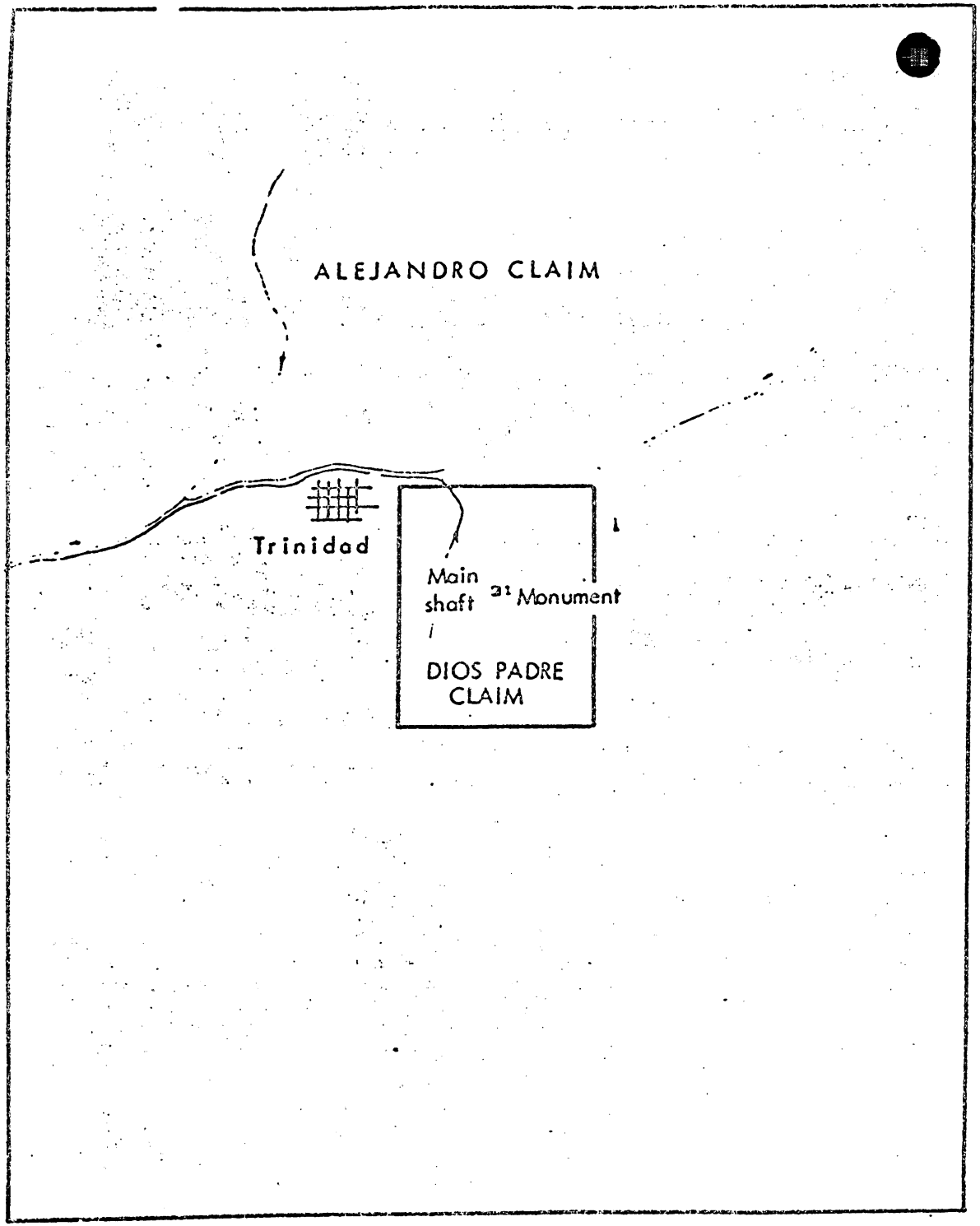


Figure 2

PLAN of PROPERTY

0 1000 2000 3000 feet

D.S. Robertson
Feb. 1965

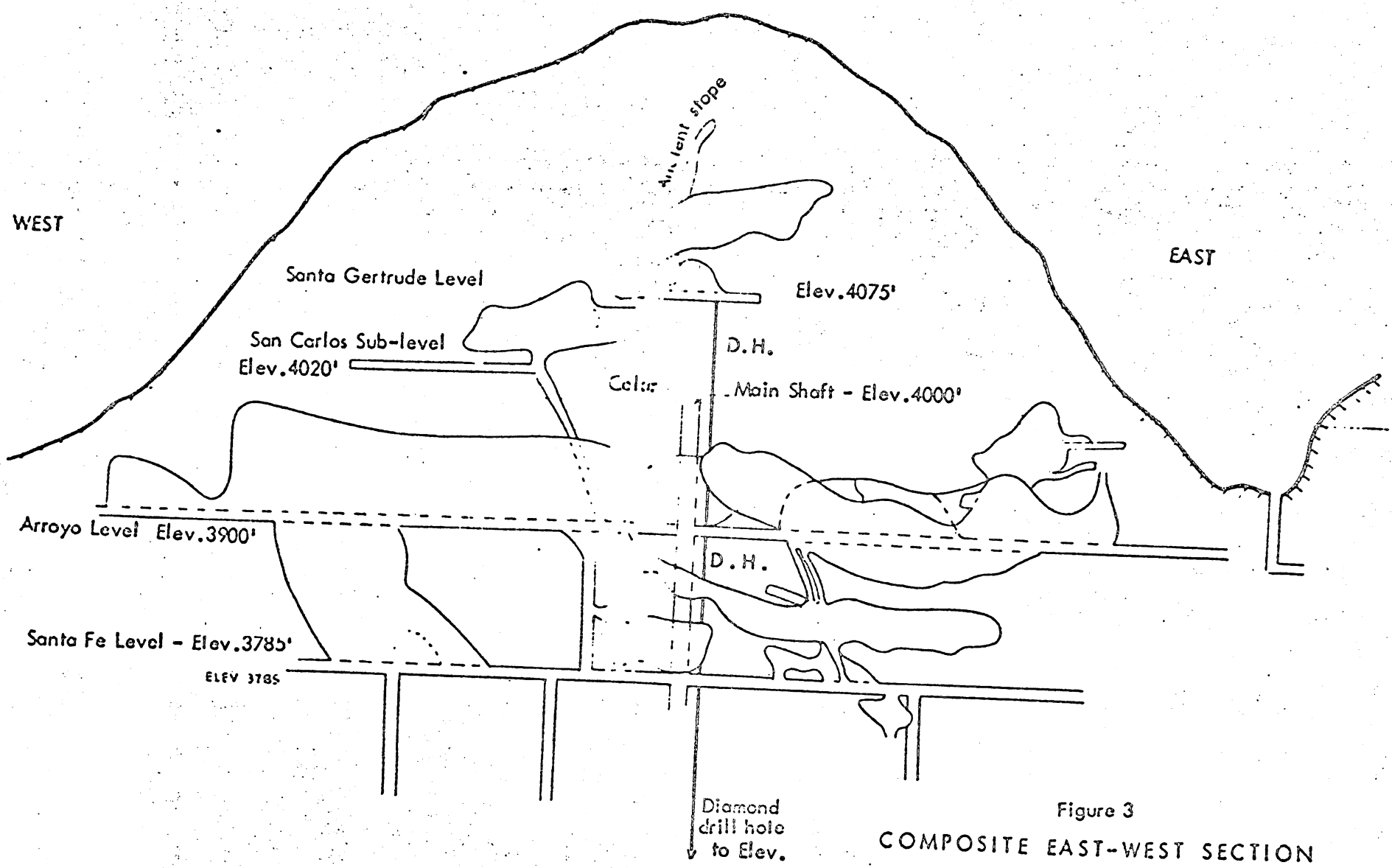


Figure 3

COMPOSITE EAST-WEST SECTION

As drawn from old plans for G. Holbrooke

0 100 200 300 feet

D.S. Robertson

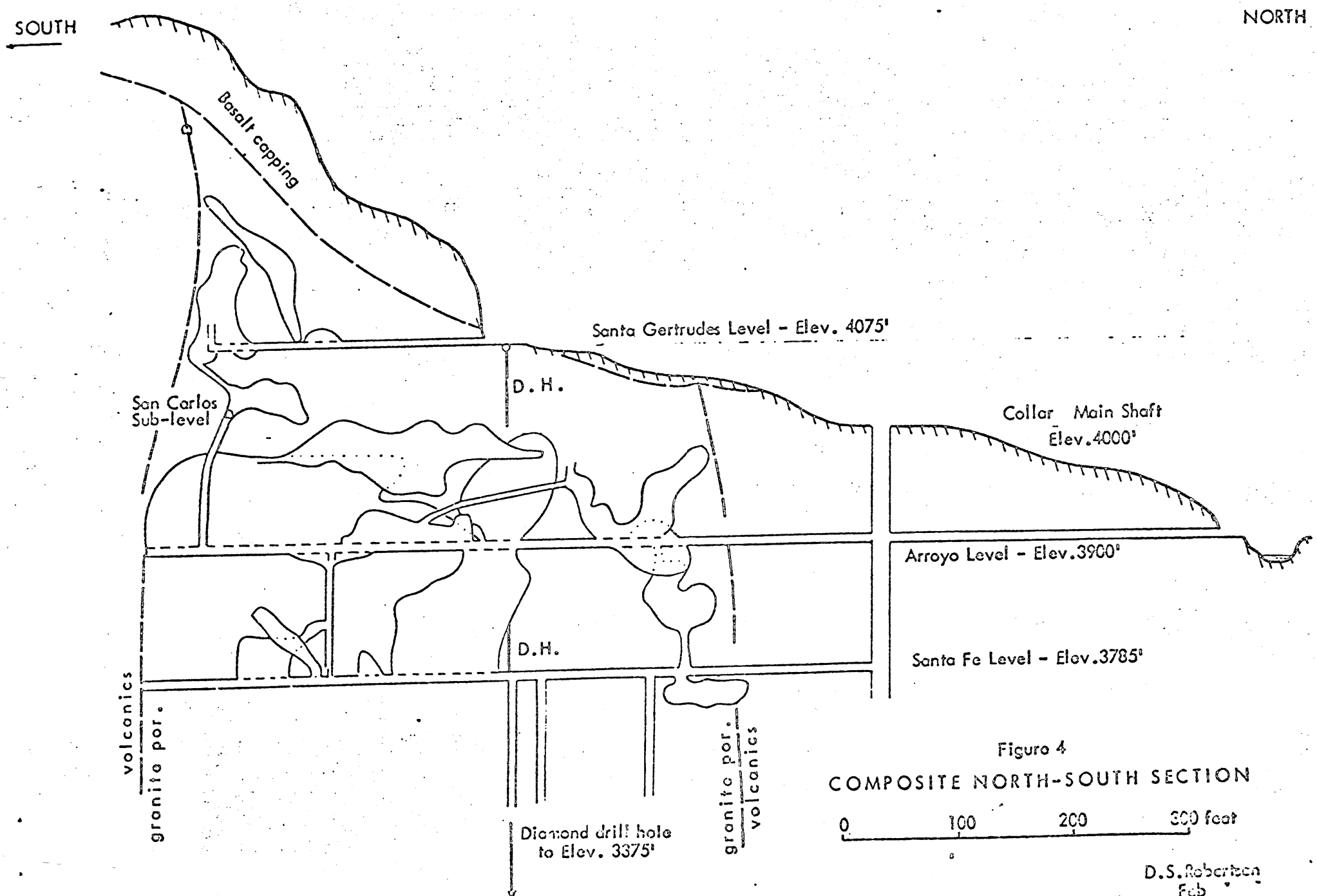


Figure 4

COMPOSITE NORTH-SOUTH SECTION

D.S.Robertson
Feb

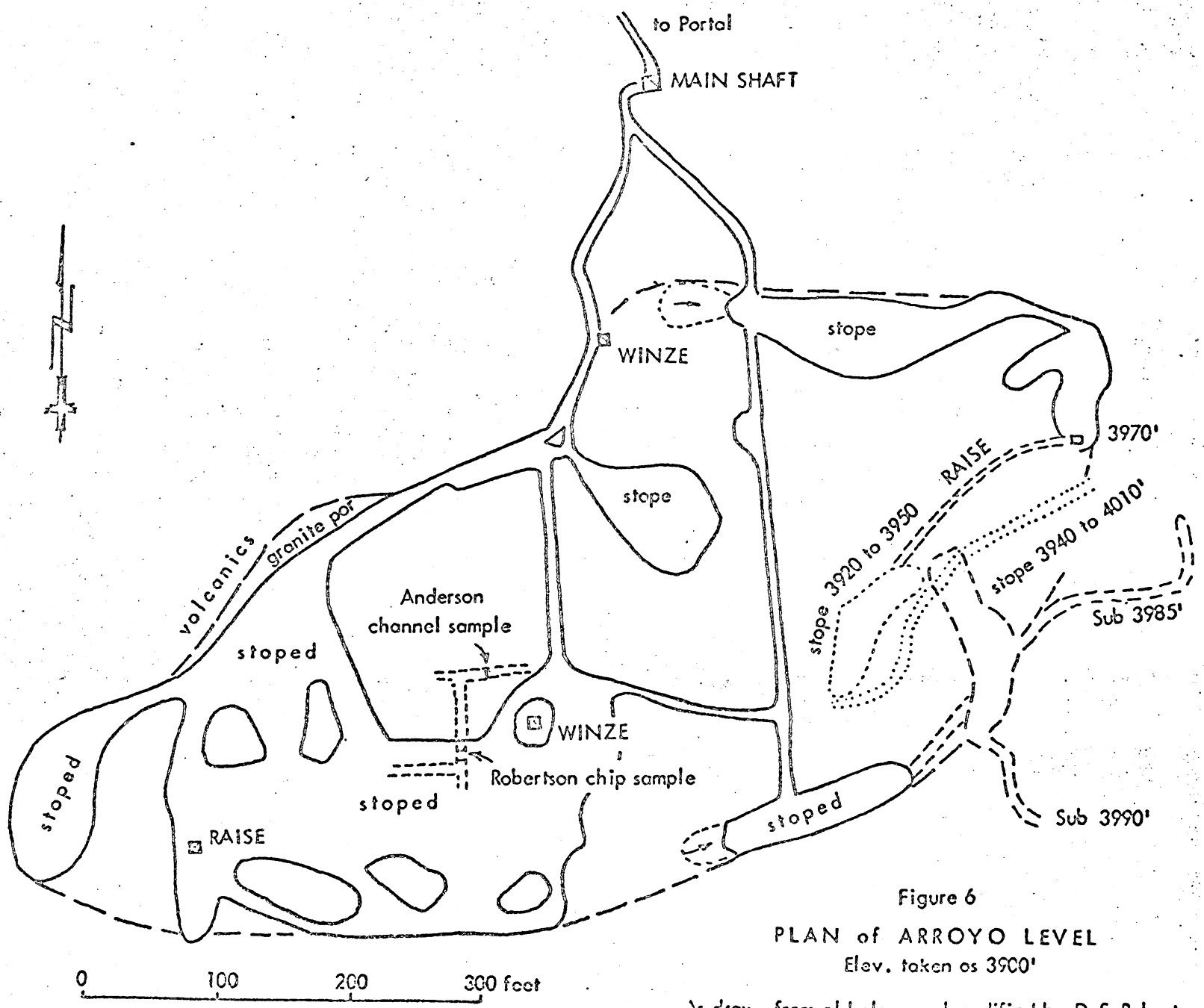


Figure 6

PLAN of ARROYO LEVEL

Elev. taken as 3900'

As draw. from old plans and modified by D.S.Robertson
Feb. 1965

NOTE FILE ON "PORPHYRY COPPER"

Location: T 24 S, R 15 E, Section 1, 2; T 24 S, R 16 E, Sections 6, 7, 18

Copper-Moly, Elda and Property: Cinco Groups
District: Duquesne, W flat
Mt. Range of Mt. Washing
County: ton, Santa Cruz
State: Arizona

Source of Information
- [ ] Field Observations
- [ ] Publications
- [ ] Company Files
- [X] Other

Explantion:
Information abstracted from the Superior Oil - Callahan Venture on the Italian Canyon Project.

Reviewed by: Melville See Date April 15, 1971

Recommended Company Interest Classification:
- [ ] Active
- [ ] Possible
- [ ] None
- [X] Scientific

Qualifying Remarks: The conclusion of the Superior-Callahan venture is summarized: "The copper, molybdenum, tungsten mineralization explored by surface samples and drill holes does not approach economic concentrations." Analysis of the data indicates there does not seem to be any further exploration potential to the property. The steep dip of the fracture zones with barren quartz monzonite between is a negative factor for lateral extensions of the mineralization.

MINERALIZATION

Alteration and Metallization: Subeconomic amounts of chalcopyrite and molybdenite are present with pyrite as flat-lying zones in a quartz monzonite intrusive. Mineralization is structurally controlled along three northwest-trending fracture zones, up to 300' wide and 1000' long. The sulphide mineralization occurs in small quartz veins or as coatings along fracture surfaces, forming in places a stockwork. Some dissemination of copper-molybdenum values occur within the fracture zones, but the intervening quartz monzonite is barren. Mineralization encountered in the drilling* averaged .07% Cu and .002% Mo with traces of tungsten. Mineralization at the surface is marked by sericite and limonite staining with some sulphides present.

Leached Outcrops: Sulphides occur at and close to the surface; indicating leaching was not an important factor. Geochemical rock-chip sampling indicates some lateral copper migration. However, the less mobile molybdenum produces geochemical anomalies coincident with the IP anomalies over the mineralized zones.

Enrichment: None indicated.

Associated Metal Deposits: Trace amounts of tungsten. The tungsten appears confined to quartz-sericite-pyrite veins at the eastern edge of the mineralized fracture zone. None of the areas sampled contained more than .07% WO_3.

STRUCTURE

Fissures: Northwest fracture zones

Intrusives:
Post-mineral fine-grained quartz monzonite sills
Coarse quartz monzonite
Granite-aplite-diorite complex
Pre E meladiorite

Breccia Pipes: Two mineralized breccia pipes, the Elda and the Red Top (previously drilled) were further explored by IP surveys during the project and found to offer no further exploration possibilities.**

Cover Rocks:

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.:

* Two 500' holes and one 1000' hole were drilled into the fracture zones.
** See attached appendix.

APPENDIX

PATAGONIA BRECCIA PIPES

Prior to the Superior-Callahan project, the Duval Corporation had drilled a single diamond-drill hole into the Red Top breccia pipe. Though no assays are available, it is believed that 324' of breccia with pyrite was intersected. The Superior-Callahan venture explored the pipe with an I.P. survey, using 500' dipole spacing. This work indicated that the pipe was a shallow feature with no depth extension.

The Elda breccia pipe was drilled previously to the Superior-Callahan venture by the West Range Company. This pipe is a linear feature, 800' long by 30' to 60' wide. West Range, in their single hole, intersected 160' of breccia, mineralized with 20% - 25% pyrite and carrying 0.21% Cu and 0.015% Mo. The Superior-Callahan project further explored the pipe using I.P. survey on a 250' dipole spacing. This study indicated the pipe to be very small, though continuing at depth.

Though uneconomic, both pipes offer scientific information on the breccia pipes of the Patagonia area. These two pipes each displayed (rock chip) geochemical anomalies. The Red Top pipe gave an anomaly for Cu, Mo, and Wo; while the Elda pipe produced a down-slope anomaly of Mo and Wo only. Mo and Wo behave similarly geochemically, and are less mobile than copper. The geochemical study of Mo anomalies may more clearly delineate the parameters of mineralized pipes in the Patagonia area.

However, in the Ventura breccia pipe to the north, with published reserves of 6,300,000 tons of 0.26% Cu and 0.17% Mo, the molybdenum is reported to be leached to a depth of 200' vertically below the surface. This is an unusual feature and emphasizes the point that the total geological-geochemical environment must always be carefully scrutinized before a valid interpretation of a geochemical survey can be made.

MS/bl
4-15-71

NOTE FILE ON "PORPHYRY COPPER"

Property: Owl Head Claims
District: Owl Head
Mt. Range: Owl Head Butte
County: Pinal
State: Arizona

Location: R 12 E, T 9 S Sections 1, 2, 5
and T 10 S Sections 25, 26, 36

Source of Information
- [X] Field Observations
- [ ] Publications
- [ ] Company Files
- [X] Other

Explantion: Field Examination
Also a report by C.H. Culp of Noram Mineral Association for W.R. Ewing of Arizona Western Mines, owners of the property. Report is inaccurate and promotional

Reviewed by: Melville See Date February 8, 1971

Recommended Company Interest Classification:
- [ ] Active
- [ ] Possible
- [X] None
- [ ] Scientific

Qualifying Remarks: Rejected. Geochemical sampling of the Pre-E granite over a wide area gave low copper values, clearly not anomalous. Narrow shear zones in the granite adjacent to ad prospect pits gave higher copper values, which rapidly diminished away from the fractures.

MINERALIZATION

Alteration and Metallization: Very weak copper-oxide mineralization occurs sporadically in a variety of rocks over a wide area. Secondary copper is associated with the following rocks: 1. with small quartz veinlets in pre-E granite; 2. along fractures in diorite-diabase dikes; 3. occasionally in slaty schist (phyllite); and 4. along fractures in volcanics and lining vesicles in post-mineral amygdaloidal basalt. The spotty occurrence of copper, its structural control (to [illegible]acture zones) and the lack of hydrothermal alteration and primary mineralization indicate there [illegible] little economic potential.

Leached Outcrops: None

Enrichment: None

Associated Metal Deposits: At the Old Jesse Benton mine and nearby, traces of pyrite and chalcopyrite occur with galena in small quartz veins along fault-fracture zones and at contacts with basic dikes. This mineralization is clearly hypogene. Weak Ag values occur with this mineralization. A composite sample of the mine dumps gave 15 ppm Ag (.45 oz/ton).

STRUCTURE

Fissures: NW and NS

Intrusives: Diorite and diabase dikes

Breccia Pipes: None

Cover Rocks: Alluvium with intermittent outcrops

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.: Numerous old shafts, prospect pits and trenches. Past production reported from Jesse Benton and Big Mines. Thirteen tons of Cu-Ag ore reported shipped to Inspiration Smelter in 1970.

Appendix: Sketch map of geology. Geochemical map.

NOTE FILE ON "PORPHYRY COPPER"

Location: T 4 S
R 15 E Sections 14, 15, 22, 23

Property: Velasco Claims
District: Banner
Mt. Range: Dripping Sprin
County: Gila
State: Arizona

Source of Information
- [ ] Field Observations
- [ ] Publications
- [ ] Company Files
- [ ] Other

Explantion: One-day field examination

Reviewed by: Melville See Date December 29, 1970

Recommended Company Interest Classification:
- [ ] Active
- [ ] Possible
- [ ] None
- [X] Scientific

Qualifying Remarks: The Chilito property held by Kennecott, borders the southern boundary of the Velasco claims. At Chilito, Troy quartzite with exotic copper along fractures is being open-pited for silica flux. Intrusive into the Troy quartzite is a clay-sericite, altered rock with remnant porphyry texture. Several of these altered outcrops have "live limonite" and offer an interesting drilling target for Kennecott.

MINERALIZATION

Alteration and Metallization: At the San Bernado Mine, on the Velasco claims, copper carbonates occur along fissures in the Martin limestone. There is no evidence of garnetization of the limestone and mineralization appears to be limited to the immediate vicinity of fissures, No tonnage potential is indicated. Although mineralization was reported to occur in the diabase (which occurs over much of the claim area) no alteration or mineralization was found present, other than occasional specularite blebs and < 1% pyrite.

Leached Outcrops: None

Enrichment: None

Associated Metal Deposits: Gold was reportedly found in the oxidized ore at the San Bernado Mine and its prospects.

STRUCTURE

Fissures: Some zones in the Troy quartzite and Martin limestone are fractured.

Intrusives: Diabase, monzonite porphyry

Breccia Pipes: None

Cover Rocks:

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.: Several shafts and adits at the San Bernado Mine. Production unknown. One drill hole by Bear Creek into diabase and monzonite porphyry. Log of drill hole attached.

NOTE FILE ON "PORPHYRY COPPER"

Property: cession (LORENZO con-)
District: Atil
Mt. Range
County:
State: Sonora, Mexico

Location: 35 kilometers northeast of Atil, Sonora, Mexico

Source of Information
- [ ] Field Observations
- [ ] Publications
- [ ] Company Files
- [X] Other

Explantion: Report by Robert Ford, mining geologist, November 1970

Reviewed by: Melville See Date December 23, 1970

Recommended Company Interest Classification:
- [ ] Active
- [X] Possible
- [ ] None
- [ ] Scientific

Qualifying Remarks: The Lorenzo property is owned by the Mexican wife of Ford's mining associate, Larry Chantler. This factor should be borne in mind when evaluating the report. The following facts are also important:
1. the alteration area is small, there may be potential for lateral extensions at depth.
2. the petrological evidence for pervasive sericite-potassic alteration is unconvincing.
3. no map of "live limonite" distribution is presented, casting doubt upon its abundance.

MINERALIZATION

Alteration and Metallization: An area of alteration, 3000' x 2000', is reported to have zonal character. An outer propylitic fringe surrounds a predominantly argilli area. In the center, sericitic alteration surrounds a core of potassic-silica (sanidine quartz) enrichment. Petrological evidence for the zonal character and for sanidine as a replacement mineral, seems weak. The occurrence of former Cu sulphides in the potassic core is reported by the presence of "copper oxides and relicts casts." Hypogene metallization is cited to have occurred in two stages: an earlier metasomatic stage contemporaneous with potassic alteration, followed by silification and further copper sulphide deposition.

Leached Outcrops: "Relief maroon limonite after chalcocite" is reported as present, but there is no description of its lateral extent or frequency of occurrence. Indigenous limonite after pyrite-chalcopyrite reportedly occurs in the central potassic alteration zone. Copper carbonates, precipitated by leaching of calcite veinlets, are also reported from this area.

Enrichment: Ford believes "an enriched zone of secondary copper sulphide should co exist with the first appearance of chalcopyrite." In addition to being a questionable statement, no information on the quantitative distribution of limonite after chalcocite is furnished to support this conclusion. Ford also suggests there may be an enriched copper oxide zone.

Associated Metal Deposits: None

STRUCTURE

Fissures: According to Ford, a strong west-northwest fault was the loci for the syenite porphyry intrusion. Later northeast faulting offset the west-northwes fault. Quartz veining in the syenite strikes northeast.

Intrusives: Diorite, syenite porphyry, mesozoic granite, in order of increasing age

Breccia Pipes: Intrusive breccia zones, reportedly are present in the syenite porphyry.

Cover Rocks:

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.: No known production, several prospect shafts.

NOTE FILE ON "PORPHYRY COPPER"

Property: Green Door
District: Montezuma
Location: 14 miles southeast of Montezuma, Sonora
Mt. Range: Los Reys Mts.
County:
State: Sonora, Mexico

Source of Information
- [ ] Field Observations
- [ ] Publications
- [ ] Company Files
- [x] Other

Explantion: Review of reports by:
1. Robert T. Mitcham, mining engineer, October 1, 2, 3, 1947
2. Charles Simpson, June 10, 11, 1968
3. James Glass, consulting geologist, April 1970

Reviewed by: ....Melville.See..... Date.....December 21, 1970.....

Recommended Company Interest Classification:
- [ ] Active
- [x] Possible
- [ ] None
- [ ] Scientific

Qualifying Remarks: The three reports very inadequately describe the proper Little information can be found regarding the geology, nature and extent o the mineralization. The three reports do not agree as to the type of deposit described, and the authors do not appear to be able to recognize the earmarks of a porphyry copper.

MINERALIZATION

Alteration and Metallization: The report by Mitcham describes a tactite deposit of magnetic-copper occurring along the contact of an argillaceous limestone with an intrusive diabase sill. The tactite consists of garnet and magnetite with lesser pyrite and chalcopyrite and assayed 1.1% Cu.* The tactite zone is reported as 100 feet thick and dipping 30° into the limestone mountain, conformable with the bedding. Mitcham also describes "vein or streaks" from 3 to 6 feet wide of disseminated copper mineralizati (cp. bornite) occurring in the diabase. Glass concludes that copper mineralization i associated with a limestone-granite contact, but also reports copper mineralization occurring in the granite and the limestone away from the contact.

*Number of samples unknown.

Leached Outcrops: Glass reports a gossan zone in the limestone which may be the surface expression of the tactite described. He also reports a gossan in the granite with associated copper showings nearby. No interpretation is made of the latter gossan, and there is no information to evaluate whether it represents a leached copper outcrop or not.

Enrichment: None indicated.

Associated Metal Deposits: Glass reports silver associated with the copper mineralization.

STRUCTURE

Fissures: Fracture zones are reported in the granite.

Intrusives: Diabase sill. The diabase in turn is intruded by diorite dikes.

Breccia Pipes: None

Cover Rocks: None

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.: Two mines were developed; the Green Door No. 1 and the Green Door No. 2. An estimated 500 tons of ore were mined at the Green Door No. 1. No figures are available for the Green Door No. 2.

NOTE FILE ON "PORPHYRY COPPER"

Property: Copper creek
District:
Location: R 13 E, T 10 S, Sections 14 and 15
Mt. Range Tortolita
County: Pinal
State: Arizona

Sources of Information
- [x] Field Observations
- [ ] Publications
- [ ] Company Files
- [ ] Other

Explantion:
A one-day field examination.

Reviewed by: Melville See Date December 16, 1970

Recommended Company Interest Classification:
- [ ] Active
- [ ] Possible
- [x] None
- [ ] Scientific

Qualifying Remarks: Occidental International delimited by drilling about 3½ million tons of Cu oxide rock, averaging .245% Cu, using a cut off of .15% Cu. Using a .3% cut off reserves drop to ½ million tons at .36% Cu. No evidence was found to suggest the property could have potential as a porphyry copper prospect.

MINERALIZATION

Alteration and Metallization: The host rock is monzonite. It is fresh with occasional weak kaolinization of the feldspar, and insipient chloritization of the biotite. Mineralization consists of chrysocolla coatings along fractures and as thin seams in the monzonite. Minor tenorite may occur in thin veinlets. Mineralization appears to have been sparse and controlled by fractures. No pervasive alteration.

Leached Outcrops: On the Apex No. 1 claim about three quarters of a mile north of the drilled area, a small spot of weak sericite alteration was observed in the monzonite. Limonite after pyrite was present there.

Enrichment: No chalcocite enrichment.

Associated Metal Deposits: None

STRUCTURE

Fissures: NS, NW, EW fracture directions, with NW faulting.

Intrusives: Monzonite, diorite

Breccia Pipes: None

Cover Rocks: Alluvium

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.:

No known production.

NOTE FILE ON "PORPHYRY COPPER"

Location: T 10 S and T 11 S
R 26 E
Sections 5, 6, 29, 30, 31, 32

Property: Beehive Claim
District: Graham Mts.
Mt. Range: Greasewood Mts
County: Graham
State: Arizona

Source of Information
- [X] Field Observations
- [ ] Publications
- [ ] Company Files
- [ ] Other

Explantion: A one-day field examination.

Reviewed by: Melville See Date December 11, 1970

Recommended Company Interest Classification:
- [ ] Active
- [ ] Possible
- [ ] None
- [X] Scientific

Qualifying Remarks: The property was reported by W. Soren, a mining engineer, to contain a large number of copper showings in volcanic rock. Because porphyry copper deposits may occur in andesite (Safford), it was felt that the Beehive claims could represent a legitimate porphyry copper prospect.

MINERALIZATION

Alteration and Metallization: Alteration is very spotty, and when present consists of epidotizatio and chloritization of a coarsely porphyritic volcanic rock. The volcanic may be the "Turkey Track" volcanic which is widespread over South Arizona and is considered to be post-mineral. Mineralization on the Beehive claims consists of erratic thin seams of pyrite and chalcopyrite along N and NE fractures in the volcanic. The sulphides have altered to oxidized copper products. The mineralization is weak, locally controlled, and there is no evidence of pervasive alteration or mineralization. Though of some scientific interest, the property does not have potential for a porphyry copper prospect.

Leached Outcrops: None.

Enrichment: None.

Associated Metal Deposits: None

STRUCTURE

Fissures: Joint directions: NE and NW

Intrusives: A granitic rock is present, apparently older than the volcanic. It varies from a porphyritic texture to aplite. Near contacts with the volcanic, the granite is more porphyritic. The granite is fresh and shows little or no signs of mineralization.

Breccia Pipes: None

Cover Rocks: Alluvium

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.: One small adit, but no visible signs of past production.

NOTE FILE ON "PORPHYRY COPPER"

Property: San Simon
District: Graham Mts.
Mt. Range
County: Graham
State: Arizona

Location: R 26 E
T 11 S
Sections 13, 14, 23, 24

Source of Information
- [X] Field Observations
- [ ] Publications
- [ ] Company Files
- [ ] Other

Explantion: One-day preliminary examination

Reviewed by: Melville See Date December 10, 1970

Recommended Company Interest Classification:
- [ ] Active
- [ ] Possible
- [X] None
- [ ] Scientific

Qualifying Remarks: The property was submitted as a porphyry copper prospect. Reportedly, a granite porphyry had intruded a granite diorite producing a radiate fracture pattern in the diorite. No evidence of such structure was found upon examination.

MINERALIZATION

Alteration and Metallization: No suggestion of copper mineralization. Weak hematite coatings along one small fracture zone suggest former pyrite. This fracture zone evidences mild kaolinization and chloritization of the granite. No pervasive alteration was found.

Leached Outcrops: None

Enrichment: None

Associated Metal Deposits: None

STRUCTURE

Fissures: The entire area consists of a coarse granite, probably of Pre-Cambrian age. There is a strong northwest joint orientation in the granite. Small dikes of aplite and rhyolite have intruded the granite along this northwest structural direction.

Intrusives: No evidence of any radial fracturing was found.

Breccia Pipes: Small breccia zones occur in the granite. Localized areas of volcanic breccia containing granite fragments also occur.

Cover Rocks: Alluvium

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.: None, except two shallow prospect pits.

SUMMARY REPORT OF FIELD EXAMINATION

Location: Approximately 3 miles due west of the northern end of Sierra Durazno

Property: Creston
District: Sierra Durazno
County: Sonoyta
State: Sonora, Mexico

Field Examination by: Mel See
Date: December 3, 1970

Type of Deposit: Cu vein

Qualifying Remarks: A one-hundred hectare claim (1000 meters x 1000 meters) was staked by Diego Salcido and Jose Canastillo for the copper showing which occurs along quartz veins. A half-day preliminary examination of the ground showed the veins to be of little interest. The area was also examined from the standpoint of porphyry copper potential and favorable indications were not found. Sporadic fractures areas in the granite country rock, with occasional weak copper staining along the northeast joints were found to be structurally controlled rather than pervasive.

Conclusions and Recommendations: The veins have little potential for development, due to lack of strike length and general weakness of copper mineralization. The little development work done, was along a weakly mineralized northeast fault, and was abandoned with little ore found (as indicated by the paucity of copper material found on the dump). No pervasive alteration, live limonite, or indication of porphyry intrusive was found. Small zones of weak alteration consisting of kaolin with lesser sericite, are found in the granite in areas where the NW and NE jointing are most intense. Alluvium cover makes it difficult to determine the extent of these fractured areas, but they appear to be sporadic. No further work seems warranted.

Mineralization: Minor blebs of chalcocite, enclosed in quartz gangue, occur in the Creston vein. The other veins evidence copper stain in the quartz and minor amounts of copper oxide. The joints in the granite occasionally evidence iron and copper stains along the northeast direction. Thin seams (1/8") of sulphide may occur along these joints, but they are strongly structurally controlled. The fracturing is not close-spaced enough, and apparently not extensive over large areas, to indicate a potential for disseminated mineralization.

Structure: A northeast striking rhyolite dike has intruded granite. At the granite-dike contact, quartz veins occur, striking parallel to the contact and dipping southeastward. The dike and quartz veins have been faulted by several northwest-trending faults. A stronger vein, the Creston, strikes for several hundred feet to the northwest. Post-mineral volcanics and alluvium cover much of the area. Where exposed, the granite evidences jointing along northwest and northeast directions.

Outcrops: Granite, volcanic, rhyolite

Enrichment: None

Intrusives: Rhyolite

Cover Formations: Volcanic, alluvium

Development: Two pits, one short inclined adit

Production: Unknown

Attachments: Location map
Geological sketch map

Prepared by: Melville See Date: 12-9 1970

SUMMARY REPORT OF FIELD EXAMINATION

Location: Approximately 2 miles due east of the northern end of Sierra Blanca.

Property: Oreston
District: Sierra Blanca
County: Concha
State: Concha, Mexico

Field Examination by: Hal Esa

Date: December 2, 1970

Type of Deposit: Cu vein

Qualifying Remarks: A one-hundred hectare claim (2000 meters x 1000 meters) was staked by Diego Saledo and Jose Casarella for the copper showing which occurs along quartz veins. A half-day preliminary examination of the ground showed the veins to be of little interest. The area was also examined from the standpoint of porphyry copper potential and favorable indications were not found. Sporadic fracture areas in the granite country rock, with occasional weak copper staining along the mortbered joints were found to be structurally controlled rather than metasomatic.

Conclusions and Recommendations: The veins have little potential for development, due to lack of depth length and general weakness of copper mineralization. The little development work done, was along a weakly mineralized northeast fault, and was abandoned with little ore found (as indicated by the paucity of copper material found on the dump). No pervasive alteration, like limonite, or indications of porphyry intrusive was found. Small areas of weak alteration consisting of basalt with lesser zeolite, are found in the granite in areas where the NE jointing are more intense. Alluvium cover makes it difficult to determine the extent of these fractured areas, but they appear to be extended. No further work is warranted.

Mineralization: Minor blebs of chalcocite, enclosed in quartz veins, occur in the fracture veins. The other veins evidence copper stain in the quartz and minor amounts of copper oxide. The joints in the granite occasionally evidence iron and copper staining along the mortbered direction. Thin veins (1/8") of sulphide may occur along these joints, but they are strongly structurally controlled. The fracturing is not close-spaced enough, and apperently not extensive over large areas, to indicate a potential for disseminated mineralization.

NOTE FILE ON "PORPHYRY COPPER"

Location: 5 Mi. SW of Wickenburg, E. of Vulture Ridge.

Property Farrow
District Wickenburg
See Index Map (p. .....) Mt. Range Vulture

Source of Information
- [x] Field Observations
- [ ] Publications
- [ ] Company Files
- [x] Other

Explantion: Submitted through Oakland
Examined 8/3/70, guided by Don Elkin. Geologic report and maps made by Elkin

Date 8/3/70

Recommended Company Interest Classification:
- [ ] Active
- [ ] Possible
- [x] None
- [ ] Scientific

Qualifying Remarks: May not be a porphyry Cu type. Property acquisition terms excessive. Copy of Elkin's report and maps retained in Tucson Files.

(see p.....)

MINERALIZATION (See Sketch Map A)

Alteration and Metallization: Very slight and spotty argillic alteration. Evidence of former sulphides less than 1/2%. Host rock is granite (pre-Cambrian?), highly fractured. Altered zone about 1/2 mile wide and 4 miles long. Reported Geo-chem Mo anomaly could not be verified.

Leached Outcrops: Tan transported limonite, most of which is probably caused by breakdown of ferromag. minerals, attenuated by trace of pyrite. (see p.B....)

(see p.....)

Enrichment: No evidence of enrichment.

(see p.....)

Associated Metal Deposits: Narrow copper veins, widely separated.

(see p.....)

STRUCTURE (See Sketch Map p.....)

Fissures: Fairly strong fracturing in several directions

(see p.....)

Intrusives: Post-ore andesite dikes.

(see p.....)

Breccia Pipes: None

(see p.....)

Cover Rocks: Surficial talus abundant. Post-ore andesite flow/intrusive, pyritized (volcanic phenomenon?) covers large area to the east.

(see p.....)

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.: None

cc: T. F. O'Neil
File

(see p.....)

Date 9/8/70 By John E. Kinnison
John E. Kinnison

HAWLEY & HAWLEY
ASSAYERS AND CHEMISTS, INC.
1700 W. GRANT RD. • BOX 5934 • 622-4836
TUCSON, ARIZONA 85703

BRANCHES
DOUGLAS, [illegible]NA
HAYDEN, A[illegible]A
EL PASO, TEXAS
AMARILLO, TEXAS

IDENTIFICATION	GOLD OZS	SILVER OZS	LEAD %	COPPER %	ZINC %	MO. %	IRON %
						ppm	
2026						< 2	

J. E. K.
AUG 28 1970

Rerun of TUC 344620 dated 8/18/70

REGISTERED ASSAYER CERTIFICATE NO. 6784 H. E. RICHARD Date Signed Arizona U. S. A.

CC: Kaiser Exploration & Mining Company
ADD: Attn: Mr. John Kinnison
CITY: P.O. Box 3605, College Station
DD: Tucson, Arizona
CITY:

REMARKS:
Trace Analysis
Minimum charge

ANALYSIS CERT. BY H. E. Richard

PREPARATION $
ANALYSIS $ 10.00

ACC: KAISER EXPLORATION & MINING CO.
DATE SPL. RECEIVED 8/18/70 | DATE COMPL 8/28/70 | TUC 344642 | $ 10.00

KEM Tuc
Forman Cu

HAWLEY & HAWLEY
ASSAYERS AND CHEMISTS, INC.
1700 W. GRANT RD. • BOX 5934 • 622-4836
TUCSON, ARIZONA 85703

BRANCHES
DOUGLAS, ARIZONA
HAYDEN, ARIZONA
EL PASO, TEXAS
AMARILLO, TEXAS

IDENTIFICATION	GOLD OZS	SILVER OZS	LEAD %	COPPER %	ZINC %	MO. %	IRON %
				ppm		ppm	
2026	None	None		241		< 2	
2027				343		15	
2028				131		< 2	
2029				23		< 2	
2030				111		< 2	
2031				15		< 2	
2032	None	0.03		29		< 2	

J. E. K.
~~JUN~~ AUG 25 1970

REGISTERED ASSAYER CERTIFICATE NO. 6784 H. E. RICHARD Date Signed Arizona U. S. A.

CC: Kaiser Exploration & Mining Company
ADD: Attn: J.E. Kinnison
CITY: 1200 E. Lester
DD: Tucson, Arizona 85719
CITY:

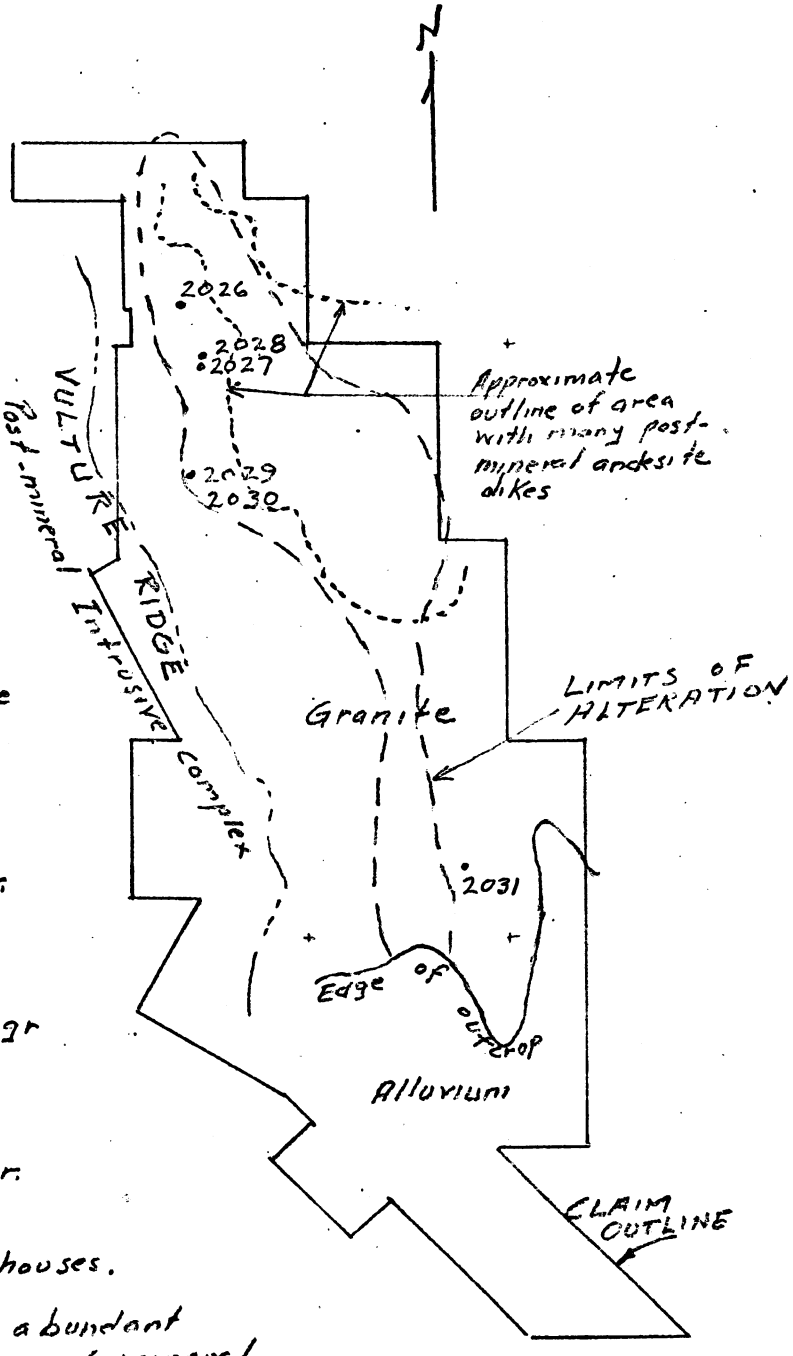
REMARKS:
Au, Ag, single determinations
Cu, Mo, trace analysis
$36.00 + 5% air pollution surcharge

ANALYSIS CERT. BY H. E. Richard

PREPARATION $ 5.95
ANALYSIS $ 37.80

ACC: KAISER EXPLORATION & MINING CO.
DATE SPL. RECEIVED 8/18/70 | DATE COMPL 8/20/70 | TUC 344620 | $ 43.75

Sample	Description
2026	Bulldozer Cut. Area of Elkin's Mo high (113 & 232 ppm) WK. Kaol. gran.
2027	WK alt. gr. in trench on strike with qtz-Cu stringers in shear zone
2028	100' N of 2027 in road cut. Kaol vy WK.
2029	Wash bank. Fresh gr. w/ shiny biotite.
2030	Adjacent to 2029. Fe-stained "crackled" gr and diabase dikes.
2031	W. side of fresh gr. h. ll.
2032.	E. of claims near houses. Red volcanics with abundant py casts. Probably post-mineral.



Modified from Elkin's map. Samples by JEK

SKETCH
FARROW PORPHYRY Cu
MARICOPA CO., ARIZ
1" = 1 mile

NOTE FILE ON "PORPHYRY COPPER"

State: Arizona
County: Yavapai
Property: (Jane Claims) Cu B
District: Silver Mountain
Mt. Range: W. slope of Brad ~~shaw mountains~~

Location: T 9 N, R 1 W
Sections 2, 3, 4, 9, 10, 11, 14, 15
5 miles South of Crown King
See Index Map (p. .....)

Source of Information:
- [ ] Field Observations
- [x] Publications
- [ ] Company Files
- [ ] Other

Explantion: Review of reports by:
Kelsey L. Boltz, October 24, 1966
Hale Togoni, December 31, 1969

Date.....

Recommended Company Interest Classification:
- [ ] Active
- [ ] Possible
- [ ] None
- [ ] Scientific

Quaiifying Remarks: A porphyry copper prospect
A preliminary mapping and drilling program was completed in 1966. In 1967, Mineral Trust Corporation entered into a lease option agreement for the property and contracted Utah Construction & Mining Co. to do geochemical and IP work and drill one hole. Several IP anomalies were reportedly found and add. quartz sericite alteration was found to the N and NW of the previously-drilled alteration area.

Reviewed by: Melville See

MINERALIZATION (See Sketch Map .....)

Alteration and Metallization: A halo of propylitic alteration and quartz-sericite alteration extends as much as 3000' out from the center of mineralization, which is characterized by silification and potassic (K feldspar) alteration. Mineralization consists chiefly of disseminated pyrite-chalcopyrite and minor amounts of molybdenite. Mineralization is structurally controlled to a shatter zone in the quartz monzonite surrounding the intrusive diorite porphyry. Some of the porphyry near the monzonite contact is also mineralized. The primary mineralization is quite consistent, with a Cu range of 0.07% to 0.3% and a Mo range of 0.01% to 0.03%. The over-all grade of mineralization excluding the single Utah construction drill hole averages 0.137% Cu and 0.017% Mo. Boltz estimates a potential of 500,000,000 tons of mineralized rock.

Leached Outcrops:

Enrichment: Boltz, in his report, notes that there is an absence of any significant superzone enrichment. However, later a single drill hole put down by Utah Construction penetrated a weakly enriched zone of 22' thickness. This zone was characterized by chalcocite coatings on chalcopyrite and pyrite. Three assays from the core gave Cu values of .4%, .56%, .16%, or an average of .37% Cu. At 51', the enrichment gave way to primary sulphide mineralization.

Associated Metal Deposits:

STRUCTURE (See Sketch Map p.....) A circular shatter zone 600' to 800' wide occurs in the quartz
Fissures: monzonite around the periphery of the diorite porphyry. The intrusion of the diorite porphyry may have caused the fracturing. The fractures later became the loci of mineralization.

Intrusives: The quartz monzonite host rock is a phase of the Bradshaw granite of possible pre-Cambrian age. The quartz monzonite was intruded by a diorite porphyry mass, numerous sill like fingers of porphyry intrude the monzonite at depth.

Breccia Pipes: A breccia zone of circular form and approximately 1/2 mile in diameter is found in the quartz monzonite at the north periphery of the diorite porphyry. Two drill holes indicated that the breccia is mineralized and is slightly higher grade than the rest of the deposit.

Cover Rocks:

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.: During 1966, seven holes were core drilled to shallow depths, the deepest being 426'. Two other shallower holes were drilled by plug-bit. In 1968, Utah construction core drilled a single 60° inclined hole to a depth of 1012' on an IP anomaly. Primary sulphide mineralization was observed throughout the hole, though weakening at depth. No assays available.

NOTE FILE ON "PORPHYRY COPPER"

Location: Mohave County, Arizona, 20 miles northeast of Duval's Ithica Peak mine

Property Mockingbird
District Weaver
Mt. Range Black Hills

See Index Map (p. .....)

Source of Information
- [ ] Field Observations
- [ ] Publications
- [ ] Company Files
- [x] Other

Explantion: Review of report and maps by K. W. Nickerson, consulting geologist, 12431 West Alameda Drive, Lakewood, Colorado 80228. Copy retained in Tucson files.

Date 11-25-70

Recommended Company Interest Classification:
- [ ] Active
- [ ] Possible
- [x] None
- [ ] Scientific

Qualifying Remarks: Does not appear to be a porphyry copper deposit, although there are scattered "showings" of Cu oxide over the claim group, owned by Silver Lamb Mining Corporation

(see p.....)

MINERALIZATION (See Sketch Map .....)

Alteration and Metallization: Veins, 1' to 2' wide, strike NW. Geo-chem soil traverses: Mo generally 2 ppm. Max. 6 ppm; Cu generally 100 ppm, but several zones contain up to 200 ppm.

Leached Outcrops: Not described. (see p.....)

Enrichment: Probably none. One sample cpy found at surface. (see p.....)

Associated Metal Deposits: Veins operated in old days for gold. (see p.....)

STRUCTURE (See Sketch Map p.....) (see p.....)

Fissures:

Intrusives: Rhyolite - latite dikes (see p.....)

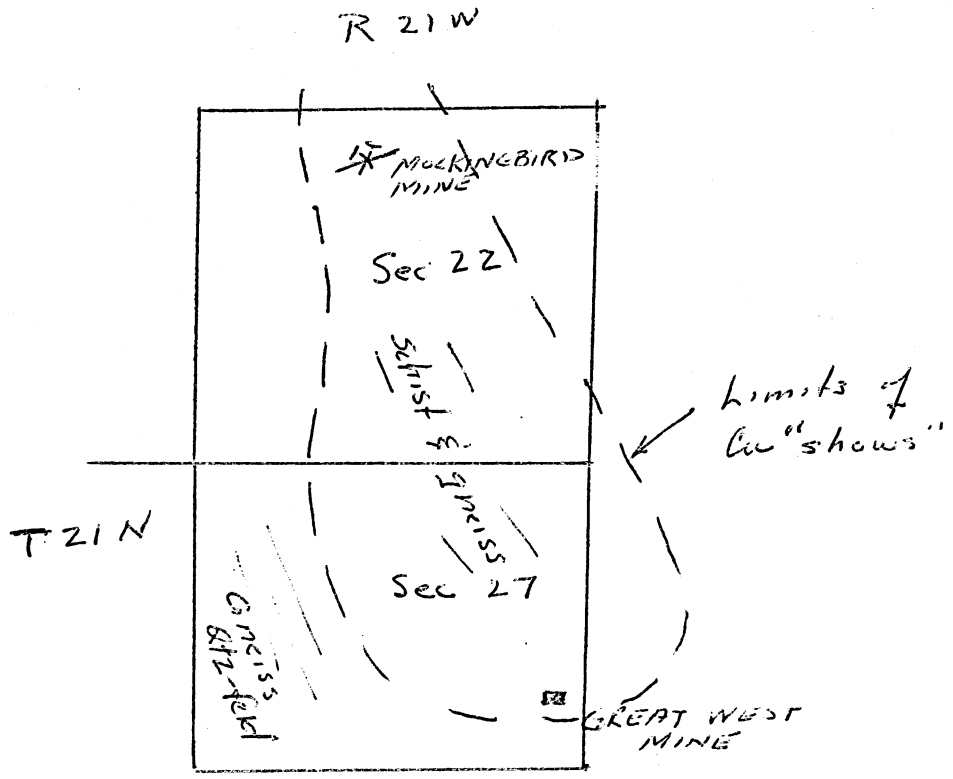
Breccia Pipes: None (see p.....)

Cover Rocks: None (see p.....)

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.: (see p.....)

Small, old workings on veins.

c.c. J.E. Kinnison Date 11-27-70 By Lee E. Kinnison (see p.....)



MOCKINGBIRD PROSPECT

SKETCH

NOT TO SCALE

From Data by Nickerson

VEK Dec 1970

SUMMARY REPORT OF DATA REVIEW

Location:	Southwest slope of Mingus mountain, western foothills of the Black Hills--See U.S.G.S. Bulletin 782 by Lindgren	Property:	Yaeger Mine
		District:	Black Hills
		County:	Yavapai
		State:	Arizona

Data Review by: John E. Kinnison
Date: November 24, 1970

Type of Deposit: Vein in pre-Cambrian granite--probably of pre-Cambrian age.
Qualifying Remarks: Submitted with a copy of Lindgren's description from his bulletin, and an engineering assay plan of the working to the 1,300 level. Lindgren does not describe the surface showing of the vein, which suggests that it is a weak outcrop. The single shoot developed by underground work appears to have been stoped out.

Conclusions and Recommendations: The ore formerly developed has been stoped out. With present day underground mining costs as high as they are, compared with the narrowness of the vein and the moderate grade encountered, the original shoot could not have been mined at a profit under today's economic conditions. From data at hand, I see no reason to think further exploration would produce anything better than that which has been found to date.

Mineralization: A low-dipping vein contains pyrite and bornite together with chalcopyrite. As shown on the assay plan, the width varies from 1 foot to 4 feet wide, and averages 2 feet or 3 feet. Lindgren reports 7 feet maximum width. The single shoot rakes east across the dip of the vein, which dips 35° southwest and strikes north 50° west.

Structure: The vein beyond the limits of the stoped areas appears to be about 1 foot to 2 feet wide. Stoping commenced at the 300 level (incline distance), where it is only a few feet long. It swells to 350 feet strike length maximum at about the 600 level and pinches to less than 100 feet from the 900 to the 1,300 level. A narrow "tail" of mineralization grading +4% copper extends beneath the 1,300 level for a short distance as shown by assays in a winze , but there is no lateral extent to this tail indicated on the drift at the 1,300 level.

Outcrops: No data.
Enrichment: Not reported
Intrusives: Host rock is pre-Cambrian Bradshaw granite.
Cover Formations: None.
Development: A shaft inclined 30° along the vein, and drifts on twelve levels.
Production: Lindgren reports 9,000,000 lbs copper--stope development does not support this quantity.

Attachments: Assay plan.

Prepared by: _____ Date: 11-24-70
John E. Kinnison

NOTE FILE ON "PORPHYRY COPPER"

Location: East of Bonita Creek between Lone Star (Kennecott) and Morenci

Property: Blue Crystal
District: Lone Star
Mt. Range: Gila
County: Graham
State: Arizona

Source of Information
- [ ] Field Observations
- [ ] Publications
- [ ] Company Files
- [X] Other

Explantion: Submitted by Clyde Peters. Geologic report by W.C. Lacy, previously drilled by Amax (2 holes) and P.D. (3 holes). Post-ore volcanic cover over entire area. Theory advanced is that weak Cu veinlets and a kaolinized-pyritized patch of volcanics could be an indication of pre-volcanic mineralization which followed the same path.

Reviewed by: John E. Kinnison Date September 1970

Recommended Company Interest Classification:
- [ ] Active
- [ ] Possible
- [ ] None
- [X] Scientific

Qualifying Remarks: JEK conclusion: weak post-ore mineralization could permeate anywhere along the Safford-Morenci zone, not necessarily over a former mineralized area. Best area had been drilled and penetrated barren monzonite. Kaolinized volcanics may well be volcanic-associated feature.

MINERALIZATION

Alteration and Metallization: Volcanics are cut by veinlets and short fissures, ¼" - 2" wide, of quartz, contain chalcocite (probably hypogene), oxidized to chrys. These are widely separated but form a distinct zone 3000' x 2000' approximately. To the south, Lacy maps a zone of kaolinization and lim/pyrite, limits undefined. This area is now incorporated in the Blue Crystal claim group.

Leached Outcrops: None of pre-ore rock. Quartz veinlets in volcanics show chrysacolla oxidizing from chalcocite.

Enrichment: None

Associated Metal Deposits: None in volcanics. Claims are in the Morenci-Safford mineral zone.

STRUCTURE

Fissures: Main feature in Bonita Creek fault, which strikes northwest and drops 2000+ feet of Gila conglomerate against volcanics on the east side.

Intrusives: Monzonite, unmineralized, penetrated in DDH BC-1 and BC-2 (located central area of claims), at about 1200 feet.

Breccia Pipes: Not known with certainty. BC-5 log "Bx w/monzonite fragments, 834-2325'." Could be volcanic assoc. diatreme of post-ore age. Volc. Bx mapped at surface near hole.

Cover Rocks: Thick section volcanics.

DEVELOPMENT, PRODUCTION, FACILITIES, ECONOMIC POSITION, ETC.:

Date: December 1, 1970 By: John E. Kinnison

SUMMARY REPORT OF FIELD EXAMINATION

Location: T 5 S, R 19 E
R 20 E

Property: Athletic Mining Co. Claims
District: Aravaipa
County: Graham
State: Arizona

Field Review of Examination by: Thomas Denton, 1947
Date: Cleland Conwell, 1964

Type of Deposit: Pb-Zn-Ag veins
Qualifying Remarks: Four diamond drill holes were spotted to intersect the Head Center vein. Intersepts of the vein were at 138', 203', and 247' with vein thicknesses (apparent) of 3.8', 5.3', and 1.8' respectively for the three holes. Hole #4 was stopped at 110' without intersecting the vein. The vein appeared to be weakening in Hole #3, 200' along strike from the drift.

Conclusions and Recommendations: The veins lack the tonnage potential to be of interest to Kaiser. Underground exploration along strike of the Head Center vein might be rewarding for a one or two-man operation.

Mineralization: Pb, Zn, Ag in veins associated with thrust fault blocks, and as replacements along contacts with intrusive igneous rocks. Some Cu mineralization present in the veins.

Structure: Paleozoic limestones and quartzites have been intruded by andesite, diabase and rhyolite porphyry. Regional compression resulted in thrust-fault zones, which were the loci for vein mineralization.

Outcrops: Limestone, andesite, diabase

Enrichment: None

Intrusives: Andesite, diabase, rhyolite porphyry

Cover Formations: Diabase may be post-mineral

Developments: Some recent trenching. Older underground workings, such as the Head Center and Iron Cap mines. Four shallow holes were drilled on the Head Center mine claim.

Production: Unknown

Attachments:

Prepared by: _____ Date: _____ 197___
Melville See

SUMMARY REPORT OF FIELD EXAMINATION

Location: T 24 S, R 29 E
Sections 15, 16, 17

Property: Ellsworth
District: Ash Spring
County: Cochise
State: Arizona

Review of Field Examination by: John Faick, PhD
Date: November 5, 1968

Type of Deposit: Contact deposits in limestone
Qualifying Remarks: There is some indication of a silver zone elongated along a NE trend. Outward from this zone, silver values, associated with the Pb mineralization, decrease rapidly. This area of higher silver values seems limited in its tonnage potential

---

Conclusions and Recommendations: The mineralization is spotty, and does not run consistently high enough in silver values to view the property as a silver prospect. Tonnage potential is limited by:

...the spotty and erratic nature of the mineralization, the lack of Pb mineralization in the intrusives, and the confinement of the mineralized zones to limestone areas at or near the intrusive contacts. Since the prospect is primarily a Pb prospect, with little Cu, it does not warrant interest.

Mineralization: Mineralization consists principally of galena and secondary lead minerals derived from the alteration of galena. Silver is intimately associated with the lead mineralization. Mineralization occurs along fractures and on bedding planes of the limestone, and forms small pods and lenses.

Structure: Limestones and clastic sediments of the Bisbee Group have been intruded by monzonite - andesite dikes and sills. The limestone shows little alteration, but is fractured in the contact areas. The intrusives evidence little or no alteration.

Outcrops: Limestone, monzonite, andesite.

Enrichment: Not indicated.

Intrusives: Monzonite and andesite dikes and sills.

Cover Formations: No

Development: Three or four shafts and workings from the early 1900's, now caved.

Production: Rumored at $75,000 during the years 1909, 1910, 1911, and 1918.

Attachments: Sketch map.

Prepared by: _____, Date: 11-3-70
Melville See

SUMMARY REPORT OF FIELD EXAMINATION

Location	Near the village of Trinidad 11 kilometers from Santa Rosa 224 km SE of Hermosillo 157 km E of Guaymas	Property: District: County: State: Country:	Dios Padre Mine Yecora Sahauripa Sonora N. W. Mexico

Field Review of Examination by: G. L. Holbrooke, October 16, 1964
Date: David Robertson, March 1965
MacKay and Schnellman, November 1966

Type of Deposit: Disseminated Pb - Ag - Cu along shear zones.

Qualifying Remarks: The deposit has some similarities to the porphyry Cu deposits of the Southwest United States. They are: the presence of a porphyry intrusive, alteration and mineralization of the porphyry, widespread shearing and fracturing of the porphyry host, and a moderately large low-grade tonnage potential. Dissimilarities are: the high ratio of Pb - Ag to Cu and the vertical zoning character of the deposit. The mineralization has not been drilled at depth, thus the total geological picture has not been developed.

Conclusions and Recommendations: The deposit must be proven as to tonnage and grade by a drilling program. The reports estimate that a tonnage potential of 6-million tons exists, based on sampling of those workings not flooded. Grade estimation (MacKay and Schnellman) of this mineralization is 5 to 15 oz. Ag/ton, .5% Cu, and 1-3% Pb. This is a guess and must be regarded as such. Mineralization continues in depth beyond the lowest level (now inaccessible) and virtually nothing is known regarding its extent or grade. MacKay and Schnellman indicate that the mineralization potential may be larger than recognized in earlier work, and could be as high as 18-million tons.

Mineralization: Mineralization is structurally controlled, parallel to the north-northwest trending major axis of a large regional anticline. Mineralization has been most intense along strongly sheared zones in the porphyry. The ore in the upper levels of the mine consisted of argentiferous galena, with lesser amounts of tetrahedrite, chalcopyrite and sphalerite. With depth, the galena diminished and mineralization was characterized by an increase in chalcopyrite-tetrahedrite with associated pyrite and arsenopyrite.

Structure: The deposit is capped by a thin basalt flow on an irregular surface of Tertiary conglomerate. The conglomerate overlies the andesite porphyry, which is the host rock for mineralization. The andesite porphyry is probably a tongue of a small granitic stock, which has intruded a series of Cretaceous sandstones, arkoses and volcanics. The porphyry intrusive was later sheared and fractured along a northwest axis, and then mineralized along breakage zones.

Outcrops: Basalt, conglomerate. andesite porphyry
Enrichment: None indicated.
Intrusives: Andesite porphyry
Cover Formations: Basalt, conglomerate
Development: Four levels with cross-cuts, comprising approximately 6000' of workings, and a main shaft - 219 feet deep. Two diamond drill holes put down by the Cananea Copper Co. in 1946-47, penetrated the deposit to a depth of 700' and it is reported they were still in mineralization when stopped. Approx. 500,000 tons of Ag ore mined prior to 1910.

See Attachments.

NOTE FILE ON "PORPHYRY COPPER"

J. E. K. Property

FEB 10 1966

Location: 33 miles N.E. of Mesa, along U.S. 87

Area: South of Sunflower
District: Roosevelt
Mt. Range: Mazatzal Mtns.
State: Arizona

Field Check by: R.H.L.

Date: February 10, 1966

Recommended Company Interest Classification:
- ☐ Active
- ☐ Inactive
- ☒ None
- ☐ Scientific

Conclusion: Red colour not indicative of alteration-mineralization.

Notes on Reconnaissance:

Mr. Kinnison requested me to check a colour anomaly, which he and Mr. Sell observed from the air while on a reconnaissance flight of the Mazatzal mercury occurrences. (See file Aa-7.13.0A of Jan. 18th, 1966) In his memo he suggested that float from a creek draining the area should be checked.

On Jan. 20th and 21th the float occurring in Rock Creek, Camp Creek, and Pine Creek (see attached map) was carefully examined and it was found that by an aerial reconnaissance check that Camp Creek is the principal drainage, while Pine Creek to the north, in part drains the colored zone by small tributaries.

The rocks of the area may be described as a medium grained, equigranular granite, carrying abundant primary pink orthoclase. This colour varies in intensity from place to place.

Assays for selected samples (Hawley and Hawley) of the area showed no copper content. The following are geochemical assays of soil samples taken from [illegible]

[illegible] (percentage cu)

Date February 10, 1966 By Robert H. Luning

EXPLORATION NOTE FILE - RECONNAISANCE

Property: Posten Butte
Area:
District: Black Water
Mt. Range:
State: Arizona

Location: N.W. of Florence, Pinal County

Field Check by: J.E. Kinnison and R.Cummings

Date 10/11/67

Recommended Company Interest Classification:

- ☐ First Order
- ☐ Second Order
- ☐ Inactive
- ☐ None
- ☒ Technical

Conclusion: New information on exploration activity at Posten Butte

J. E. K.

APR 04 1969

Notes on Recconnaissance:

On the east side of Posten Butte, about 1000' NE on the road that goes in from under the railroad track on the south, there is a new location notice, apparently one of a group. This is No Mad # 3, dated March 30, 1967, signed by Steve Karoly. On the ridge some 2000' to the North is a drill rig. Location pits have been dug. The No Mad # 3 runs easterly.

A geologist from Duval Corporation, David L. Stevens, came down to greet us. He says the property was brought to the attention by the prospector who owns the claims. Duval's activities are confined to the relatively unaltered northern outcrops where the granite shows a little copper stain. Mr. Stevens says that all of the land south of the power line running west (and north of Posten Butte, about 800 ft) has been withdrawn, amounting to a quarter of a section south of the power line, because of the historical importance of Posten Butte. We see that they had prepared drill locations next to our old No. 1 hole and also others to the north which are now apparently in the invalid area. The drill according to Stevens, is a Long Year model 44. Contractor is out of State.

Note: A few days after the visit above described, Art Blucher informed me that Quintana had tied up all the farmland south of the county road. Namely, England and McFarland farms.

☐ Map Attached

Date 3/31/69 By J.E. Kinnison

NOTE FILE ON "PORPHYRY COPPER"

Location: 3/4 miles (est.) S.E. of the Castle Dome open pit.

Property Area Castle Dome
District Miami
Mt. Range Pinal
State Ariz.

Field Check by: J.E.K.

Date 2/15/68

Recommended Company Interest Classification:
- ☐ Active
- ☐ Inactive
- ☐ None
- ☐ Scientific

Conclusion: Probable ore body within the Castle Dome altered zone, SE of the Pit.

Notes on Reconnaissance: Low, rounded hills with general red and orange color are laced with relatively recent drill roads. The area seen is, perhaps, 1000 ft. North by 1000 ft. west; the extent westerly is unknown. The drilling area ~~ends nearby~~ begins at the east edge of the altered zone, and extends ~~beyond~~ west. Dr. ll sites are 300 ft. apart (est.). Depths, as indicated by core blocks left at site, exceed 700 feet. Core chips lost at site show altered aqueous rock (porphyry?) with pyrite and chalcopyrite. The number of roads, and spacing of the sites examined, suggest the testing area thoroughly drilled out, possibly ~~penetrating~~ deeper primary Cu. The limonite in the capping is orange and brown, and does not suggest much chalcocite.

Date 2/29/68 By John E. Kinnison

NOTE FILE ON "PORPHYRY COPPER"

Location: Drill located on east side of Chase creek.

Property
Area
District Morenci
Mt. Range
State Arizona

Field Check by: JEK

Date 2/14/68

Recommended Company Interest Classification:
- ☐ Active
- ☐ Inactive
- ☐ None
- ☒ Scientific

Conclusion: Question: Why is a drill collared in Gila cgl outside the limits of the altered zone?

Notes on Reconnaissance:

A single drill was observed from the visitors viewpoint at Morenci, collared in Gila conglomerate, about ½ mile S.E. of the pre-Cambrian granite exposed in Chase creek (or about 2½ miles S.E. of the alteration limits), on a bluff of dissected Gila cgl east of Chase creek. I did not obtain a closer check from Chase creek, so the distances given is an approximate only.

Two drills are situated in the northern portion of the "King" ore zone.

Date 2/27/68 By John E. Kinnison

NOTE FILE ON "PORPHYRY COPPER"

Location: NE of old Sacramento Pit

Property Bisbee
Area
District
Mt. Range
State Arizona

Field Check by: JEK

Date 2/13/68

Recommended Company Interest Classification:
- ☐ Active
- ☐ Inactive
- ☐ None
- ☒ Scientific

Conclusion: Chalcocite ore in schist, north of the Dividend fault, will form an extension of the Lavender Pit.

Notes on Reconnaissance:

Several new benches have been cut north of the highway, the northeast end of which lies N 32° E from Sacramento Hill. The upper bench exposes highly altered schist with chalcocite on pyrite, beneath a very red capping. The upper bench is evidently to be part a new re-route segment of highway, which in part is parallel to the old one and about 600 feet north of it. One shovel was digging on the dumps which fill the old Sacramento Pit; the apparent connection with the Lavender Pit ~~extension~~ will be northeast through the remaining portion of Sacramento Hill and part of the dumps.

Date 2/27/68 By John E Kinnison