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James Doyle Sell Mining Collection

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AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

July 20, 1973

J. H. C.
AUG 14 1973
THS, RIZE

TO: W. L. Kurtz

FROM: J. D. Sell

Amole District
Tucson Mtn. Park Area
Pima County, Arizona

A Professor Ted Anderson, consultant in economics, from one of the California institutions called Norm Visnes on July 19th. The call was transferred to me and Prof. Anderson stated that he had a client who had some 3,400 acres of mineral claims. He asked if we were interested and I replied that ASARCO was always interested, but would need further information and especially geological-assay data and, of course, where the area is located.

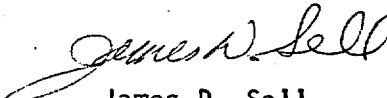
In the afternoon a Mr. Lyle R. Palant, real estate and finance, located at the Tucson House here in Tucson, called and said he was responding to Prof. Anderson's call. The area turned out to be south of Tucson Mtn. Park and west of Conoco's holdings.

After some one-way conversation, I asked if he had any new data which would help us evaluate the area and he replied that he had a map and some material and a proposal.

Attached is his material, proposal, and a Xerox copy of the claim portion of his map.

No information to help us evaluate the potential. As noted in the return letter to Palant, I have declined to participate in his offer, after reviewing this with Crist and our file information.

Last week I had lunch with Jim Cooksley and during the conversation we talked about Conoco, etc., and Jim alluded to having a client out in the area which was picking up a State Oil Lease within the Tucson Mtn. Park area and was a big dealer in the so-called "Satellite City" project. Apparently this is Mr. Palant's group. I was under the impression that Jim was or had done some geophysical work for the group. I called Jim's office, but he is on vacation so could not secure any further information.


James D. Sell

JDS:lb
Attachs.

cc: JHCourtright ✓
RBCrist

From the desk of
L. R. Palant

Mr. Sells, Chief Geologist
American Smelting and Refining
1150 North 7th
Tucson, Arizona
85703

July 19, 1973

Dear Mr. Sells,

As per our conversation of this date please
find enclosed the items we discussed. I shall
look forward to hearing from you so that we may
discuss this situation.

Yours most respectfully,



Lyle R. Palant
Phone # 622-8803

Enclosures
LRP/jm

TERMS AND CONDITIONS
FOR
SALE OF SURFACE & MINERAL INTERESTS
IMMEDIATELY SOUTH & WEST OF TUCSON MT. PARK
PIMA COUNTY, ARIZONA

- 1) SALES PRICE: \$15,000,000.00 (Fifteen Million Dollars)
- 2) DOWN PAYMENT REQUIRED: \$0.00
- 3) BALANCE PAYABLE:
 - A) \$15 million of unsecured long term notes (issued by a financially acceptable maker)
 - B) Not greater than 29% of par value (face amount) of the notes may be paid prior to July 15th, 1975; thereafter principal payments must be paid in not less than two (2) calendar years (exclusive) of 1975.
 - C) Amortization of notes: As specified by the financial institution that shall lend 90% of the face value of the notes above referenced. Lending institution to be provided by maker of the \$15,000,000.00 of notes.
 - D) Interest rate on notes: As charged by financial institution that will make the loan secured (only) by said notes.
 - E) Interest payable: Monthly

- 4) PROPERTY BEING SOLD: In Township 14 South, Range 12 East, Pima County, Arizona

SECTION 28:

65 acres-surface only (located in West $\frac{1}{2}$ of Southwest $\frac{1}{4}$)-
Continental Oil holds mineral claims.

SECTION 29:

320 acres of mineral rights (owned in fee simple)

300 acres of surface ownership

Both mineral interests and surface interests are located in
South $\frac{1}{2}$ of Section 29

SECTION 30:

Mineral rights (claims) to the entire section (except Millstone
Manor No. 6 subdivision, which contains 160 acres)

80 acres surface ownership-North $\frac{1}{2}$ of Southeast $\frac{1}{4}$ of Sec. 30.

SECTION 31:

Mineral claims to the entire section

Surface ownership:

150 acres in Southeast $\frac{1}{4}$ of Section

150 acres (minimum) in North $\frac{1}{2}$ of Section

SECTION 32:

Hydro-Carbon Lease, plus mineral claims to entire Section (except two school site locations of 30 acres, total, situate therein).

Surface-None (owned by State of Arizona)

SECTION 33:

Surface ownership:

120 acres in Northwest $\frac{1}{4}$

90 acres in South $\frac{1}{2}$ of South $\frac{1}{2}$ of Section

Mineral ownership:

None-Continental Oil claims exist thereon

SECTION 16:

Mineral ownership:

Hydro-Carbon lease and mineral claims on the entire East $\frac{1}{2}$ of said Section.

Surface ownership:

None- (owned by State of Arizona)

PROPERTY BEING SOLD: In Township 14 South, Range 11 East, Pima County, Arizona

SECTION 24:

Mineral ownership:

Claims to the entire section

Surface ownership:

640 acres

TOTAL DEEDED ACRES (MINIMUM) - which includes more than 5.5 miles of major road frontages is 1,595 acres.

TOTAL MINERAL CLAIMS OR OWNERSHIP is 3,300 acres or more.

- 5) CLOSING DATE: Immediate
- 6) TITLE INSURANCE: Paid in full by Seller
- 7) EXISTING DEBT ON PROPERTIES: \$4,000,000.00
- 8) DEBT AT TIME OF CLOSING: None
- 9) SELLERS:
 - A) Rancho Riata, Inc., an Arizona corporation
 - B) and Associates
- 10) REQUIREMENTS FOR EXPLORATION AND DEVELOPMENT OF MINERALIZATION IN SUBJECT AREA: NEGOTIABLE
- 11) ROYALTY PAYABLE FROM MINERALS EXTRACTED FROM WITHIN THE AREA: NEGOTIABLE

ASSUMPTIONS USED IN ANALYSIS
OF
"WEST TUCSON PROJECT"
(as REAL ESTATE - ONLY)

- 1) THE "PURCHASER" IS INTERESTED IN "MAKING MONEY" IN A CONSERVATIVE MANNER.
- 2) THE "PURCHASER" HAS NO RESERVATIONS IN UNDERTAKING A SOUND, THOUGH UNIQUE, BUSINESS TRANSACTION, SIMPLY BECAUSE THEY "HAVE NEVER DONE ANYTHING LIKE THAT BEFORE!"
- 3) THE "PURCHASER" WOULD NOT BE "UNHAPPY" HAVING ADDITIONAL WORKING CAPITAL ON HAND, WITHOUT DILLUTION THROUGH SALE OF ADDITIONAL CORPORATE SHARES, ETC..
- 4) THE "PURCHASER" HAS A STRONG INTEREST IN MINERALOGICAL DEVELOPMENT OF THE SUBJECT AREA. (N.B. THE "PLAN" WORKS WELL EVEN IF THE "PURCHASER" HAS NO INTEREST WHAT-SO-EVER IN MINERALIZATION!)
- 5) THE "PURCHASER" HAS A CLEAR UNDERSTANDING OF THE USES OF FINANCIAL "LEVERAGE" IN BUSINESS ACTIVITIES.
- 6) THE "PURCHASER" IS AWARE OF THE EXCEPTIONAL GROWTH OF ARIZONA AND IN PARTICULAR, TUCSON.
- 7) THE "PURCHASER" HAS NO INTEREST IN THE SUBDIVIDING OR DEVELOPMENT OF REAL ESTATE. IF SUCH AN INTEREST DOES, HOWEVER, EXIST TOGETHER WITH A KNOWLEDGE OF REAL ESTATE DEVELOPMENT, THE FINANCIAL REWARDS TO THE "PURCHASER" MULTIPLY ENORMOUSLY!
- 8) THE "PURCHASER" IS A BUSINESS ENTITY THAT MAKES MONEY AND WILL CONTINUE TO DO SO, TO A SIGNIFICANT EXTENT, FOR THE NEXT ELEVEN (11) YEARS.
- 9) THE "PURCHASER" IS SUBJECT TO ANNUAL PAYMENTS OF FEDERAL AND STATE INCOME TAXES, AT A 50% LEVEL ON EARNINGS, BEFORE TAXES, OF \$1,200,000.00 PER ANNUM (ON THE AVERAGE).
- 10) INTEREST PAYMENTS, IF PAID NOT GREATER THAN ONE YEAR IN ADVANCE, ARE PRESENTLY 100% "TAX DEDUCTABLE" AGAINST STRAIGHT INCOME (AND WILL CONTINUE TO BE SO DEDUCTABLE FOR THE NEXT 11 YEARS).
- 11) TUCSON, ARIZONA REAL ESTATE VALUES ON "CLOSE IN" VACANT, USABLE REAL PROPERTY, HAVING ALL UTILITIES WILL CONTINUE TO INCREASE AT 10% (OR MORE) PER ANNUM. (N.B. VALUE OF THIS TYPE OF PROPERTY INCREASED BY FAR MORE THAN 10% PER ANNUM OVER THE PAST 20 OR MORE YEARS.
- 12) TUCSON, ARIZONA POPULATION INCREASE (PERCENTAGE WISE) OVER THE NEXT 11 YEARS WILL BE AT LEAST 10% (1/10th) OF THE AVERAGE ANNUAL PERCENTAGE OF POPULATION INCREASE EXPERIENCED IN TUCSON OVER THE PAST 11 YEARS.
- 13) THE "PURCHASER" WILL BE ABLE TO EVALUATE THE MINERAL PRODUCTION VALUE OF THE SUBJECT PROPERTIES WITHIN THE NEXT 11 YEARS.

- 14) THE "PURCHASER" WILL SELL (WHOLESALE) THE ENTIRE PROPERTY, AS REAL ESTATE ONLY AT THE END OF THE 11th YEAR, ABSENT A DESIRE TO DEVELOPE MINERALIZATION IN THE AREA.
- 15) UNSECURED NOTES OF \$15,000,000.00 ISSUED BY "PURCHASER" WILL BE ACCEPTABLE SECURITY FOR AN INSTITUTIONAL LENDER (TO BE PROVIDED BY THE MAKER OF SAID NOTES) FOR PURPOSES OF LENDING 90% AGAINST THE "FACE AMOUNT" OF SAID NOTES. THIS 90% LOAN WOULD BE MADE TO THE "SELLERS" OR HOLDERS, IN DUE COURSE, OF SAID NOTES.
- 16) THE INTEREST RATE ON SAID \$15,000,000.00 OF NOTES WILL BE 8% PER ANNUM (PAYABLE MONTHLY).
- 17) THE INSTITUTIONAL LENDER (PROVIDED BY THE MAKER OF THE NOTES) WILL CHARGE 8% INTEREST PER ANNUM ON THE 90% LOAN TO BE MADE USING THE \$15,000,000.00 NOTES AS SOLE SECURITY.
- 18) THE NOTES WILL PROVIDE FOR NO PAYMENTS OF PRINCIPAL FOR AT LEAST THE FIRST 11 YEARS, WHICH MORATORIUM OF PRINCIPAL PAYMENTS WILL MATCH THE TERMS OF THE 90% INSTITUTIONAL LOAN TO BE SECURED BY THE REFERENCED NOTES.

FINANCIAL OUTLINE
OF
PURCHASER BEFORE CLOSING

FIXED ASSETS (AT COST)= X

LONG TERM DEBT (UNSECURED)= Y

AFTER CLOSING

FIXED ASSETS (AT COST OR
MARKET, THE LOWER THEREOF)

LONG TERM DEBT (UNSECURED)

X plus \$15,000,000.00

Y plus \$15,000,000.00

BEFORE TRANSACTION

ANNUAL TAXABLE INCOME= X

ANNUAL INCOME TAXES PAYABLE (50%
BASIS)= Y

AFTER TRANSACTION

ANNUAL TAXABLE INCOME

ANNUAL INCOME TAXES PAYABLE (50%
BASIS)

X minus \$1,200,000.00 (8%
INTEREST ON \$15,000,000.00)

Y minus \$600,000.00

LONG TERM SECURED LOANS AVAILABLE TO PURCHASER
(BASED ON 2/3 OF ASSETS, AT COST OR MARKET VALUE, THE LOWER THEREOF)

BEFORE

LONG TERM LOANS AVAILABLE (SECURED)

LONG TERM LOANS OUTSTANDING
(SECURED)

X

Y

AFTER

LONG TERM LOANS AVAILABLE (SECURED)

LONG TERM LOANS OUTSTANDING
(SECURED)

X plus \$10,000,000.00 (2/3 OF
\$15,000,000.00 ACTUAL COST)

Y plus \$10,000,000.00

CURRENT ASSETS & LIABILITIES

BEFORE

CURRENT ASSETS:

CASH ON HAND= X

CURRENT LIABILITIES:

Y

AFTER

CURRENT ASSETS:

CASH ON HAND= X plus \$10,000,000.00

CURRENT LIABILITIES:

Y

INCREASE IN WORKING CAPITAL (AFTER CLOSING) \$10,000,000.00 IN CASH (NON-TAXABLE, AS IT IS PROCEEDS OF A LOAN; THE INTEREST ON SAID LOAN BEING AN ADDITIONAL TAX DEDUCTION AGAINST STRAIGHT INCOME!)

THE ADDITION OF \$10,000,000.00 MAY BE USED FOR MINERAL EXPLORATION, PURCHASE OF PUBLICLY HELD CORPORATE SHARES (ASSUMING A DEPRESSED PRICE EXISTS), PAYMENT OF CURRENT LIABILITIES, EXPANSION OF CORPORATE FACILITIES, PURCHASE OF INTERESTS (OR CONTROL) OF SMALLER COMPANIES, CALLING OF CONVERTABLE, CALLABLE DEBENTURES OR STOCK, ETC., ETC., ETC..

R E F E R E N C E T E R M S U S E D

- 1) SOFT DOLLARS= AMOUNTS OF MONEY WHICH ARE 100% TAX DEDUCTABLE AGAINST "STRAIGHT INCOME".
- 2) HARD DOLLARS= AMOUNTS OF MONEY REMAINING AFTER THE PAYMENT OF FEDERAL AND STATE INCOME TAXES.
- 3) HARD DOLLAR COST= THE AMOUNT OF AFTER TAX DOLLARS INVESTED IN A GIVEN SITUATION.

SCHEDULE OF HARD DOLLARS INVESTED

(ASSUMING 8% INTEREST RATE ON \$15,000,000.00 OF NOTES AND A 50% TAX BRACKET OF PURCHASER)

<u>YEAR</u>	<u>TOTAL HARD DOLLARS-TO DATE</u>
FIRST	\$600,000.00
SECOND	\$1,200,000.00
THIRD	\$1,800,000.00
FOURTH	\$2,400,000.00
FIFTH	\$3,000,000.00
SIXTH	\$3,600,000.00
SEVENTH	\$4,200,000.00
EIGHT	\$4,800,000.00
NINTH	\$5,400,000.00
TENTH	\$6,000,000.00

BALANCE OF HARD DOLLARS STILL OWED AT 11th YEAR= \$15,000,000.00
(LONG TERM UNSECURED NOTES OUTSTANDING, WHICH WERE ISSUED AT TIME OF CLOSING OF THE ORGINAL PURCHASE).

AS AT THE 11th YEAR, THE "COST BASIS", IN HARD DOLLARS, FOR THE "WEST TUCSON PROJECT" (AS REAL ESTATE ONLY) WOULD BE:

AFTER TAX MONEY-INTEREST PAYMENTS=	\$6,000,000.00
UNSECURED NOTES OUTSTANDING	= <u>\$15,000,000.00</u>
TOTAL TAX BASE (COST)	= \$21,000,000.00

AVERAGE HARD DOLLARS INVESTED ("OUT OF POCKET") OVER THE 10 YEAR PERIOD EQUALS \$3,000,000.00 (\$0.00 AT TIME OF CLOSING, \$6,000,000.00 AT END OF 10th YEAR).

VALUE SCHEDULE OF WEST TUCSON PROJECT

AS

REAL ESTATE ONLY

NOTE: A 10% ANNUAL INCREASE IN LAND VALUE HAS BEEN USED.

<u>YEAR</u>	<u>VALUE INCREASE</u>	<u>VALUE AT END OF YEAR</u>
CLOSING (\$15,000,000.00)		
FIRST	\$1,500,000.00	\$16,500,000.00
SECOND	\$1,650,000.00	\$18,150,000.00
THIRD	\$1,815,000.00	\$19,965,000.00
FOURTH	\$1,996,500.00	\$21,961,500.00
FIFTH	\$2,196,150.00	\$24,157,650.00
SIXTH	\$2,415,765.00	\$26,573,415.00
SEVENTH	\$2,657,341.50	\$29,230,756.50
EIGHTH	\$2,923,075.65	\$32,153,832.15
NINTH	\$3,215,383.21	\$35,369,215.36
TENTH	\$3,536,921.53	\$38,061,136.89
ELEVENTH	\$3,890,613.68	\$42,796,750.57

VALUE COMPUTED TO ELEVENTH YEAR EQUALS	\$42,796,750.57
COST BASIS (FOR TAX PURPOSES)	- \$21,000,000.00
NET TAXABLE GAIN EQUALS	\$21,796,750.57

ASSUMING THE "PURCHASER" DOES NOT DESIRE TO UTILIZE FROM A MINERAL DEVELOPMENT STANDPOINT, AND THUSLY ELECTS TO SELL THE PROPERTY ONLY FOR ITS REAL ESTATE VALUE (DURING THE TENTH YEAR OF OWNERSHIP) AND PRIOR TO THE DUE DATE ON THE \$15,000,000.00 OF UNSECURED NOTES USED TO ACQUIRE THE PROPERTY, THE TOTAL HARD DOLLARS "OUT OF POCKET" AVERAGED OVER A TEN YEAR PERIOD WOULD BE \$3,000,000.00 AS CONTRASTED TO A NET GAIN FROM REAL ESTATE OF \$21,796,750.57! THE GAIN OF \$21,796,750.57 SHOULD OF COURSE, ALSO BE DIVIDED BY TEN YEARS IN ORDER TO ASCERTAIN THE ANNUAL AVERAGE DOLLAR GAIN ON THE AVERAGE ANNUAL HARD DOLLAR INVESTMENT. USING SUBJECT FORMULA, THE AVERAGE HARD DOLLAR INVESTMENT OVER THE SUBJECT PERIOD (TEN YEARS) WOULD BE \$3,000,000.00. THE AVERAGE ANNUAL GAIN ON THE \$3,000,000.00 INVESTMENT WOULD BE \$2,179,675.06 (BEFORE FEDERAL AND STATE TAXES).

\$3,000,000.00 PER ANNUM YEILDS \$2,179,675.06 PER ANNUM (BEFORE TAXES).

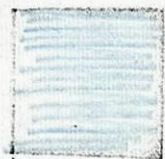
THE AVERAGE INVESTMENT RETURN TO THE "PURCHASER" (AND OF COURSE ITS STOCK-HOLDERS, IF ANY) IS THEREFORE 72.656% PER ANNUM BEFORE TAXES.

THE FOREGOING ANALYSIS OF THE "WEST TUCSON PROJECT" ASSUMES NO MINERAL-IZATION DEVELOPMENT BY "PURCHASER" AND PRESUMES NO REAL ESTATE DEVELOP-MENT BEING UNDERTAKEN BY THE "PURCHASER"!

COLOR CODE

Mineral and Surface Ownerships

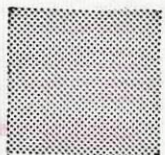
SOUTHERLY PORTION OF Tucson Mountain Park Area



CONTINENTAL OIL COMPANY (CONOCO) MINING CLAIMS
ON PRIVATE AND PUBLIC LAND (CONOCO OWNS NO
SURFACE AREA)



SIGNO VINCES, INC., AND/OR RANCHO RIATA, INC. (AND
ASSOCIATES) SURFACE OWNERSHIP AND MINERAL
CLAIMS (OR OUTRIGHT OWNERSHIP OF MINERALS)



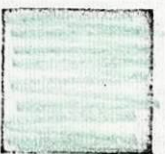
SIGNO VINCES, INC. HYDRO - CARBON LEASE, MINERAL
CLAIMS; SURFACE OWNED BY STATE OF ARIZONA



RANCHO RIATA, INC. MINERAL CLAIMS ON FEDERAL
LAND (OPEN FOR MINERAL ENTRY)



SIGNO VINCES, INC. AND/OR RANCHO RIATA, INC. (AND
ASSOCIATES) OWNS SURFACE; CONOCO HAS STAKED
MINING CLAIMS THEREON



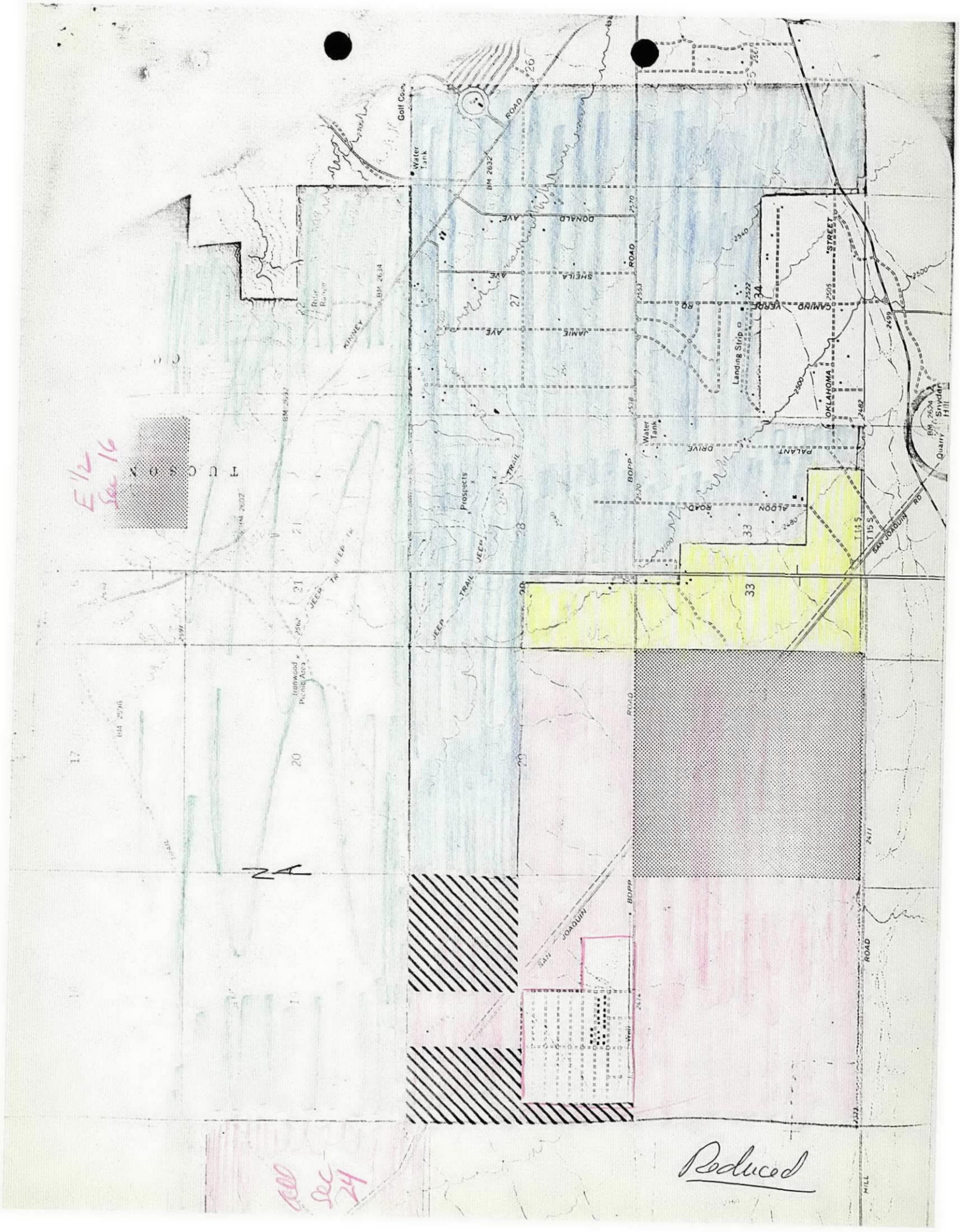
TUCSON MOUNTAIN PARK AND SAGUARO NATIONAL
MONUMENT AREA (NOT OPEN FOR MINERAL ENTRY)



AREAS OF KNOWN MINERAL PRODUCTION AND/OR
PROSPECTING

3559
10'
T. 14 S.
T. 15 S.
3558
420 000
FEET
3557
3556
3555

Reduced





AMERICAN SMELTING AND REFINING COMPANY
SOUTHWESTERN EXPLORATION DIVISION
P. O. BOX 5747, TUCSON, ARIZONA 85703

J. H. C.
AUG 14 1973

1150 NORTH 7TH AVENUE
TELEPHONE 602-792-3010

July 20, 1973

Mr. Lyle R. Palant
Suite 1421
1501 North Miracle Mile
Tucson, Arizona 85705

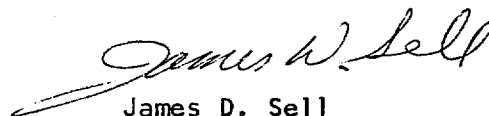
Dear Sir:

Your packet of information arrived yesterday afternoon (July 19th) and I have had the opportunity to review both your information and some which is in our office.

In light of our own information and the apparent lack of any further geophysical or geological work, which might influence any decision, our office does not wish to participate in your proposal at this time.

I am returning your packet and map of the claim holdings. Also, for your information, Mr. J. H. Courtright is Chief Geologist of ASARCO. Mr. Courtright is presently out-of-state and could not handle this personally.

Sincerely,


James D. Sell

JDS:1b
Encs.

cc: JHCourtright
WLKurtz
RBCrist

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

May 17, 1960

C. P. Pollock, Exploration Manager
American Smelting and Refining Company
125 Broadway
New York 5, New York

SOUTH ANGLE DISTRICT
Porphyry Copper Exploration

Dear Sir:

This will transmit Mr. Kinnison's geological report on the subject area. His carefully compiled map and text furnish the background for the generalizations about exploration possibilities contained in my April 25 letter to you.

The geologic map and interpretations thereof are based on original field work, mostly done by him and partly by other Company geologists. The resolution of Tertiary stratigraphy was aided in part by certain regional correlations worked out in the last few years by Mr. Courtright and me. There is considerable published information on the subject area, but without exception we have found these former publications to contain serious errors. The reasons for this appear to be a combination of incomplete field work, complex geologic relationships, and an environment of expansive alluvial cover and small isolated outcrops.

In any case we have found it necessary over the past 3 or 4 years to study and revise some of the published geological concepts of the region. In other words, we have had to concern ourselves with many problems which usually are left to the interest of the U. S. and State Geological Surveys. Kinnison's report and map represent the present state of our knowledge of the geology of the area, but inasmuch as studies are being continued intermittently some modifications may be necessary in the future.

Be intention Kinnison's report is descriptive and academic in tone. It will primarily serve as a reference for you, the geophysicists and others. For example, in future letters we would expect to refer to a formation by name without necessarily at the same time having to define its significance in terms of structure, stratigraphic position or mineralization, our assumption being that the reader could refer to Kinnison's map or report.

In your letter of May 12 to me you mention Mr. Erwin's memorandum pointing out anomaly No. 1 in Block III of our Avra Valley aeromagnetic survey. At the time I wrote the April 25 letter to you I had not reviewed

C. F. Pollock
May 17, 1960

- 2 -

that survey. Subsequently, though, Mr. Kinnison had done so in connection with preparing his report, and he takes note of this in a section on geophysical considerations. I do not find a reply by any of us to the recommendations by Mr. Erwin and Mr. Lacy that property investigation and further geophysical work should be considered. However, I do know that at that time we considered the surface indication too weak to be of interest. As explained in my letter of April 25, our present interest derives from two principal new facts: (1) Kern's drill holes on Park Hill show a marked increase in disseminated chalcopyrite below 600', and (2) Kern's drill hole No. 3 situated nearly 2 miles southwest of Park Hill encountered porphyry with minor chalcopyrite.

I believe that after you and Mr. Lacy have had opportunity to study Kinnison's report, we all will then be in a better position to discuss the applications of geophysics. Your suggestion that Mr. Lacy should come to Tucson at an early date is a good idea.

Yours very truly,

Original Signed by
K. Richard

KENTON RICHARD

Attachment- Report with Map

KR/ds

cc: DJTope - w/att

RJLacy - w/att

File Copy routed to:

TASnodden

ACHall

JRCourtright

JKinnison

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

May 18, 1960

MEMORANDUM FOR K. E. RICHARD

SOUTH AMOLE DISTRICT
Porphyry Copper Exploration

In his letter to Mr. Pollock of April 25, 1960, Mr. Richard discussed the property situation and outlined in general the plans for future procedure in the subject area. The following comments describe the principal geologic features which will influence exploration and interpretation of data gained therefrom.

SUMMARY

The Mission and Pima ore deposits, and the copper mineralization in the San Xavier Reservation occur within a broad belt of alteration which trends northwesterly toward the gravel covered pediment along the southwest flank of the Tucson Mountains. In this vicinity, the South Amole district, drilling at Park Hill by Kern County Land Co. (see attached map) disclosed significant disseminated copper mineralization in sediments adjacent to a monzonite intrusive. Their drilling also has shown that a shallow pediment extends farther west beneath gravel than previously supposed, and that weakly mineralized monzonite porphyry is there present. Disseminated copper occurs in a small monzonite plug at Saginaw Hill, 4 miles southeast of Park Hill.

These copper deposits in the South Amole district are not ore bodies, nevertheless they are significant in that they may be offshoots, or satellites, of a larger zone of disseminated mineralization concealed by alluvium on the adjacent pediment. Furthermore, our drilling on the Indian leasedid not discover a northern limit of the Mission-San Xavier alteration zone, so this important copper-bearing zone may questionably be projected into the wide alluvial covered pediment west and south of Saginaw Hill ("North Boundary area," Richard's letter to Pollock). For these reasons, parts of the South Amole district and San Xavier Reservation should be regarded as potentially ore-bearing.

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Table I	11

MINERALIZATION

The disseminated Cu mineralization known in the Pima (Mission and San Xavier) and Amole Districts is of four related types. Wide halos of altered rock surround the ore zones.

1. Pervasive dissemination and local massive sulphide replacement in tactite; viz., the Mission ore zone and Pima mine. The tactites were formed from Paleozoic limestones.

2. Dissemination in fractured clastic sediments of the Amole and Pima groups; viz., the Mission ore zone and Pima mine, the sub-commercial deposit of the San Xavier lease, and parts of the Duval mine. These deposits have the characteristics of the so-called "porphyry coppers."

3. Dissemination in porphyries. This type is not dominant in the commercial deposits of this area. Mineralized porphyry occurs at Seginaw Hill, Mission, San Xavier lease, and Duval.

4. Bedded replacement of Amole group. This type of deposit occurs in Park Hill, discovered by Kern's drilling. The thin-bedded sediments are hardened by insipient silication, but bedding is preserved. Disseminated to massive chalcopyrite, pyrite and pyrrhotite selectively mineralize along bedding structure.

Alteration associated with (1) forms large areas of garnet, diopside and actinolite. Magnetite is present in the Pima mine. Alteration associated with (2) and (3) forms quartz, sericite, and clay, and is typical in a general way of the alteration found at Silver Bell and elsewhere. Much of the alteration of the "metaporphry" at Mission is similar to feldspathization of the Ajo or Bagdad type.

PARK HILL DRILLING

Company interest in the South Amole district was stimulated when Wayne K. Wallace, chief geologist, Tucson office of Kern County Land Co., allowed me to see some of their drill cores and logs from Park Hill (letter, Richard to Pollock, 1/4/60). Subsequently, Richard and Courtright examined some of the core, and a report and drill logs by Wallace.

Kern drilled 6 holes in a joint effort with Ventures, Ltd., and a seventh hole after Ventures had dropped out. Two of these were shallow inclined holes to test specific targets, and another was a shallow vertical hole north of a major fault in the footwall block. The mineralization cut by these 3 holes is weak. The remaining four holes (Table 1), which bound an area roughly 400' x 500', are vertical and range from 1170' to 1550' in depth. All show appreciable mineralization.

The outcrop above the well mineralized ground is but weakly altered, and does not reflect the ore-grade horizon, which is below 600'. The rocks are thin bedded argillite (hornfels) and sericitized arkose. Beds dip about 45°, except in the first few hundred feet, where steeper dips are found to be truncated above a persistent 30° fault.

Kern has assayed only selected portions of core (Table 1) -- those zones in which there is visibly strong copper mineralization. The lower grade portions between these zones of high-grade received little attention from Kern geologists. Assays of the thin higher grade zones vary from about 1 to 5% Cu; 2-3% being the most common range. Certain lime-silicate argillite beds appear to be most favorable for the high-grade Cu concentrations. Pyrite and chalcopyrite replace these beds, yet preserve the bedding structure. The arkose appears to be most favorable for disseminated mineralization, but an undetermined amount of copper is also disseminated as tiny sulphide grains throughout the argillite. Silver is present in a ratio of about 1/2 oz Ag to each 1% Cu.

GEOPHYSICAL CONSIDERATIONS

The application of induced polarization, the method most directly responsive to disseminated sulphides, needs little comment. In the reconnaissance of parts of the San Xavier Reservation and southwest of Saginaw Hill, the first objective of IP surveys would be to discover whether or not the San Xavier altered zone has a northern limit, and to outline its location if it does continue. The weakly disseminated, sub-ore grade sulphide concentrations of the altered zone will be of significance if they can be detected. Since some beds of the Amole group contain very small quantities of syngenetic pyrite, a background response may have to be considered.

Magnetometer surveys would certainly pick up response from the magnetic post-ore basalts, and also from magnetic formations in the Pima group of pre-ore rocks. For examples, the Hycon aeromag. San Xavier survey for ASARCO pointed out the basalt cover with considerable success, and the Kern drilling southwest of Park Hill showed a magnetic high there to be caused by magnetic conglomerates of the Claflin Ranch or Silver Bell formation. Magnetite in the Pima mine ore zone (United Geophysical) and pyrrhotite zones at Park Hill (Kern Co.) have produced magnetic-high anomalies. The Park Hill magnetic high was also located by our Hycon survey; After a field check this area was recommended for further study by ASARCO geophysicists (Memo: Erwin to Lacy, 7/17/57; letter: Lacy to Richard 7/30/57). In contrast, a magnetic low has been found over some altered and sulphidized areas, such as San Manuel and Silver Bell. These examples are given to illustrate some of the features which would influence, and complicate, the interpretation of magnetic surveys in the Amole area.

Electromagnetic surveys need little comment here. The EM work at Mission and ensuing discussions have brought out the pertinent factors and problems. I might note, however, that southwest of Park Hill a strong EM high area (Kern Co. survey), elongated NW, may reflect a fault marking the edge of the shallow pediment; it might be that EM work could help outline the pediment, if this becomes necessary.

At Mission and San Xavier it proved possible to correlate bodies of heavy silicates (tactites) with gravity "highs" and to correlate some "structure-type" linear gravity features to contact (fault) structures. On a regional scale, high mountain blocks produce higher gravity response than deep valley blocks, and if the two are bounded by a large steep fault, the gradient between the high and low gravity intensity might so reflect.

The interpretation of response obtained over alluvium would be hampered because it is not possible to compensate for effects produced by the presently unknown bedrock topography in the South Amole area. Tactite bodies may or may not be concealed beneath alluvium on the San Xavier-Amole pediment; at least, there are no direct leads, or projections, which would so indicate. It is an open question, then, whether gravity surveys are warranted at this time.

ROCKS

The identifiable rock formations in the Pima-San Xavier-South Amole districts are numerous and varied, and it is essential to structural interpretations that they be recognized correctly. The stratigraphic column and igneous intrusives that have been resolved by Company geologists in recent years are shown on the attached map.

The geologic data that have in the past been published on the Pima District and Tucson Mountains are useful in varying degrees, but all those former works contain misleading and sometimes grossly incorrect interpretations. Two years ago I had written on the South Amole district in an unpublished thesis (University of Arizona). Parts of the geologic presentations now given are based on that work, and parts on mapping and drilling interpretations for the Company by J. H. Courtright, O. D. Evans, Byron Hardie, R. Cribbs, and myself. I consider that the information now set forth, even though brief, to be a significant advance over the geologic information which is available to other companies. Some additions and perhaps changes may incur in the future, as study of this area still continues, but I have no doubt that the salient facts as here described are correct. Where controversy exists I have attempted so to specify.

Pre-Ore Rocks

Mineral Hill granite. -- Pre-Cambrian. Coarse-grained interlocking quartz and pink or tan feldspar, with wisps of biotite-chlorite. Age open to some argument, as it hinges upon structural interpretation near Mineral Hill, and correlation by lithology to definite pre-Cambrian granite 3 miles to the southwest.

Cambrian Sediments. -- (1) Bolsa quartzite at base, about 600' thick; impure and gritty; thin, pebble-conglomerate at base. Overlain by (2) Cochise formation, 300' thick in north Tucson Mountains; not definitely known in Pima district, although a brown silty schistose quartzite, about 25-100' thick at Mineral Hill and Twin Buttes may be its equivalent. Overlain by (3) Abrigo limestone, about 350' thick; banded, gnarly limestone and siltstone.

Carboniferous and Devonian limestone. -- (1) Devonian Martin limestone, about 350' thick; thin- to medium-bedded limestone and dolomite; brown and gray, weathers to buff and pink tones; thin coral reef in upper half. Overlain by (2) Mississippian Escabrosa limestone, about 600' thick; thick-bedded pure, gray limestone; under slightest metamorphism forms massive, white, coarse-grained marble. Overlain by (3) Pennsylvanian Horquilla limestone, thickness

plus or minus 1000', not accurately known; thin bed of red siltstone and chert-pebble conglomerate at base; lower portions limestone, some dolomite, few thin shale partings; upper portions more clastic with much sandstone and shale.

Permian limestone. -- (1) Bary formation -- in part equivalent to Bryant's Andrada formation -- overlies Horquilla limestone with gradational contact; Pennsylvanian-Permian boundary within lower part of unit; limestone, shale, sandstone, some red beds and gypsiferous units; thickness not established, probably between 300-800'. Overlain by (2) Scherrer formation; pure, fine-grained white quartzites, above and below a gray fine-grained dolomite with characteristic calcite nodules (1/8" to 1/2"); lower quartzite 300' (?), dolomite 150-300', upper quartzite 50-150'. Overlain by (3) Concha limestone, 800' plus thick; dark gray to black cherty limestone; generalized sequence is: 25' thin-bedded limestone at base, followed by 50' very cherty limestone, followed by 75' massive black limestone, followed by variable sequence of thin- to thick-bedded limestone and dolomite.

Amole group. -- Lower and Upper Cretaceous, upper parts may be earliest Tertiary. Thickness not accurately known, but probably exceeds 4000'. Limestone conglomerate up to 50' thick at base -- usually thinner. Amole group above this consists of a monotonous sequence of thin- to medium-bedded arkose and siltstone, shaly units, and occasionally a thin silty limestone bed. Tan to gray in weathered outcrop, with a few black shales and limestones. Unweathered silty sequences are dark to light gray, weakly calcareous, and contain traces of syngenetic pyrite and carbonaceous material. Near Saginaw Hill I have mapped four formations, but their correlations north and south of this area are uncertain. These are:

1. Braun formation, estimated thickness 1000' plus, overlies limestone conglomerate deposited on Permian Concha(?) limestone. Tan and gray (outcrop) siltstone and silty arkose, few thin limestones, generally thin-bedded or shaly.
2. Dead Cow formation, 2000' thick more or less. Interpreted to overlie Braun formation. Coarse-grained white or gray arkose, pebbly lenses common. Interbedded siltstones about 30% of section -- in outcrop these are generally covered. Lower Cretaceous fossils in middle. Unconformity near top, but lithology same above and below.
3. Mouse House formation, thickness uncertain, may be several hundred feet. Interpreted to overlie Dead Cow formation. Black and tan carbonaceous shales and shaly limestone. Contains Upper Cretaceous fossils (possibly Tertiary).
4. Echo Valley formation. Thickness unknown, may exceed 1000'. Similar to Mouse House formation, except that it contains fewer limestone beds. Also similar to Braun formation. May prove not to be feasible to separate this unit from underlying Mouse House formation.

Pima group. -- A new name, used for those rocks presumed to be of Lower Tertiary age, which lie between the Amole group and the Cat Mountain rhyolite. We presently divide this group into:

1. Silver Bell formation. Massive andesite-porphyry breccia. Courtwright has found this unit to be very widespread -- from Silver Bell as far east as the Little Hatchet Mountains, New Mexico. The thickness varies from zero to 1000' more or less in the Amole-Pima area. Commonly it is strongly magnetic, but this is a variable feature. May be dominantly of flow-breccia or volcanic mud-flow origin, but water washed conglomerates are interbedded.
2. Claflin Ranch formation. -- Composed of conglomerate, arkose, and siltstone, possibly with a considerable amount of pyroclastic constituents. The conglomerates, except where metamorphosed, are moderately soft and pebbles and boulders weather out. The siltstone and arkose are similar to those of the Amole group. Andesitic debris is characteristic. Colors are gray to olive. Andesite pebbles may cause the formation to be locally magnetic. Red beds have been noted in what may be Claflin Ranch, west of the Tucson Mountains on the Papago Reservation; mapping in the Tucson Mountains at present includes the Recreation redbeds (formerly called Cretaceous) and some red conglomerates on "Piedmontite Hill" within this formation.
3. Tucson Mountain chaos. Known definitely only in Tucson Mountains, where it forms tabular layer below Cat Mountain rhyolite, and unconformably above the Amole group. Thickness varies from zero to 400'. Consists of unsorted rubble and huge "house-sized" blocks of all older rocks, formed by landslide action. May be younger than Silver Bell and Claflin formations, or partly equivalent.
4. Papago formation. Massive argillite which overlies the Paleozoic rocks in the Mission ore zone.
5. Kino formation. Conglomerate and argillite below "bottom thrust" in Mission Ore zone. May overlie Papago formation. Both Papago and Kino formations believed roughly equivalent to Claflin Ranch formation.

The relative ages of the above members of the Pima group are subject to further study. In general, the Claflin Ranch formation appears to vary tremendously in thickness and usually it lies beneath the Silver Bell formation. In particular localities it appears that Claflin-type beds overlie as well as underlie Silver Bell-type andesite. The similarity between certain features of the Tucson Mountain chaos and the Claflin Ranch suggests correlation, but inasmuch as the "chaos" contains fragments of Silver Bell and Claflin types, it may be in part or entirely younger.

Cat Mountain rhyolite. -- Lower Tertiary. A sequence of rhyolitic welded tuff-agglomerates. Thickness varies from zero to 800' plus.

Anklam formation. -- Lower Tertiary. Overlies Cat Mountain rhyolite with apparent conformity. Maximum thickness plus 500'. A new name to replace term "Safford tuff" as applied to these beds. Consists of tuffaceous lake beds of silt and arkose, poorly indurated.

Ivy May andesite. -- Replaces term "diopside andesite". Brown porphyritic andesite which intrudes Anklam formation as sills. May locally be a flow on Anklam beds.

Sierrita granite. -- This term has previously been defined in varying manners; some speculation still exists concerning the coarse-grained variety. Divisible into:

- A. Twin Buttes phase. Gray medium-grained, even-textured quartz monzonite or granite, with thick euhedral books of biotite. Intrudes Paleozoic, Cretaceous, and Tertiary(?) rocks. Forms the principal mass of Sierrita granite outcrop.
- B. Coarse-grained phase. Similar to A. but contains large orthoclase crystals. Texture more uneven. Biotite more altered. Contacts with Twin Buttes phase obscure. Forms footwall of "Basement fault" below Mission ore zone. Crops out west of Mineral Hill. This phase might originally have been pre-Cambrian granite, now partially melted or digested, but in any case it is indeed a part of the Sierrita granite mass.

Spherulitic rhyolite. -- Light colored siliceous rhyolites which intrude zone of Tucson Mountain chaos and cut lower part of Cat Mountain rhyolite.

Biotite rhyolite. -- Tan rhyolite, packed with foreign inclusions. Biotite laths numerous. Intrudes Ivy May andesite and Anklam formation. Dominantly pipe-like intrusive but also may form flow layer on San Xavier Reservation. Has characteristic textures -- both megascopic and microscopic -- which appear in all areas where it has been mapped.

Short's Ranch andesite. -- Light gray acid andesite porphyry. Intrusive near Saginaw Hill; may be flow elsewhere. Younger than Anklam formation.

Intrusive porphyries. -- Monzonite and quartz monzonite porphyry occur as small stocks and dikes. Includes "meta-porphyry" of Mission ore zone. These appear to be the youngest of the pre-ore intrusives.

Post-Ore Rocks

San Xavier formation. -- Middle Tertiary, possibly equivalent to Lower Miocene Minetta formation. Variable in thickness. Conglomerate and silty sandstone is overlain by flow of basalt porphyry with strikingly large feldspar phenocrysts, in turn overlain by conglomerate and silty sandstone. Lower conglomerate generally reddish in color. Upper conglomerate generally brown, with fragments of basalt porphyry. Rarely, large tabular blocks of shattered rock are interbedded with the conglomerates, and are probably landslide slabs.

Black Mountain basalt. -- Middle Tertiary. Black vesicular aphanitic basalt flows. Generally forms "tableland" topography.

"Older conglomerate". -- Well indurated conglomerate overlying Black Mountain basalt on the covered pediment of San Xavier Reservation.

Valley gravels. -- Generally unconsolidated gravels and sand of the present mountain-erosion cycle.

Intrusive andesite. -- Various andesitic and basaltic intrusives of small size. Some are post-Black Mountain basalt; some mapped in this category may be pre-ore.

EROSION SURFACES

Surfaces of erosion are important to structural analysis, inasmuch as they represent periods when older rocks were locally removed, and they frequently mark the end of an episode of structural disturbance. In this area, especially, some unconformities have been misinterpreted by other geologists to be fault structures. The several such surfaces which we have recognized here to be of particular importance are as follows:

1. Pre-Cambrian. The great unconformity between older pre-Cambrian and Paleozoic needs no comment.

2. Erosion between Permian and Cretaceous is seen here to have channeled only slightly into the Paleozoic rocks. The bedding of the two rock sequences is conformable. In some specific localities in southern Arizona this surface is one of considerable relief, erosion having cut into the pre-Cambrian. This condition, although not known or suspected, might exist in the San Xavier-Amole area.

3. At the end of the Cretaceous period, or in the earliest of Tertiary time, "Laramide" forces were initiated. The Paleozoic-Cretaceous sedimentary basin was destroyed, and epeiric seas were pushed out -- never to return. Sediments were intensely folded and locally, as at the Silver Bell mine area, may have been intruded by acid igneous bodies. These rocks were leveled to a surface of low relief called the "Tucson surface".

4. The Pima group was deposited on the Tucson surface. There may be intervals of erosion within the group, but these are not yet well known. Igneous intrusion may or may not have accompanied the close of this period.

5. In the Roskrige Mountains 20 miles west of the Tucson Mountains, the Pima group lies in large angular unconformity below the Cat Mountain rhyolite. Conglomerate and sandstone 10' thick mark the contact. At Silver Bell this unconformity is demonstrated by a thin conglomerate of the contact. This surface of erosion is referred to as the "Papagueria surface". Where exposed in the Tucson Mountains it is not apparent as a major erosional surface.

6. After deposition of the Cat Mountain rhyolite and Anklam formations, and intrusion by igneous bodies, these rocks were altered, mineralized, faulted and tilted, and subsequently exposed to erosion. The surface produced was probably in part mountainous. This first post-ore erosion surface is named the "San Xavier surface". The San Xavier formation overlying it contains fragments of altered rock.

7. Erosion of parts of the San Xavier formation preceded the Black Mountain basalt. The beds below the basalt are in angular unconformity on a regional scale. Locally, sharp monoclinal folds cause steep unconformity.

8. The "older conglomerate" lies on an erosion surface of basalt; the extent of this erosion is not now known.

9. The present bedrock surface reflects the last phase of Basin-Range mountain structure, but now has been eroded to form the widespread pediments of the Pima-San Xavier-Amole region.

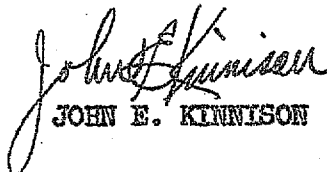
STRUCTURE

As may be seen on the attached geologic map, the structural pattern is complex throughout, but three major "structure blocks" are dominant.

1. The Mission ore zone and San Xavier alteration belt south of Black Mountain form the hanging wall plate of a post-ore low-angle fault, district-wide in its extent, which has moved mineralized rocks and Tertiary post-ore formations over Sierrita granite. This "Basement fault" has been referred to as a thrust fault; contrary to this conventional interpretation, our present belief is that it may have been formed by a free-sliding gravity block of huge dimensions. The position of the Basement fault north of the Reservation is unknown. Unless it is so great a feature as to involve the whole of the Tucson Mountains, it must emerge to the bedrock sub-outcrop somewhere in the "North Boundary" area. The internal structure of the upper plate is complex. Clues which will eventually point out the location of the faulted lower segment of the Mission ore zone are presently being sought.

2. The footwall block is composed of Sierrita granite in the Pima district. Near the Duval mine, ten miles south of Mission, the footwall block contains mineralized sediments and other rocks.

3. The Tucson Mountain block is probably formed, in part at least, by steep Range-front faults buried under alluvium some miles distant from bedrock outcrops. Certain pronounced fissures in alluvium near and northwest of Black Mountain may reflect steep bedrock structures which separate the Tucson Mountain block from the Reservation area.


JOHN E. KINNISON

Attachments
JEK/ds

TABLE IPark Hill Drill Hole Assays

No Assays: DDH's 1, 2, and 6

No Log : DDH 7 (1500' TD - penetrated some ore intercepts)

DDH 3

<u>Footage</u>	<u>Run</u>	<u>% Cu</u>	<u>Oz. Ag</u>	
636.0 - 641.0	5	.13	.2	
641.0 - 646.0	5	.71	.4	
646.0 - 651.0	5	.92	.4	
651.0 - 652.0	1	.38	.2	20'
652.0 - 656.0	4	.75	.2	<u>.61%</u> Cu
656.0 - 659.0	4	3.96	1.0	.3 oz Ag
704.5 - 709.5	5	.13	.2	
709.5 - 713.0	3.5	3.95	.7	6.5'
713.0 - 716.0	3	.61	.4	<u>2.41</u> Cu
722.0 - 727.0	5	.41	.3	.55 Ag
727.0 - 729.0	2	.47	.3	
				7'
				<u>.42</u> Cu
				.3 Ag
765.0 - 769.0	4	2.85	.3	
871.0 - 876.0	5	.18		
876.0 - 881.0	5	.33		
881.0 - 886.0	5	.56		
886.0 - 891.0	5	.44		60'
891.0 - 896.0	5	.24		<u>.27</u> Cu
896.0 - 901.0	5	.18		All
901.0 - 906.0	5	.21		Arkose
906.0 - 911.0	5	.18		
911.0 - 916.0	5	.18		
916.0 - 921.0	5	.15		
921.0 - 926.0	5	.23		
926.0 - 931.0	5	.31		
931.0 - 936.0	5	.33		
1292.0 - 1293.5	1.5	1.88	.4	

1550 TD

0 - 445' Arkose, siltstone, some ls.

445 - 1550' Br, dip 30°, at start. Diss Cu in Ark. below.
 Arg. and ark., some limy(?) beds. Spotty strong
 replacements and diss Cu to bottom.

TABLE I - Continued

<u>DDH 4</u>			
<u>Footage</u>	<u>Run</u>	<u>% Cu</u>	<u>Oz. Ag</u>
733.0 - 736.0	3	.09	.7
736.0 - 739.0	3	1.97	1.3
739.0 - 740.0	1	.45	.1
.....			
835.0 - 837.0	2	.11	.8
837.0 - 838.0	1	2.06	1.2
838.0 - 839.0	1	.36	.5
839.0 - 842.0	3	5.54	2.2
842.0 - 844.0	2	.30	.4
.....			
1088.0- 1089.5	1.5	.45	.5
1089.5- 1090.5	1.0	.31	.2
1090.5- 1092.5	2.0	.71	.3
1092.5- 1095.0	2.5	.88	.4
.....			
1170 TD			

Ark and arg. Steep dips, flatten toward 220'.
 Ex, 30°, at 220' -- below beds dip 40-50°. Diss
 Cu logged from 220 down, increasing in strength.
 Bottom 50' weak.

<u>DDH 5</u>					
<u>Footage</u>	<u>Run</u>	<u>% Cu</u>	<u>Oz. Ag</u>		
683.5 - 687.0	3.5	1.18	.6		
688.0 - 692.0	4	1.15	.5		
696.0 - 698.0	2	1.15	.5	6'	
698.0 - 700.0	2	3.95	1.6	2.61	Cu
700.0 - 702.0	2	2.73	.9	1.0	Ag
710.5 - 712.0	1.5	4.45	1.4		
763.5 - 770.5	2	1.16	.3	4.5'	
770.5 - 771.5	1	4.57	1.1	1.88	Cu
771.5 - 773.0	1.5	1.05	.3	.5	Ag
839.0 - 843.0	4	3.02	.9		
1178.5 TD					

0 - 300 Log diss Cu.
 - 540 Mostly barren.
 - 1150 Diss Cu and some strong replacement.
 - 1178.5 Barren.

AME AM SMELTING AND REFINING COMPA.
Tucson Arizona

January 4, 1960

Mr. C. P. Pollock, Exploration Manager
American Smelting and Refining Company
120 Broadway
New York 5, New York

AMORE DISTRICT
Southern Tucson Mountains
Pima County, Arizona

Dear Sir:

Enclosed is copy of memorandum and sketch map by Mr. Kinnison in which he describes some data which was recently shown to him regarding exploration activities in the southern Tucson Mountains. This material is of interest to us for several reasons, and I am sending it along to you, with copy to Mr. Lacy, because it has a bearing on Induced Polarization surveys which we have in mind.

Kern County Land Co. has obtained surprisingly good copper sulphide values in drill holes in a small, weak-looking alteration zone (marked (1) on Kinnison's map) which is covered by alluvium on the south and west. This suggests that the mineralized zone we have in our ground on the San Xavier Reservation may have some general continuity north-northwestwardly beneath gravel cover into the area of Kinnison's map. (For your orientation the northwest corner of the property on the Reservation which we have retained, and which includes the mineralized outcrops you inspected with us on your recent visit here, is about 1/4 miles south of the Reservation north boundary line shown near the bottom of Kinnison's map.)

We had planned Induced Polarization surveys in this area along the Reservation north boundary sometime this winter, as we talked about briefly when you were here. This work would be done with the idea of trying to trace the possible north or northwestward continuation of the Reservation alteration zone. The information Kinnison has obtained improves the picture here and makes this area more interesting for IP surveys. There is no pressure to do the work right now, and I will report more fully on the matter of IP surveys before the surveys are to be made, but possibly Mr. Lacy can keep it in mind for such time as Mr. Sargent returns from South America.

We had not heretofore been aware that Bear Creek's claims extended so far south. This is unfortunate, but we will further investigate the question of the validity of the claims.

In an effort to get copies of the Kern County Land Co. drilling results, or at least to get a closer look at their data, I will approach Wallace with the idea that this Company might be interested in their property.

Yours very truly,

Original Signed by
R. Richard

ROBERTON RICHARD

Attachment

RS/ds

cc: RLacy - w/att.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

December 17, 1959

CONFIDENTIAL

MEMORANDUM FOR K. E. RICHARD

AMOLE DISTRICT

On 11/20/59 I talked with Wayne K. Wallace, who is in charge of field exploration in Arizona for Kern County Land Company, about their drilling in the Sedimentary Hills (called Park Hill by Kern) of the Tucson Mountains. He showed me several maps and cross sections, assays, and drill cores. The accompanying sketch map is drawn from memory of these data.

Their drilling to date includes:

1. About 5 holes, in the belt of alteration (as mapped by Wallace) marked (1), which range from about 500 to 1500 feet deep. The ore occurs principally as banded chalcopyrite in limy siltstone beds. Certain limy beds, which are correlatable between drill holes, contain up to 5% Cu as disseminated and banded chalcopyrite in two- to six-foot thick beds. Some intervals average 0.4 to 1% Cu over distances up to 100 feet. Barren zones of argillite separate the mineralized beds. The bedding strikes NW and dips about 40° SW. It is evident that even if this zone is not a commercial deposit, it contains a significantly large quantity of copper. The drilling data has been compiled by Wallace into composite logs, and is well shown graphically on cross sections.

2. About a mile NW of Snyder Hill (2 on the map) a quartz monzonite porphyry was drilled, below 130 feet of gravel. Arkose, redbeds and conglomerate were also cored. The porphyry is not altered in the usual sense, although the feldspars are weakly kaolinized, and there may have been some recrystallization. Narrow blebs of chalcopyrite and veins of pyrite-chalcopyrite occur in the porphyry. No assays were made by Kern, but I estimate that this rock might contain .05 to .1% Cu. The arkose is weakly altered and shows limonite derived from pyrite. The conglomerate is composed of rounded andesite-pebbles and interbedded arkose, and may be the Silver Bell formation. It also contains traces of copper sulphide. Permian limestone is in fault contact (30° gauge, 20' no core) overlying Silver Bell(?) in one hole.

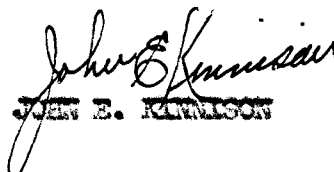
The target of this drilling was a magnetic high, caused by the Silver Bell(?) formation which is highly magnetic in the core. These claims have been abandoned by Kern.

December 17, 1959

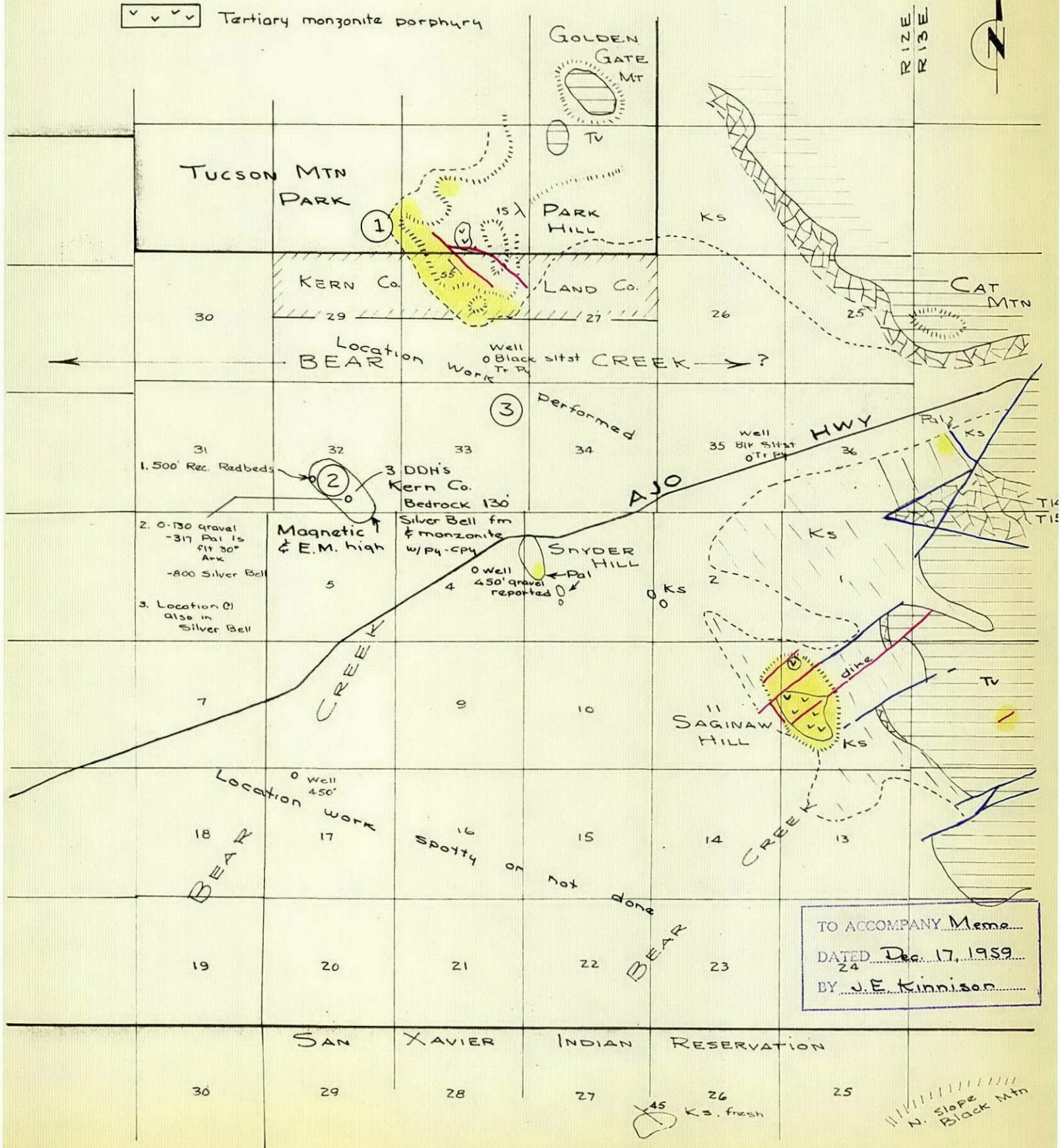
According to Wallace, Bear Creek Mining Co. has staked about 400 claims south, east, and west of Kern. During November they drilled two DDH's, just south of Kern claims (3 on the map) to 250 and 350 feet. A brief reconnaissance west of Saginaw Hill indicates that Bear Creek has staked a large area extending south to the San Xavier Indian Reservation, under the name of Richard Nielson, but that little if any location work has been done.

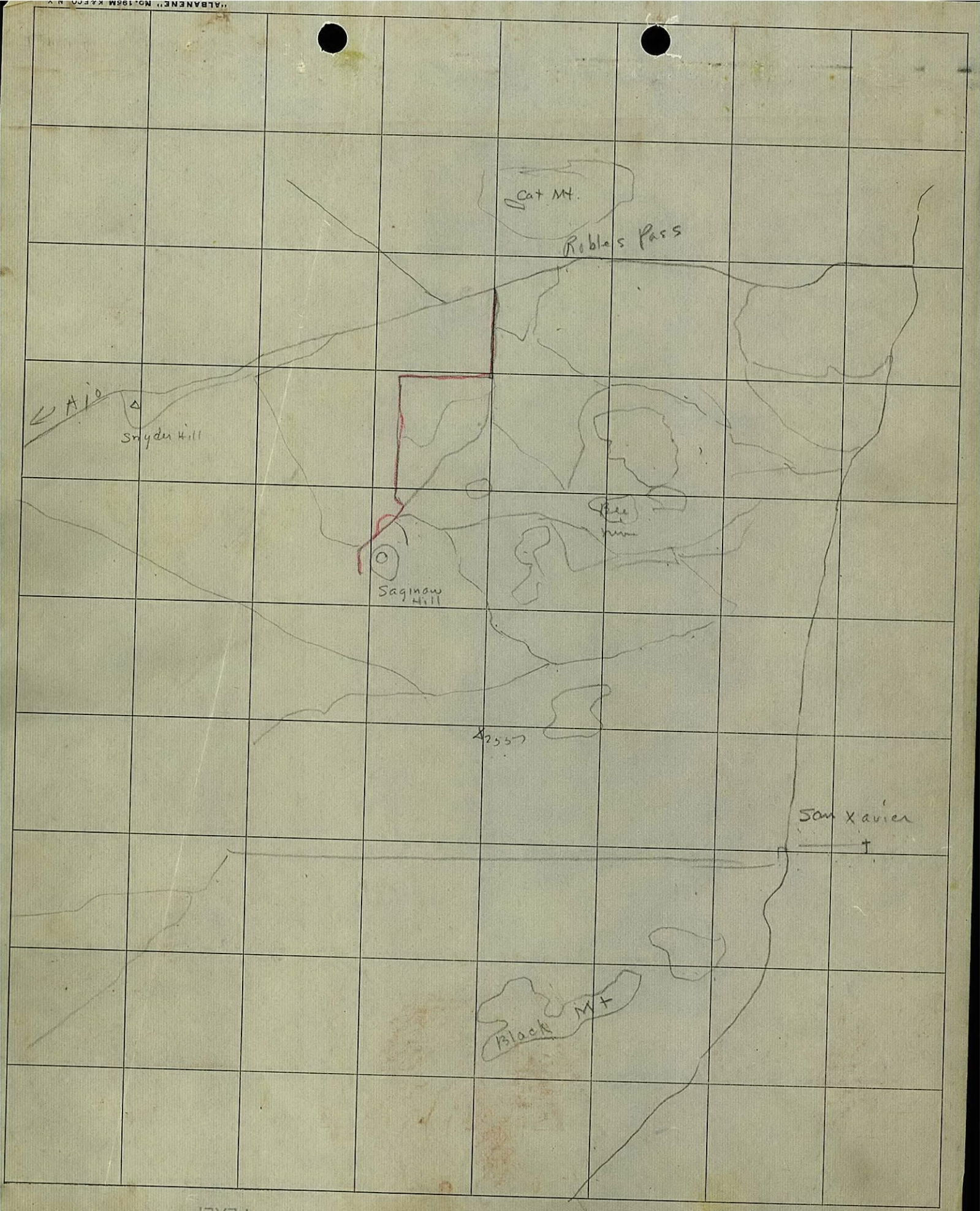
Wallace stated that Kern had proposed to Anaconda that drilling on their land be undertaken in a joint effort; this proposal was not accepted. He also intimated that a joint venture or a direct sale would be open to consideration with other companies.

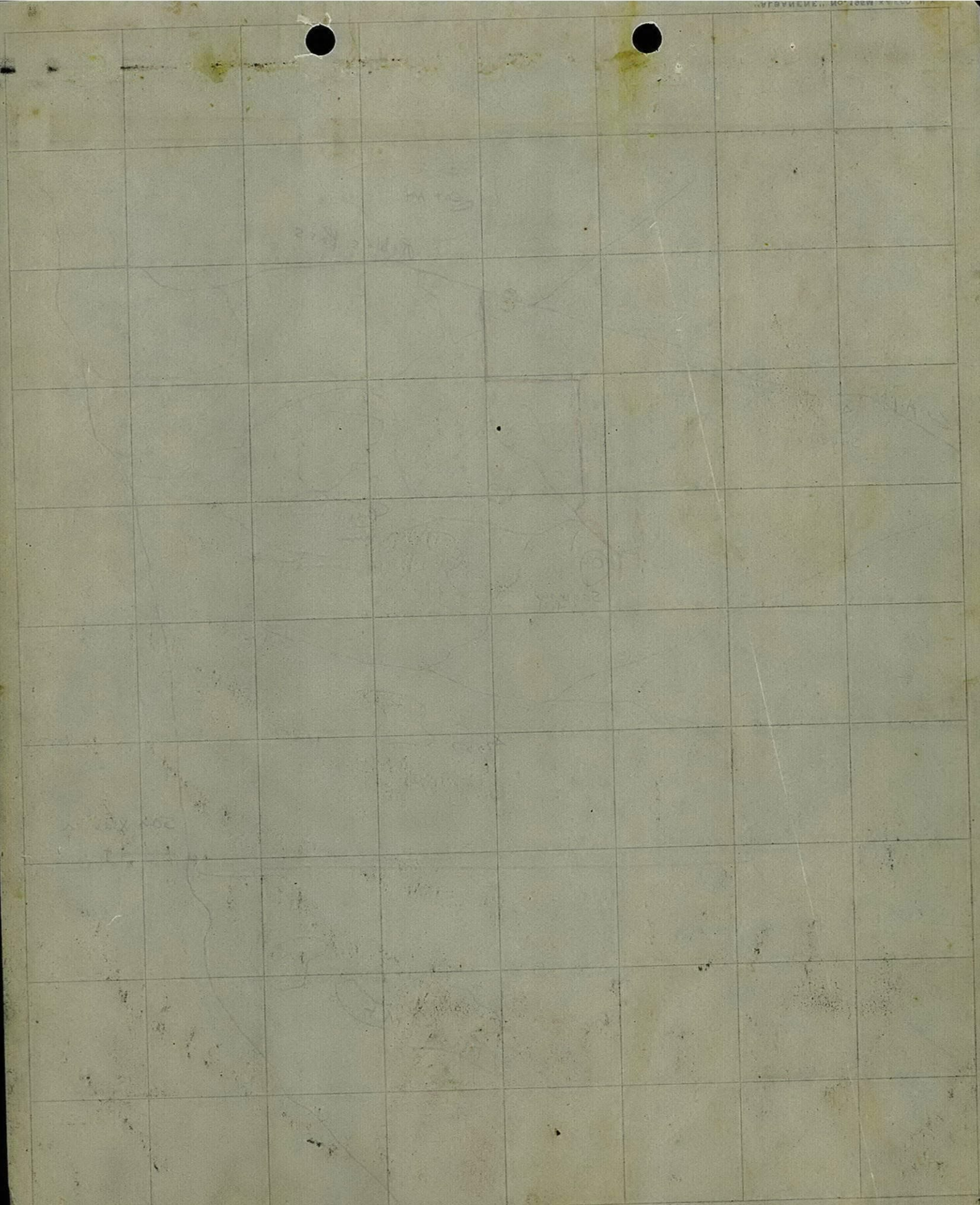
Kern's exploration has established that considerable copper exists in the sediments of Park Hill, and that altered rocks and porphyry exist under a shallow pediment some distance SW of the nearest outcrops. Coupled with the known weak alteration and porphyry at Saginaw Hill, these data suggest this general area may now be regarded more favorably than in the past as a possible exploration lead. The data Kern has obtained would be useful in evaluating exploration possibilities in the area west of Black Mountain on the San Xavier Reservation, as well as a possible extension NW from that area into the Saginaw Hill vicinity.


JOHN E. RICHARDSON

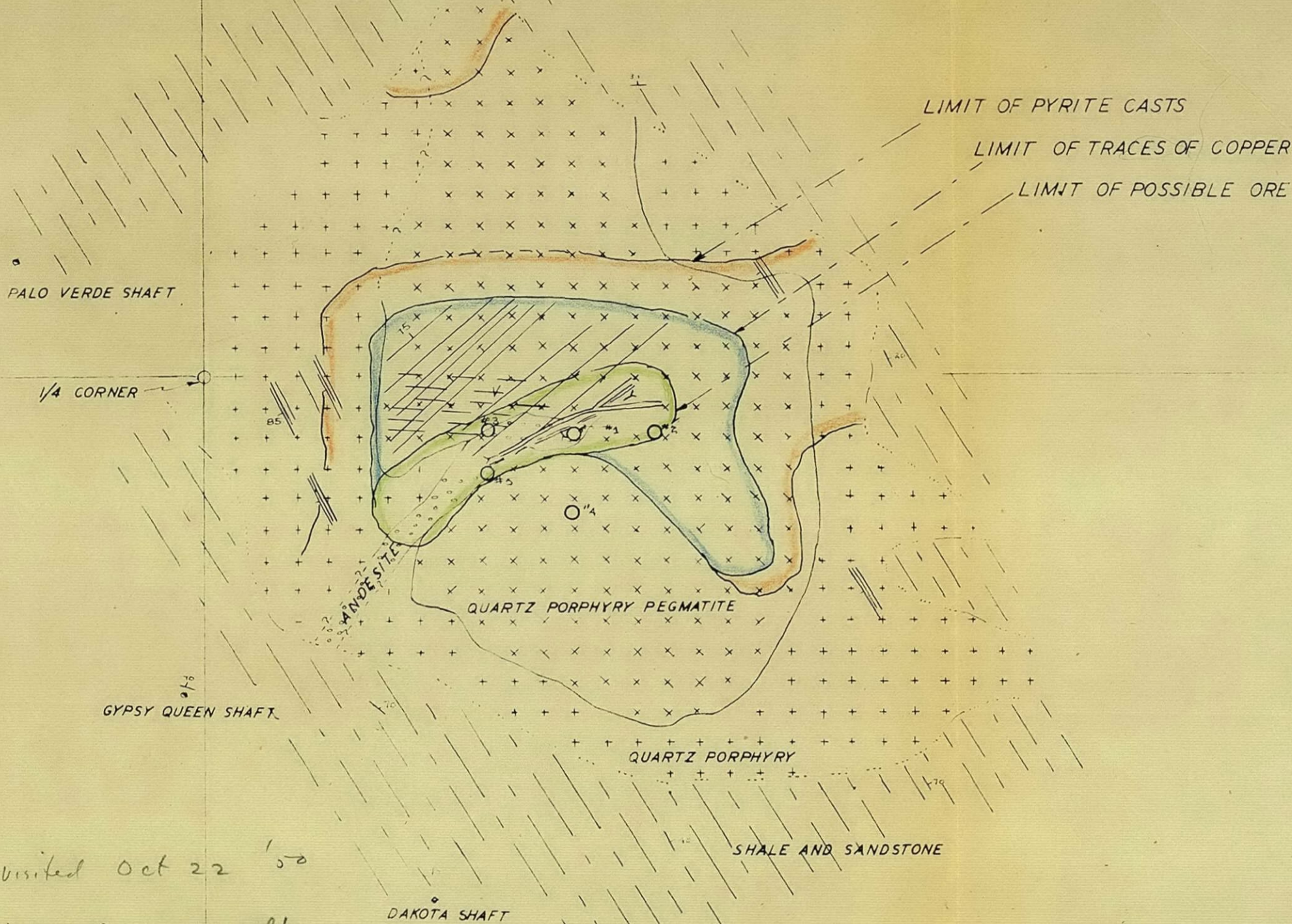
JER/as
cc: JECourtright







MINE _____ LOCATION _____ LEVEL _____
GEOLOGY BY _____ SURVEY _____ SCALE _____ DATE _____



visited Oct 22 '50

in general weak alt
in "QPP" - stronger along
shear zones - little leaching
evident - copper mostly fixed as silicates or oxides
District deserves aerial recon - due to presence of much Post M cover
7 1/2
9 mi So of Tucson
So of Ajo rd & west of the Mission Rd

AMOLE COPPER PROSPECT

PIMA COUNTY ARIZONA
EXAM. FOR A.S. & R. CO. MARCH 30, 1946
TUCSON, ARIZONA

GEOLOGY BY:
J.P. POLLOCK
J.C. PLAYTER

DATE:
MARCH 30, 1946
FILE NO: 663
SCALE 1"=300

○ ESTIMATED POSITION OF
C. & A. DRILL HOLES