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RAY WEST AND NORTH BUTTE PROJECTS

PINAL COUNTY, ARIZONA

BY: L. CLARK ARNOLD
April 24, 1972

Quintana Minerals Corporation
1892 WEST GRANT ROAD
TUCSON, ARIZONA 85705
602/622-4801

FILE MEMORANDUM

DATE: April 24, 1972

TO: Mr. W. E. Saegart

RE: Ray West and North Butte Projects
Pinal County, Arizona

FROM: Mr. L. Clark Arnold

Summary

Geologic mapping, compilation of previous work and property acquisition are now complete for the Ray West and North Butte areas. Exploration during 1972 will consist of two widely spaced scout drill holes in each project area at the locations shown on Figure 1 and Figure 2. Several similar tests will be made during 1973 and several shallow holes will be drilled to investigate exotic mineralization on the Adams property.

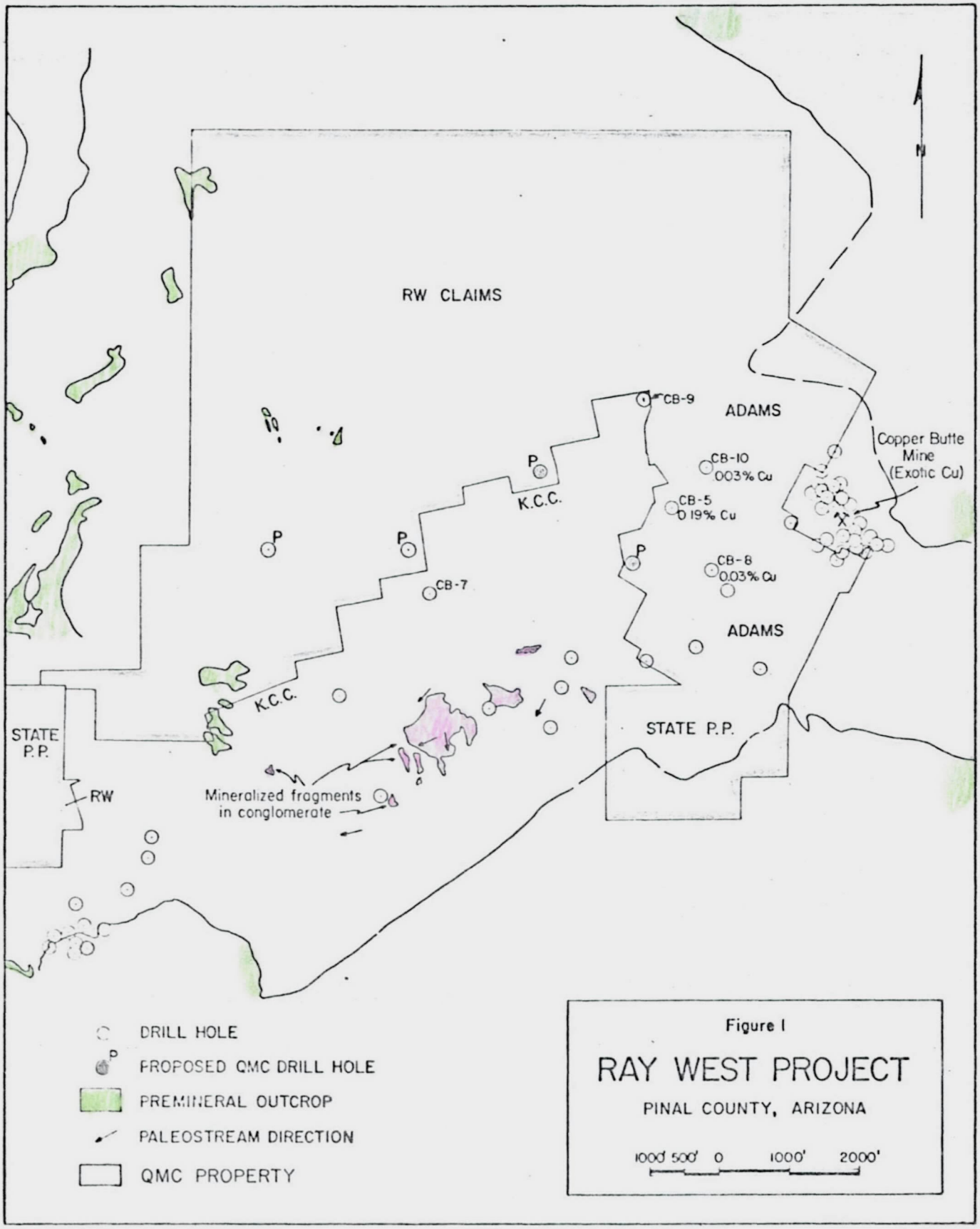
The drilling target developed in the Ray West area is based on the presence of strong exotic mineralization at Copper Butte and on an interpretation of paleotransport of mineralized cobbles in the Whitetail Conglomerate. A series of holes drilled by Kennecott Copper Corporation has already eliminated part of the potential target area, and one hole, CB-5 encountered significant alteration and sulfide mineralization which may represent the fringe of our indicated target.

Geologic mapping and sampling in the North Butte area have revealed a sizeable zone of hydrothermal alteration and 0.2% oxide-sulfide mineralization at the edge of postmineral cover. Previous drilling through the cover has been concentrated within about 900 feet of premineral outcrop. This work has confirmed the presence of anomalous mineralization beneath cover but leaves this mineralization open to the north and west (see Figure 2).

The nature of the evidence on which these projects are based makes them unusually attractive targets. Mr. W. E. Saegart and I are both extremely optimistic concerning the outcome of the work in these areas.

The Ray-Sacaton Trend

The Ray West and North Butte projects began as an evaluation of the covered portion of the N 70° E lineament or mineral belt connecting the well known deposits at Ray and Sacaton. The importance of this zone or trend was initially suggested by the


RW CLAIMS
N
CB-9
ADAMS
Copper Butte
Mine
(Exotic Cu)
CB-10
0.03% Cu
CB-5
0.19% Cu
CB-8
0.03% Cu
P
K.C.C.
CB-7
ADAMS
STATE
P.P.
RW
Mineralized fragments
in conglomerate
STATE P.P.
DRILL HOLE
PROPOSED QMC DRILL HOLE
PREMINERAL OUTCROP
PALEOSTREAM DIRECTION
QMC PROPERTY
Figure 1
RAY WEST PROJECT
PINAL COUNTY, ARIZONA
1000' 500' 0 1000' 2000'

The Ray-Sacaton Trend (Continued)

elongation of various intrusive bodies associated with the Ray and Sacaton mineralization, by the presence of the Pioneer mineralized area located on the trend near Cochran, and by the parallelism of adjacent trends--one of which intersects the Kelvin area south of Ray. Targets in this part of the porphyry province are especially attractive because of the high degree of enrichment which characterizes the deposits at Ray and in the nearby Globe-Miami area. The possibility of locating a similarly enriched deposit provides the necessary added incentive in areas where access is poor and deep drilling necessary.

The Ray West Project

Ray West Project, Pinal County, Arizona
Property Position Summary Sheet - March 16, 1972

Federal Lode Claims

RW-1-185 Located and validated by QMC. Assessment work due August, 1973.

RW-254-255 Fractional claims located and validated by QMC. Assessment work due August, 1973.

RW-186-253 Location markers only. Corners or relocation due May 15, 1972.

Adams Option (64 Federal Lode Claims)

Jim and Gila Claims QMC to perform and record 1972 assessment work. Annual payment due Mr. R. M. Adams, January, 1973. Option expires January, 1976.

State Prospecting Permits

No. 21412 Approximately 160 acres, Sec. 32, T3S, R12E, anniversary date January 12, 1973.

No. 21414 Approximately 440 acres, Sec. 36, T3S, R12E, anniversary date January 18, 1973.

Ray West Claim Group

Validation of claims RW-1-185 and 254-255 has been completed and additional claims (RW-186-253) have been located to serve as a

Ray West Claim Group (Continued)

buffer zone north of the validated claim group. Present plans do not call for cornering or validation of this group.

Geologic Investigation

Having assessed the favorability of the exploration scheme and the general suitability of the target area which might emerge, the investigation began and proceeded simultaneously along two lines.

A preliminary mapping and sampling program was carried out along the entire margin of postmineral cover and geologic mapping on 2000 scale was extended into previously unmapped areas. At the same time an effort was made to gather and review the results of all previous work in the area.

86 samples of rocks of premineral age were collected along the margin and in small windows of postmineral cover. A maximum sample spacing of about 3000 feet was maintained for sampling purposes so that any large continuous zone having anomalous Cu or Mo situated at the edge of cover would be detected. An additional 17 samples were collected from the area of the Ray Mine to serve as a reference suite (see Attachment 1). (F-4 May 2929)

The apparent Mo anomaly indicated by samples 6, 7, 8, 11, 12 and 15 on Attachment 1 is spurious, and results from the use of the atomic absorption method for carbonate rocks.

The reference suite collected from the Ray area is described in detail in Appendix 1 of this report. Study of this suite suggests that recognizable alteration, mostly in the form of bleaching and pyritic mineralization, extends 1500-2500 feet beyond the limit of strong mineralization as mapped by Ransome (1923).

Outside the zone of well developed alteration is a second zone in which less distinctive effects are recognized. Considered by itself the geochemistry of these outer alteration zones is somewhat uncertain, but if evaluated in light of hydrothermal alteration, the results present a somewhat more consistant and useable frame of reference.

For purposes of this study 100 ppm Cu is considered high background and all samples containing that amount or more are identified on Attachment 1.

Geologic Investigation (Continued)

Several altered zones were recognized in the course of the geologic mapping and sampling. The locations of these zones are shown at Attachment 2. Of the zones mapped, all except one were found to be quite small and discontinuous or to terminate before reaching postmineral cover. The one large zone shown on Attachment 2 is considered to be suggestive of strong mineralization and will be discussed in connection with the North Butte project--which is based upon prospecting a possible extension of this zone beneath postmineral cover.

The results of the preliminary geochemical survey revealed no significant anomalies at the edge of the covered area. However, the results of the survey tend to confirm the importance of the Ray-Sacaton mineral trend on which the project was initially based. Attachment 1 shows that samples having "anomalous" copper contents tend to fall along a line between the Ray deposit and the Pioneer mineralized area. This line corresponds quite closely to the Ray-Sacaton trend.

Although the sampling program produced no direct encouragement for the Ray West area, the results do serve to eliminate much of the area immediately adjacent to premineral outcrops and to focus attention on the central portion of the covered area.

Compilation and Review of Previous Work

Information on previous geologic mapping as well as drilling data was received from a number of sources. Mr. George Warnock provided the results of his work in connection with a Cerro project some years ago. Mr. A. R. Still provided some of his geologic mapping as well as data from a single Duval Corporation drill hole and Duval field investigation. Mr. Robert M. Adams supplied geologic mapping and drilling data accumulated by the Walnut Canyon Mining Company, as well as more recent mapping and drilling information by Kennecott Copper Corporation. Drilling information published by the U.S.B.M. (1946) was also compiled.

Attachment 3 (on 2000 scale) represents a synthesis of all the previous geologic mapping as well as additional work done to supplement the previous data. Attachments 4 and 6 give a brief summary of the drilling data compiled as well as the location of several holes for which data are unavailable. The color code designation used is slightly misleading--since a very long

Compilation and Review of Previous Work (Continued)

intercept with even very low copper values can result in a grade-footage product of 50 or more, and fall into the "ore grade or marginal category". Reference to the side notes, however, should prevent any possible confusion.

General Geology

Precambrian rocks of the Ray West area include the Pinal Schist and Ruin (Oracle) granite of older Precambrian age which are unconformably overlain by members of the younger Precambrian Apache Group. Paleozoic sedimentary rocks are conformable with the underlying Apache rocks and consist primarily of limestones.

Intrusive rocks of Laramide (?) age are noted in the study area and probably correspond in a general way to the mineralized intrusions of similar age which are associated with the Ray mineral deposit. Early Tertiary time was followed by a long stable period during which conditions in this particular part of Arizona were unusually favorable for secondary enrichment of copper mineralization. A series of conglomerates and volcanic rocks which comprise the postmineral section accumulated during middle Tertiary time. The oldest of these units is the Whitetail Conglomerate which was deposited upon a highly irregular erosion surface. This formation varies in thickness from zero, in the northwest part of the Ray West study area, to a maximum of nearly 600 feet near Copper Butte. The Whitetail Conglomerate is typically composed of angular, poorly sorted fragments representing all of the earlier stratigraphic section.

Overlying the Whitetail is a dacite tuff unit equivalent to the well known dacite of the Superior area, but considerably thinner. The thickness of the dacite is only about 50 feet in the Ray area, but the unit thickens to the west--reaching a thickness of 800 to 1000 feet in the area west of Copper Butte.

The Gila Conglomerate which followed the dacite in the Ray West area includes both sedimentary and volcanic units and occupies the top of the exposed stratigraphic column. The lower part of the Gila is composed of a conglomerate unit much like the Whitetail Formation--except that it contains fragments of dacite and may be differentiated from the Whitetail on that basis. A bedded tuff (designated Ttf on Attachment 3) conformably overlies the lower unit in the Ray West area and forms the top of the stratigraphic

General Geology (Continued)

section in that area. Farther west and north, the tuff member is both intruded and overlain by a rhyolite unit designated Tr on Attachment 3. This unit, which is apparently both intrusive and extrusive in nature, occupies a large area generally situated between the Ray West and North Butte areas. Along its western margin the rhyolite is overlain by Gila-like gravels suggesting that the deposition of the Gila Conglomerate spanned the period(s) of volcanism which produced the tuff and the rhyolite.

Tuffs and flows of the North Butte series (designated Nb on Attachment 3) overlie the tuff member of the Gila Conglomerate at North Butte. These flows are tentatively correlated with the rhyolite because both overlie the tuff member of the Gila with apparent conformity. However, spatial separation of the units prevents direct correlation.

Structure of the Tertiary Basins

Postmineral cover west of Copper Butte consists essentially of a roughly rectangular area whose southeast corner is located near the Copper Butte mine (see Attachment 3). In detail the basin is quite complex but in general, it appears to be a Basin and Range fault block structure principally controlled by two large displacement normal faults. These structures intersect at an angle of approximately 90° near Copper Butte and account for the orthogonal shape of the basin on its south and east side.

Postmineral rocks which are absent near the Rincon in Section 22, T3S, R12E (see Attachment 3) increase in thickness to the east and south reaching a combined thickness of nearly 2000 feet near Copper Butte (see Attachment 5). The rocks within the basin therefore form a wedge shaped unit which is thickest near Copper Butte and becomes progressively thinner to the north and west. Faulting along the basin margins post dates deposition of the lower conglomerate unit of the Gila Formation, but predates deposition of the tuff member as evidenced by the lobe of Ttf which extends unbroken across the trace of one of the major structures near Copper Butte (see Attachment 3). The early history of this faulting is uncertain but probably predates deposition of the Whitetail Formation since the structure appears to control,

at least in part, the thickness of the Whitetail. If this basin is analogous to those of the Superior area it may be assumed that formation of the basin, i.e., faulting progressed simultaneously with deposition of the conglomerates which fill the structure.

Exotic Copper Mineralization

Previous work in the study area has centered around the well known exotic copper mineralization at Copper Butte and immediately west of Copper Butte. Kennecott Copper Corporation has apparently drilled out a marginal or submarginal deposit of exotic copper mineralization in this area. Copper occurs in the form of chrysocolla ($CuSiO_3.H_2O$) which fills open spaces in the Whitetail Conglomerate and dacite tuff.

Considerable difference of opinion exists concerning the exact genesis of the Copper Butte mineralization. One theory is that the copper was transported from the source in mineralized fragments and then redistributed following deposition of the fragments. The other theory, and the one to which I subscribe, is that the copper was dissolved in surface or ground water at the source area and transported to its present location in solution. Mineralized fragments, probably derived from a porphyry copper deposit, are also present at Copper Butte but the total copper contributed by such fragments is subordinate to the chrysocolla which fills open spaces in the Whitetail and dacite.

Deposits of this type are well known in both North and South America and are consistantly related to nearby sources of hypogene copper deposits in which an oxide zone has developed. The Exotica deposit derived from the nearby Chuquicamata mineralization and the Emerald Isle deposit derived from the Mineral Park deposit in Yavapai County, Arizona, are notable examples and bear a close resemblance to the Copper Butte deposit. Because the chemistry of these deposits is well understood, it is possible to state with a high degree of confidence that a large exotic deposit, such as the Copper Butte deposit,originated from a nearby hypogene deposit in which oxide copper mineralization was exposed to erosional processes. The enormous complexity of surface and ground water flow and chemistry, however, virtually defy direct solution in terms of exact location of the source.

Transport distances for exotic mineralization are variable but

Exotic Copper Mineralization (Continued)

often fall in the one to three mile range, although one deposit in South America is thought to have traveled seven or eight miles from its source area. The Ray deposit could have been the source for the exotic mineralization at Copper Butte. However, the long distance from Ray and the location of the deposit --near the southeast corner of a basin which was apparently filled from the north, make Ray an unlikely source. For reasons which will be discussed below, I feel that a more likely source is an undiscovered porphyry deposit located west or northwest of Copper Butte--in the general vicinity of Hell's Peak.

Mineralized Fragments in the Whitetail Conglomerate

A second, and basically different type of exotic mineralization is present in the Whitetail beds west of Copper Butte. In this area the conglomerate is strongly iron stained and contains high concentrations of leached capping and mineralized cobbles. Unlike the Copper Butte deposit, copper mineralization is confined principally to the fragments themselves and rarely fills open fissures in the conglomerate. Although generally weaker than the Copper Butte mineralization, some samples of the Whitetail collected in this area were found to contain over 1% Cu. I feel that this deposit is fragmental in nature to a much greater extent than the Copper Butte deposit--although both are probably related to the same hypogene source.

Throughout much of the western area the Whitetail Conglomerate consists of fragments of mineralized rock which were derived from the leached zone--or upper oxide zone of a porphyry copper deposit. Mineralized schist is the most frequently noted lithology and in some outcrops comprises more than 90% of rock volume. Altered and mineralized granite and porphyry are also noted but are always subordinate to the schist. Reports on several previous projects have included descriptions of the mineralized fragments, and Kennecott Copper Corporation is presently engaged in an evaluation of the fragmental exotic deposit but there seems to be no general agreement on the source of the mineralized fragments.

In order to better understand the paleotransport of the Whitetail in this area, some 40 conglomerate outcrops were examined in detail. Lithologies present, relative number of mineralized fragments, angularity, color, presence of oxide copper mineralization

Mineralized Fragments in the Whitetail Conglomerate (Continued)

and orientation of imbricated pebbles were noted and compiled. The results of this work are shown on Attachment 3 and summarized below. The areas having the greatest concentration of mineralized fragments and the strongest iron staining, are shown in pink on Attachment 3. Also shown, are the paleotransport directions as suggested by imbricated pebbles.

Tabulation of lithologic information suggests that rounding of individual cobbles and mixing of various lithologies both increase toward the south, southeast and southwest. Fragments of Precambrian granite are not found in the Whitetail more than a few hundred feet north of the fault which separates the two rock types just north of the Gila River. This strongly suggests that the area south of the fault, which consists almost entirely of granite, was not an important source for the Whitetail beds to the north. Also suggestive of a northerly source area is the wedge shaped configuration of the structural basin discussed above. Transport directions indicated by imbricated pebbles are somewhat inconsistant but tend to fall in a south or southwesterly quadrant (see Attachment 3). Also suggestive of southerly transport is the apparent absence of mineralized fragments in Whitetail outcrops lying north of the latitude of Hell's Peak.

Estimating transport distance is at least as difficult as estimating direction, but based on changes in angularity and homogeneity observed in the Whitetail over distances of one to two miles, I would estimate the transport distance of the concentrated mineral fragments shown on Attachment 3, at one to three miles in a south or southwesterly direction. This would place the source area about two miles west of Copper Butte in the general vicinity of Hell's Peak.

Drilling Information

The Copper Butte area, as well as that containing the concentration of mineralized fragments, has been the scene of extensive drilling programs over the last 30 years. The result of drilling by the Walnut Canyon Mining Company, the U.S. Bureau of Mines and some of the drilling by Kennecott Copper Corporation are summarized on Attachment 5. This work falls into two categories; that pertaining to exotic mineralization in and around Copper Butte and that which deals with sulfide mineralization west of Copper Butte.

Both the U.S. Bureau of Mines project and the work by the Walnut

Drilling Information (Continued)

Canyon Mining Company were characterized by very poor core recovery and the results of that drilling, as it applies to grade and thickness of exotic copper mineralization, are highly suspect. Recent drilling by Kennecott Copper Corporation which was followed by an offer to purchase part of the Adams property (see Attachment 6) tend to place that property in a favorable light. A preliminary test of this mineralization is scheduled for the 1973 phase of the Ray West project.

Kennecott drilling, west of Copper Butte, has produced some information relative to our indicated target in the Hell's Peak area. Holes CB-6, 7, and 10, encountered fresh to weakly altered rocks with background amounts of Cu and Mo. However, holes CB-5, 8, and 9--the westerly most holes on the Adams property, encountered weak to moderate alteration, sulfide mineralization and anomalous amounts of Cu and Mo.

Of particular interest was CB-5 which encountered approximately 1% sulfides and 200 feet of 0.19% Cu mineralization, part of which is thought to be in the form of chalcocite.

This drilling, which is open to the south and west, is extremely important to the Ray West project because it provides a possible quantitative clue to the location of the deposit--whose existance is suggested by the two types of exotic mineralization described above.

Conclusion and Proposed Drilling Program

The combination of exotic and sulfide copper mineralization, upon which the Ray West project is based, combine to produce an extremely favorable target in the general vicinity of Hell's Peak.

RW-1 and RW-2 (see Attachment 1 and Figure 1) which are the first tests of the Ray West series, will explore this area of highest favorability. Subsequent work in 1973 will explore exotic mineralization on the Adams property and test the northern part of the Ray West Claim area.

The North Butte Project

North Butte Project, Pinal County, Arizona
Property Position Summary Sheet - March 17, 1972

Federal Lode Claims (Total of 109 Claims)

NB 16-25, NB 33-131 - located, cornered and validated by QMC. Assessment work due August, 1973.

State Prospecting Permits

No. 21409 - 321.48 acres, Sec. 36, T3S, R11E. Anniversary date January 18, 1973.

No. 21410 - 405.88 acres, Sec. 30, T3S, R12E. Anniversary date January 18, 1973.

No. 21411 - 404.40 acres, Sec. 31, T3S, R12E. Anniversary date January 18, 1973.

No. 21412 - 160 acres, Sec. 32, T3S, R12E. Anniversary date January 18, 1973.

No. 21413 - 160 acres, Sec. 32, T3S, R12E. Anniversary date January 18, 1973.

No. 21415 - 400.48 acres, Sec. 1, T4S, R11E. Anniversary date January 18, 1973.

No. 21416 - 640.16 acres, Sec. 2, T4S, R11E. Anniversary date January 18, 1973.

No. 21604 - 320 acres, Sec. 32, T3S, R12E. Anniversary date March 8, 1973.

Total State Prospecting Permits - 2,812.40 Acres

North Butte Claim Group

Validation of the North Butte claim group (consisting of 109 claims) was completed on March 18, 1972.

Compilation of Previous Work

All available geologic information for the North Butte area has been reviewed and compiled on the accompanying maps. This compilation represents the combined efforts of the Florence Fagerland Mining Company (1913) Cerro Corporation, Calumet & Hecla, Duval Corporation and Penninsula Mining Company. In addition to information on 23 drill holes in the vicinity of the Pioneer area, geologic mapping by J. D. Lowell, A. R. Still and E. A. Schmidt (M.S. Thesis, University of Arizona) has been edited and compiled on the Geologic Map of the Ray West and North Butte Area (see Attachment 3).

Geologic Mapping and Sampling

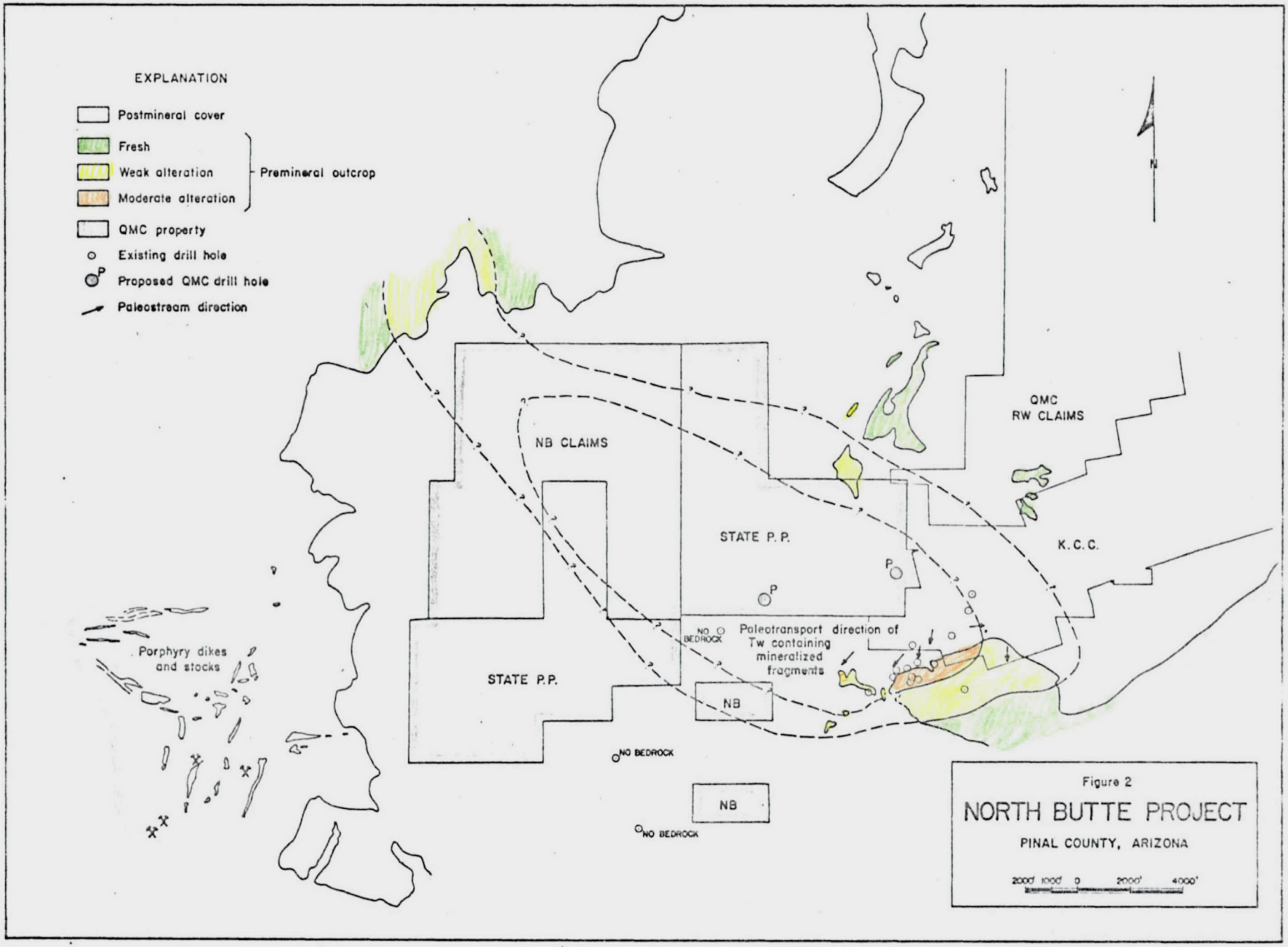
In addition to the compilation described above, geologic mapping and sampling of premineral rocks was extended from the Gila River northward to the old Mineral Hill district and westward from Cochran to the premineral outcrops west of North Butte.

Basis for the North Butte Project

The Pioneer area near Cochran has been explored on a sporadic basis since the early 1900's and at least two attempts at production have been made.

Altered and mineralized Pinal Schist outcrops in a narrow band at the edge of postmineral cover (see Figure 2). Within this zone the schist is bleached, limonite stained and contains sparse copper oxides. Limonite textures suggest 1-2 percent original sulfides consisting principally of pyrite with minor chalcopyrite and chalcocite. Small irregular bodies of porphyritic rocks occur within and around the mineralized area, but only one example was noted in which the porphyry itself was significantly altered or mineralized. Outside the principal altered zone alteration intensity decreases sharply as shown in Figure 2 and the Hydrothermal Alteration Map Ray West and North Butte Areas (Attachment 2).

Early churn drilling in the Pioneer area indicated the presence of strong copper mineralization of the mixed oxide-sulfide type in the altered schist. Subsequent diamond drilling in the same area has tended to confirm the presence of anomalous copper mineralization, but indicates a grade of 0.15-0.20 percent--rather than 1.2-1.7 percent as suggested by the earlier work.


EXPLANATION
Postmineral cover
Fresh
Weak alteration
Moderate alteration
Premineral outcrop
QMC property
Existing drill hole
Proposed QMC drill hole
Paleostream direction
N
NB CLAIMS
QMC
RW CLAIMS
STATE P.P.
K.C.C.
P
P
NO BEDROCK
Paleotransport direction of Tw containing mineralized fragments
Porphyry dikes and stocks
STATE P.P.
NB
NO BEDROCK
NB
NO BEDROCK
Figure 2
NORTH BUTTE PROJECT
PINAL COUNTY, ARIZONA
2000' 1000' 0 2000' 4000'

Basis for the North Butte Project (Continued)

The Whitetail Conglomerate of the Pioneer area outcrops in a narrow irregular band parallel to the edge of premineral outcrop. The outcrops are principally composed of schist fragments with lesser amounts of granite and porphyry. Mineralized fragments are present but the outcrop area is small relative to the Ray West area, so that observation of a large number of widely separated exposures is not possible. Imbricated pebbles suggest a south or southwesterly paleotransport.

Several drill holes which penetrated the Whitetail Conglomerate intersected what appears to be exotic copper mineralization (see Attachment 7) near the base of the formation. This mineralization resembles that at Copper Butte and like the Copper Butte exotic mineralization, suggests derivation from a not-too-distant source of copper, probably in an oxidized state.

A second, much weaker zone of alteration has also been noted at the edge of postmineral cover in the Mineral Hill district about five miles northwest of the Pioneer area. Although lacking the copper mineralization of the Pioneer area, the alteration contrasts sharply with the unaltered rocks along much of the perimeter of the covered North Butte block.

Conclusion and Proposed Drilling Program

The geometry of the North Butte alteration zones (see Figure 2) suggests that the Pioneer altered zone may be the southeastern end of an elongate zone which extends northwestward beneath postmineral cover--possibly emerging at the south end of the Mineral Hill district.

All of the drilling to date has been within 1800 feet of premineral outcrop and drilling opposite the most favorable exposures is confined to within 900 feet of premineral outcrop. This drilling, which encountered 0.1-0.2 percent copper mineralization is open to the north and northwest and constitutes an attractive drilling target.

Two drill holes, NB-1 and NB-2 are proposed for 1972. The locations of these holes are shown on Attachment 1 and Figure 2. They are located respectively 4000 feet north and 6000 feet northwest of the Pioneer area. Subsequent work during 1973 will continue testing the North Butte area on widely spaced centers.

APPENDIX I

HYDROTHERMAL ALTERATION OF
OUTCROP SAMPLES
REFERENCE SUITE - RAY DEPOSIT
FOR SAMPLE LOCATIONS REFER TO ATTACHMENT 1

RW-104	Cu 102 ppm Mo 1 ppm	Granodiorite - rusty yellow brown. Biotite - shiny, no sign chlorite. Potassium Feldspar - dull surfaces, no well developed alteration product. Plagioclase - thoroughly altered to dull white pseudomorphs. General - tends to be very crumbly, has appearance of deep weathering.
RW-105	Cu 15 Mo 1	Schist - gray with dark rusty brown and yellow rusty brown surface iron stains. Dark stains resembling incipient dendrites, but no manganese oxide stains rub off.
105 ↓ 106	Homogenous texture Lim/sul.	Fine grained - mixture of quartz and sericite. Foliation barely visible.
RW-106	Cu 28 Mo 1	Schist - gray to dark gray with some manganese oxide and very very sparse limonite formed after pyrite on foliation planes. Also some powdery yellow jarosite present. Sample shows some homogenication of texture. Possible slight silification.
106 ↓ 107	Chlorite	
RW-107	Cu 30 Mo 1	Schist - silvery gray with rusty yellow-brown stain. Prominent blades of chlorite. Very very sparse limonite formed after pyrite on foliation surfaces. Surfaces accentuated and with soapy feel.
107 ↓ 108	Well developed lim/sul. Bleaching Clay	
RW-108	Cu 81 Mo 2	Schist - silvery gray to white with brown iron stains. Local well developed limonite after sulfide on hairline fractures. Schist very homogenous. Foliation barely visible. Rock has strong clay and is probably silicified.
108 ↓ 109	Lithology change.	

RW-109 Cu 107
Mo 4

109

Lithology change.
Red limonite.
Partly decomp. sul.
Coarse texture.

110

Porphyry - gray, no iron stains.
Biotite - prominent specks, shiny.
Plagioclase - all clouded, porph. texture well developed, strong overall clay content.
Potassium Feldspar - cloudy, some intergranular erosion.

RW-110 Cu 400
Mo 5

110

Lithology change.
Change in texture.
Quartz eyes form.

111

Schist - gray with rusty reddish-brown and yellow-brown limonite after sulfide. Also manganese oxide blebs. Definite coarsening of texture, coarse sericite and possible silification. Quartz eyes begin to form.

RW-111 Cu 246
Mo 5

111

Lithology change.
Fresh biotite.
Fresh plagioclase

112

Schist - gray with rusty yellow-brown stains. Pitchy botryoidal limonite after sulfide. Very coarse sericite or chlorite (?) gives speckled appearance.

RW-112 Cu 790
Mo 9

112

Lithology change.
Change in habit of coarse sericite.

113

Porphyry - gray to gray-green with rusty yellow-brown limonite. Poorly developed ragged porph. texture.
Biotite - shiny with some red limonite.
Plagioclase - ragged crystals but with twin lines. Possibly some green sericite.

RW-113 Cu 26
Mo 3

113

Lithology change.
Fresh feldspar

114

Schist - dark gray to black. No iron stains. Some Manganese oxide. Coarse sericite limited to fractures. Fresh strong biotite, well distributed.

RW-114 Cu 91
Mo 2

114

Change to crumbly granite.

115

Precambrian granite - gray to pink, well developed, coarse granitic texture. Weak yellow and brown limonite and manganese oxide stains.
Potassium Feldspar - very shiny.
Plagioclase - general slight cloudiness, but with with lines and local chlorite.

RW-115	Cu 193 Mo 2	Precambrian granite - gray to pink with weak yellow-orange iron stains. Potassium Feldspar - fresh.
115		Plagioclase - general cloudiness.
	Lithology change.	Biotite - chloritized with some oxidation of iron.
116		Rock tends to be crumbly and deeply weathered.
RW-116	Cu 17 Mo 4	Porphyry - gray with weak red and yellow limonite stains. Strong speckled chlorite.
116		Plagioclase - general cloudiness with some hemogenization of texture.
	Lithology change.	Weak clay present.
117		Possible silification.
RW-117	Cu 19 Mo 1	Precambrian granite - gray to pinkish gray. Potassium Feldspar and Plagioclase - cloudy, but intact. Sparse chlorite. Deeply weathered appearance.
RW-118	Cu 19 Mo 1	Precambrian granite - gray to pinkish gray. Potassium Feldspar and Plagioclase - cloudy, but intact.
	Lithology change.	Sparse chlorite. Deeply weathered appearance.
RW-119	Cu 45 Mo 3	Diorite - light gray-gray green. Speckled with fresh biotite. Plagioclase - very fine grained, cloudy.
119		Strong clay content.
120		
RW-120	Cu 44 Mo 4	Diorite - light gray-gray green. Speckled with fresh biotite. Plagioclase - fresh. No clay.

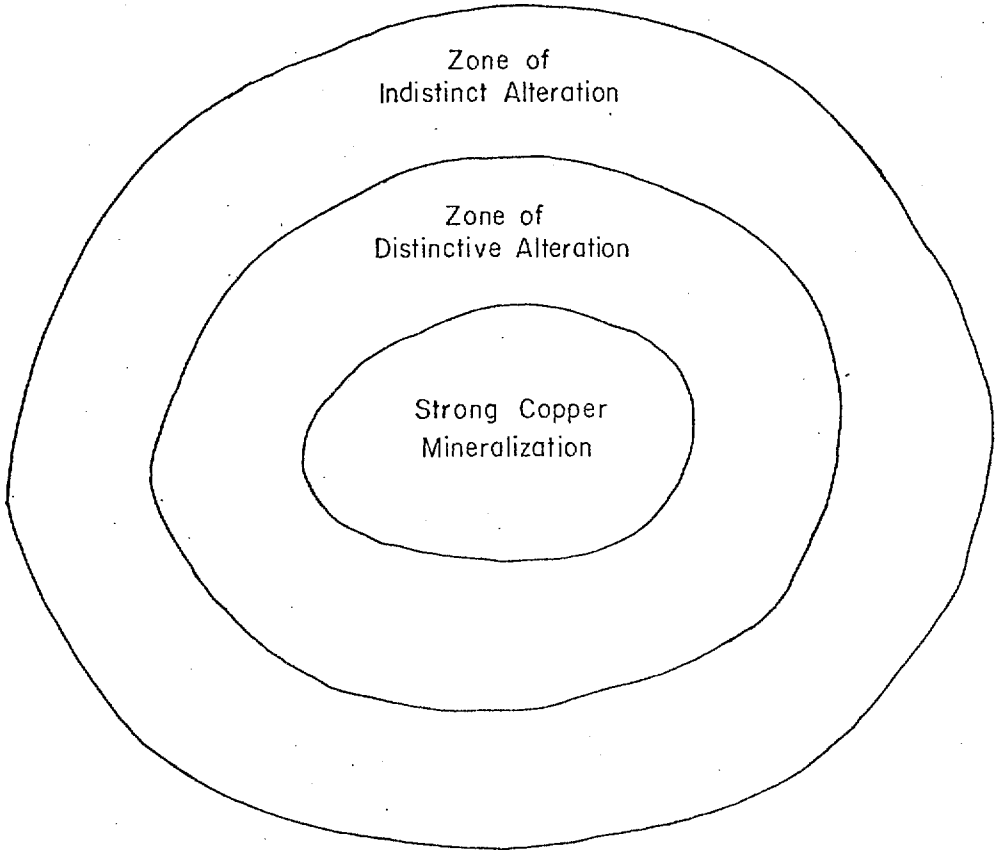
GENERAL CONCLUSIONS

1. Samples RW-107 through RW-111 show definitive alteration effects.

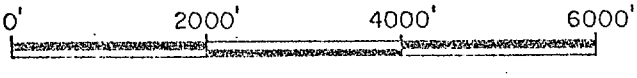
2. Samples RW-105-106 and RW-112-113 show less definitive effects. May or may not be interpreted in terms of strong mineralization.

3. Samples RW-104 and 114-120 show background effects typical of Ray district. Probably not useful in specific guide to mineralization.

4. Diagnostic alteration effects suggestive of strong mineralization have not been recognized in premineral outcrop of the Ray West project area.



"TYPICAL" PORPHYRY COPPER DEPOSIT AND ASSOCIATED HYDROTHERMAL ALTERATION ZONES



(Porphyry alteration model after Lowell and Guilbert, 1970)

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Ransome, F. L., 1923, Description of the Ray Quadrangle, Arizona: U.S. Geologic Survey Folio 217.

Lowell, J. D. and Guilbert, J. M., 1970, Lateral and Vertical Alteration-Mineralization Zoning in Porphyry Ore Deposits: Econ. Geol., Vol. 65, No. 4, Pages 373-408.

LIST OF ATTACHMENTS

1) Outcrop Geochemical Map - Ray West and North Butte Projects 1"=2000' — File Map 2929

2) Hydrothermal Alteration - Ray West-North Butte Area 1"=2000' — File Map 2929

3) Geologic Map of the Ray West-North Butte Area 1"=2000' — File Map 2930

4) Composite of Drill Hole Assay Data - Ray West and North Butte Projects, Sheet 2 - East Half 1"=~~500~~ 2000' — File Map 2931

5) Preliminary Cross Sections A-A and B-B - Ray West-North Butte Area 1"=2000' — Not available

6) Land Ownership - Ray West and North Butte Projects Pinal County, Arizona 1"=2000' — Not available

7) Composite of Drill Hole Assay Data - Ray West and North Butte Projects, Sheet 1 - West Half 1"=~~500~~ 2000' — File Map 2931

RAY WEST AND NORTH BUTTE PROJECTS

PINAL COUNTY, ARIZONA

BY: L. CLARK ARNOLD
April 24, 1972

Quintana Minerals Corporation
1892 WEST GRANT ROAD
TUCSON, ARIZONA 85705
602/622-4801

FILE MEMORANDUM

DATE: April 24, 1972

TO: Mr. W. E. Saegart

RE: Ray West and North Butte Projects
Pinal County, Arizona

FROM: Mr. L. Clark Arnold

Summary

Geologic mapping, compilation of previous work and property acquisition are now complete for the Ray West and North Butte areas. Exploration during 1972 will consist of two widely spaced scout drill holes in each project area at the locations shown on Figure 1 and Figure 2. Several similar tests will be made during 1973 and several shallow holes will be drilled to investigate exotic mineralization on the Adams property.

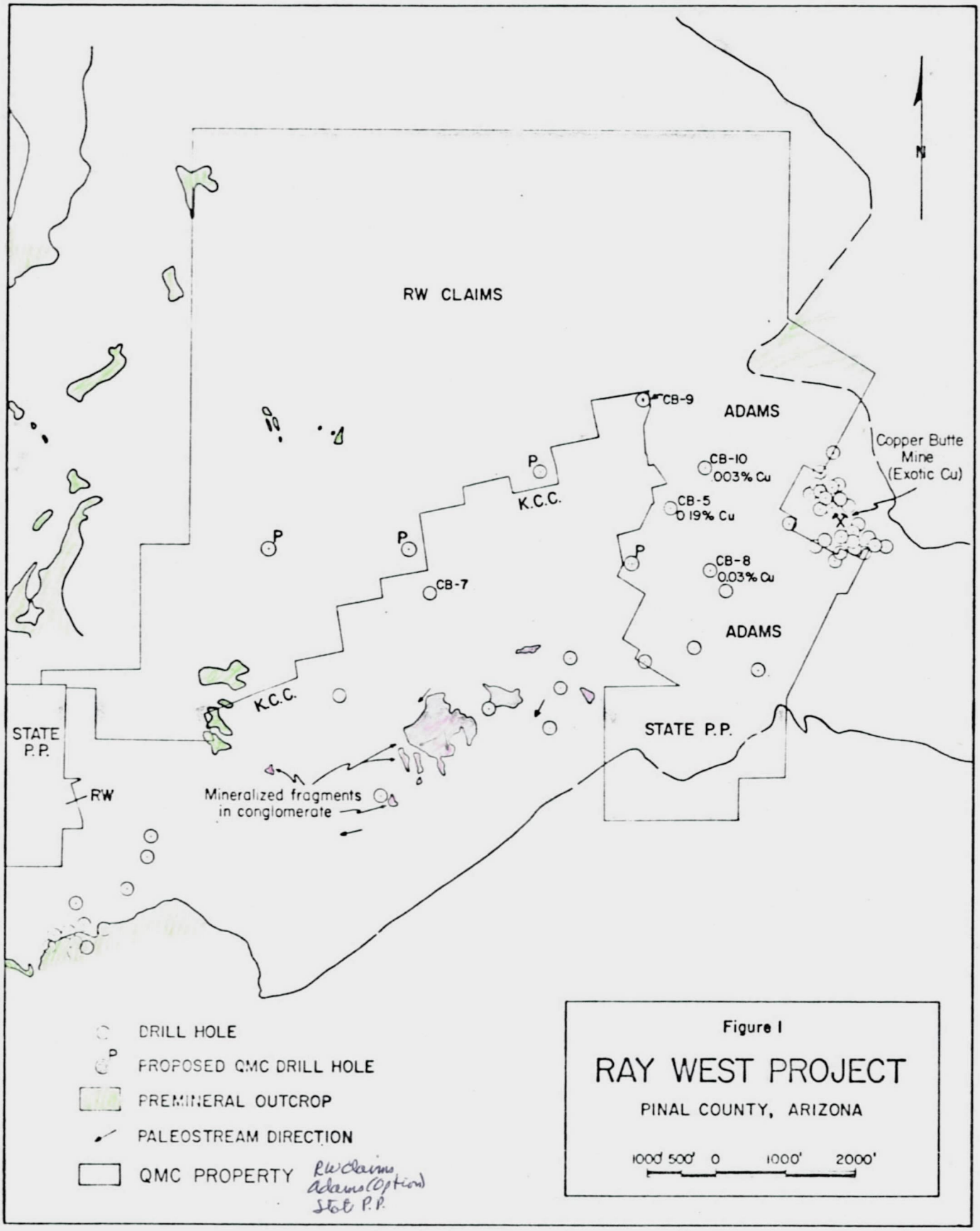
The drilling target developed in the Ray West area is based on the presence of strong exotic mineralization at Copper Butte and on an interpretation of paleotransport of mineralized cobbles in the Whitetail Conglomerate. A series of holes drilled by Kennecott Copper Corporation has already eliminated part of the potential target area, and one hole, CB-5 encountered significant alteration and sulfide mineralization which may represent the fringe of our indicated target.

Geologic mapping and sampling in the North Butte area have revealed a sizeable zone of hydrothermal alteration and 0.2% oxide-sulfide mineralization at the edge of postmineral cover. Previous drilling through the cover has been concentrated within about 900 feet of premineral outcrop. This work has confirmed the presence of anomalous mineralization beneath cover but leaves this mineralization open to the north and west (see Figure 2).

The nature of the evidence on which these projects are based makes them unusually attractive targets. Mr. W. E. Saegart and I are both extremely optimistic concerning the outcome of the work in these areas.

The Ray-Sacaton Trend

The Ray West and North Butte projects began as an evaluation of the covered portion of the N 70° E lineament or mineral belt connecting the well known deposits at Ray and Sacaton. The importance of this zone or trend was initially suggested by the


N
RW CLAIMS
CB-9
ADAMS
Copper Butte Mine (Exotic Cu)
CB-10 003% Cu
CB-5 0.19% Cu
CB-8 0.03% Cu
K.C.C.
P
CB-7
ADAMS
K.C.C.
STATE P.P.
STATE P.P.
RW
Mineralized fragments in conglomerate
DRILL HOLE
PROPOSED QMC DRILL HOLE
PREMINERAL OUTCROP
PALEOSTREAM DIRECTION
QMC PROPERTY
RW Claims
Adams (Option)
Stat P.P.
Figure 1
RAY WEST PROJECT
PINAL COUNTY, ARIZONA
1000' 500' 0 1000' 2000'

The Ray-Sacaton Trend (Continued)

elongation of various intrusive bodies associated with the Ray and Sacaton mineralization, by the presence of the Pioneer mineralized area located on the trend near Cochran, and by the parallelism of adjacent trends--one of which intersects the Kelvin area south of Ray. Targets in this part of the porphyry province are especially attractive because of the high degree of enrichment which characterizes the deposits at Ray and in the nearby Globe-Miami area. The possibility of locating a similarly enriched deposit provides the necessary added incentive in areas where access is poor and deep drilling necessary.

The Ray West Project

Ray West Project, Pinal County, Arizona
Property Position Summary Sheet - March 16, 1972

Federal Lode Claims

RW-1-185	Located and validated by QMC. Assessment work due August, 1973.
RW-254-255	Fractional claims located and validated by QMC. Assessment work due August, 1973.
RW-186-253	Location markers only. Corners or relocation due May 15, 1972.

Adams Option (64 Federal Lode Claims)

Jim and Gila Claims	QMC to perform and record 1972 assessment work. Annual payment due Mr. R. M. Adams, January, 1973. Option expires January, 1976.

State Prospecting Permits

No. 21412	Approximately 160 acres, Sec. 32, T3S, R12E, anniversary date January 12, 1973.
No. 21414	Approximately 440 acres, Sec. 36, T3S, R12E, anniversary date January 18, 1973.

Ray West Claim Group

Validation of claims RW-1-185 and 254-255 has been completed and additional claims (RW-186-253) have been located to serve as a

Ray West Claim Group (Continued)

buffer zone north of the validated claim group. Present plans do not call for cornering or validation of this group.

Geologic Investigation

Having assessed the favorability of the exploration scheme and the general suitability of the target area which might emerge, the investigation began and proceeded simultaneously along two lines.

A preliminary mapping and sampling program was carried out along the entire margin of postmineral cover and geologic mapping on 2000 scale was extended into previously unmapped areas. At the same time an effort was made to gather and review the results of all previous work in the area.

86 samples of rocks of premineral age were collected along the margin and in small windows of postmineral cover. A maximum sample spacing of about 3000 feet was maintained for sampling purposes so that any large continuous zone having anomalous Cu or Mo situated at the edge of cover would be detected. An additional 17 samples were collected from the area of the Ray Mine to serve as a reference suite (see Attachment 1).

The apparent Mo anomaly indicated by samples 6, 7, 8, 11, 12 and 15 on Attachment 1 is spurious, and results from the use of the atomic absorption method for carbonate rocks.

The reference suite collected from the Ray area is described in detail in Appendix 1 of this report. Study of this suite suggests that recognizable alteration, mostly in the form of bleaching and pyritic mineralization, extends 1500-2500 feet beyond the limit of strong mineralization as mapped by Ransome (1923).

Outside the zone of well developed alteration is a second zone in which less distinctive effects are recognized. Considered by itself the geochemistry of these outer alteration zones is somewhat uncertain, but if evaluated in light of hydrothermal alteration, the results present a somewhat more consistant and useable frame of reference.

For purposes of this study 100 ppm Cu is considered high background and all samples containing that amount or more are identified on Attachment 1.

Geologic Investigation (Continued)

Several altered zones were recognized in the course of the geologic mapping and sampling. The locations of these zones are shown at Attachment 2. Of the zones mapped, all except one were found to be quite small and discontinuous or to terminate before reaching postmineral cover. The one large zone shown on Attachment 2 is considered to be suggestive of strong mineralization and will be discussed in connection with the North Butte project--which is based upon prospecting a possible extension of this zone beneath postmineral cover.

The results of the preliminary geochemical survey revealed no significant anomalies at the edge of the covered area. However, the results of the survey tend to confirm the importance of the Ray-Sacaton mineral trend on which the project was initially based. Attachment 1 shows that samples having "anomalous" copper contents tend to fall along a line between the Ray deposit and the Pioneer mineralized area. This line corresponds quite closely to the Ray-Sacaton trend.

Although the sampling program produced no direct encouragement for the Ray West area, the results do serve to eliminate much of the area immediately adjacent to premineral outcrops and to focus attention on the central portion of the covered area.

Compilation and Review of Previous Work

Information on previous geologic mapping as well as drilling data was received from a number of sources. Mr. George Warnock provided the results of his work in connection with a Cerro project some years ago. Mr. A. R. Still provided some of his geologic mapping as well as data from a single Duval Corporation drill hole and Duval field investigation. Mr. Robert M. Adams supplied geologic mapping and drilling data accumulated by the Walnut Canyon Mining Company, as well as more recent mapping and drilling information by Kennecott Copper Corporation. Drilling information published by the U.S.B.M. (1946) was also compiled.

Attachment 3 (on 2000 scale) represents a synthesis of all the previous geologic mapping as well as additional work done to supplement the previous data. Attachments 4 and 6 give a brief summary of the drilling data compiled as well as the location of several holes for which data are unavailable. The color code designation used is slightly misleading--since a very long

Compilation and Review of Previous Work (Continued)

intercept with even very low copper values can result in a grade-footage product of 50 or more, and fall into the "ore grade or marginal category". Reference to the side notes, however, should prevent any possible confusion.

General Geology

Precambrian rocks of the Ray West area include the Pinal Schist and Ruin (Oracle) granite of older Precambrian age which are unconformably overlain by members of the younger Precambrian Apache Group. Paleozoic sedimentary rocks are conformable with the underlying Apache rocks and consist primarily of limestones.

Intrusive rocks of Laramide (?) age are noted in the study area and probably correspond in a general way to the mineralized intrusions of similar age which are associated with the Ray mineral deposit. Early Tertiary time was followed by a long stable period during which conditions in this particular part of Arizona were unusually favorable for secondary enrichment of copper mineralization. A series of conglomerates and volcanic rocks which comprise the postmineral section accumulated during middle Tertiary time. The oldest of these units is the Whitetail Conglomerate which was deposited upon a highly irregular erosion surface. This formation varies in thickness from zero, in the northwest part of the Ray West study area, to a maximum of nearly 600 feet near Copper Butte. The Whitetail Conglomerate is typically composed of angular, poorly sorted fragments representing all of the earlier stratigraphic section.

Overlying the Whitetail is a dacite tuff unit equivalent to the well known dacite of the Superior area, but considerably thinner. The thickness of the dacite is only about 50 feet in the Ray area, but the unit thickens to the west--reaching a thickness of 800 to 1000 feet in the area west of Copper Butte.

The Gila Conglomerate which followed the dacite in the Ray West area includes both sedimentary and volcanic units and occupies the top of the exposed stratigraphic column. The lower part of the Gila is composed of a conglomerate unit much like the Whitetail Formation--except that it contains fragments of dacite and may be differentiated from the Whitetail on that basis. A bedded tuff (designated Ttf on Attachment 3) conformably overlies the lower unit in the Ray West area and forms the top of the stratigraphic

General Geology (Continued)

section in that area. Farther west and north, the tuff member is both intruded and overlain by a rhyolite unit designated Tr on Attachment 3. This unit, which is apparently both intrusive and extrusive in nature, occupies a large area generally situated between the Ray West and North Butte areas. Along its western margin the rhyolite is overlain by Gila-like gravels suggesting that the deposition of the Gila Conglomerate spanned the period(s) of volcanism which produced the tuff and the rhyolite.

Tuffs and flows of the North Butte series (designated Nb on Attachment 3) overlie the tuff member of the Gila Conglomerate at North Butte. These flows are tentatively correlated with the rhyolite because both overlie the tuff member of the Gila with apparent conformity. However, spatial separation of the units prevents direct correlation.

Structure of the Tertiary Basins

Postmineral cover west of Copper Butte consists essentially of a roughly rectangular area whose southeast corner is located near the Copper Butte mine (see Attachment 3). In detail the basin is quite complex but in general, it appears to be a Basin and Range fault block structure principally controlled by two large displacement normal faults. These structures intersect at an angle of approximately 90° near Copper Butte and account for the orthogonal shape of the basin on its south and east side.

Postmineral rocks which are absent near the Rincon in Section 22, T3S, R12E (see Attachment 3) increase in thickness to the east and south reaching a combined thickness of nearly 2000 feet near Copper Butte (see Attachment 5). The rocks within the basin therefore form a wedge shaped unit which is thickest near Copper Butte and becomes progressively thinner to the north and west. Faulting along the basin margins post dates deposition of the lower conglomerate unit of the Gila Formation, but predates deposition of the tuff member as evidenced by the lobe of Ttf which extends unbroken across the trace of one of the major structures near Copper Butte (see Attachment 3). The early history of this faulting is uncertain but probably predates deposition of the Whitetail Formation since the structure appears to control,

at least in part, the thickness of the Whitetail. If this basin is analogous to those of the Superior area it may be assumed that formation of the basin, i.e., faulting progressed simultaneously with deposition of the conglomerates which fill the structure.

Exotic Copper Mineralization

Previous work in the study area has centered around the well known exotic copper mineralization at Copper Butte and immediately west of Copper Butte. Kennecott Copper Corporation has apparently drilled out a marginal or submarginal deposit of exotic copper mineralization in this area. Copper occurs in the form of chrysocolla ($CuSiO_3.H_2O$) which fills open spaces in the Whitetail Conglomerate and dacite tuff.

Considerable difference of opinion exists concerning the exact genesis of the Copper Butte mineralization. One theory is that the copper was transported from the source in mineralized fragments and then redistributed following deposition of the fragments. The other theory, and the one to which I subscribe, is that the copper was dissolved in surface or ground water at the source area and transported to its present location in solution. Mineralized fragments, probably derived from a porphyry copper deposit, are also present at Copper Butte but the total copper contributed by such fragments is subordinate to the chrysocolla which fills open spaces in the Whitetail and dacite.

Deposits of this type are well known in both North and South America and are consistantly related to nearby sources of hypogene copper deposits in which an oxide zone has developed. The Exotica deposit derived from the nearby Chuquicamata mineralization and the Emerald Isle deposit derived from the Mineral Park deposit in Yavapai County, Arizona, are notable examples and bear a close resemblance to the Copper Butte deposit. Because the chemistry of these deposits is well understood, it is possible to state with a high degree of confidence that a large exotic deposit, such as the Copper Butte deposit,originated from a nearby hypogene deposit in which oxide copper mineralization was exposed to erosional processes. The enormous complexity of surface and ground water flow and chemistry, however, virtually defy direct solution in terms of exact location of the source.

Transport distances for exotic mineralization are variable but

Exotic Copper Mineralization (Continued)

often fall in the one to three mile range, although one deposit in South America is thought to have traveled seven or eight miles from its source area. The Ray deposit could have been the source for the exotic mineralization at Copper Butte. However, the long distance from Ray and the location of the deposit --near the southeast corner of a basin which was apparently filled from the north, make Ray an unlikely source. For reasons which will be discussed below, I feel that a more likely source is an undiscovered porphyry deposit located west or northwest of Copper Butte--in the general vicinity of Hell's Peak.

Mineralized Fragments in the Whitetail Conglomerate

A second, and basically different type of exotic mineralization is present in the Whitetail beds west of Copper Butte. In this area the conglomerate is strongly iron stained and contains high concentrations of leached capping and mineralized cobbles. Unlike the Copper Butte deposit, copper mineralization is confined principally to the fragments themselves and rarely fills open fissures in the conglomerate. Although generally weaker than the Copper Butte mineralization, some samples of the Whitetail collected in this area were found to contain over 1% Cu. I feel that this deposit is fragmental in nature to a much greater extent than the Copper Butte deposit--although both are probably related to the same hypogene source.

Throughout much of the western area the Whitetail Conglomerate consists of fragments of mineralized rock which were derived from the leached zone--or upper oxide zone of a porphyry copper deposit. Mineralized schist is the most frequently noted lithology and in some outcrops comprises more than 90% of rock volume. Altered and mineralized granite and porphyry are also noted but are always subordinate to the schist. Reports on several previous projects have included descriptions of the mineralized fragments, and Kennecott Copper Corporation is presently engaged in an evaluation of the fragmental exotic deposit but there seems to be no general agreement on the source of the mineralized fragments.

In order to better understand the paleotransport of the Whitetail in this area, some 40 conglomerate outcrops were examined in detail. Lithologies present, relative number of mineralized fragments, angularity, color, presence of oxide copper mineralization

Mineralized Fragments in the Whitetail Conglomerate (Continued)

and orientation of imbricated pebbles were noted and compiled. The results of this work are shown on Attachment 3 and summarized below. The areas having the greatest concentration of mineralized fragments and the strongest iron staining, are shown in pink on Attachment 3. Also shown, are the paleotransport directions as suggested by imbricated pebbles.

Tabulation of lithologic information suggests that rounding of individual cobbles and mixing of various lithologies both increase toward the south, southeast and southwest. Fragments of Precambrian granite are not found in the Whitetail more than a few hundred feet north of the fault which separates the two rock types just north of the Gila River. This strongly suggests that the area south of the fault, which consists almost entirely of granite, was not an important source for the Whitetail beds to the north. Also suggestive of a northerly source area is the wedge shaped configuration of the structural basin discussed above. Transport directions indicated by imbricated pebbles are somewhat inconsistant but tend to fall in a south or southwesterly quadrant (see Attachment 3). Also suggestive of southerly transport is the apparent absence of mineralized fragments in Whitetail outcrops lying north of the latitude of Hell's Peak.

Estimating transport distance is at least as difficult as estimating direction, but based on changes in angularity and homogeneity observed in the Whitetail over distances of one to two miles, I would estimate the transport distance of the concentrated mineral fragments shown on Attachment 3, at one to three miles in a south or southwesterly direction. This would place the source area about two miles west of Copper Butte in the general vicinity of Hell's Peak.

Drilling Information

The Copper Butte area, as well as that containing the concentration of mineralized fragments, has been the scene of extensive drilling programs over the last 30 years. The result of drilling by the Walnut Canyon Mining Company, the U.S. Bureau of Mines and some of the drilling by Kennecott Copper Corporation are summarized on Attachment 5. This work falls into two categories; that pertaining to exotic mineralization in and around Copper Butte and that which deals with sulfide mineralization west of Copper Butte.

Both the U.S. Bureau of Mines project and the work by the Walnut

Drilling Information (Continued)

Canyon Mining Company were characterized by very poor core recovery and the results of that drilling, as it applies to grade and thickness of exotic copper mineralization, are highly suspect. Recent drilling by Kennecott Copper Corporation which was followed by an offer to purchase part of the Adams property (see Attachment 6) tend to place that property in a favorable light. A preliminary test of this mineralization is scheduled for the 1973 phase of the Ray West project.

Kennecott drilling, west of Copper Butte, has produced some information relative to our indicated target in the Hell's Peak area. Holes CB-6, 7, and 10, encountered fresh to weakly altered rocks with background amounts of Cu and Mo. However, holes CB-5, 8, and 9--the westerly most holes on the Adams property, encountered weak to moderate alteration, sulfide mineralization and anomalous amounts of Cu and Mo.

Of particular interest was CB-5 which encountered approximately 1% sulfides and 200 feet of 0.19% Cu mineralization, part of which is thought to be in the form of chalcocite.

This drilling, which is open to the south and west, is extremely important to the Ray West project because it provides a possible quantitative clue to the location of the deposit--whose existance is suggested by the two types of exotic mineralization described above.

Conclusion and Proposed Drilling Program

The combination of exotic and sulfide copper mineralization, upon which the Ray West project is based, combine to produce an extremely favorable target in the general vicinity of Hell's Peak.

RW-1 and RW-2 (see Attachment 1 and Figure 1) which are the first tests of the Ray West series, will explore this area of highest favorability. Subsequent work in 1973 will explore exotic mineralization on the Adams property and test the northern part of the Ray West Claim area.

The North Butte Project

North Butte Project, Pinal County, Arizona
Property Position Summary Sheet - March 17, 1972

Federal Lode Claims (Total of 109 Claims)

NB 16-25, NB 33-131 - located, cornered and validated by QMC. Assessment work due August, 1973.

State Prospecting Permits

No. 21409 - 321.48 acres, Sec. 36, T3S, R11E. Anniversary date January 18, 1973.

No. 21410 - 405.88 acres, Sec. 30, T3S, R12E. Anniversary date January 18, 1973.

No. 21411 - 404.40 acres, Sec. 31, T3S, R12E. Anniversary date January 18, 1973.

No. 21412 - 160 acres, Sec. 32, T3S, R12E. Anniversary date January 18, 1973.

No. 21413 - 160 acres, Sec. 32, T3S, R12E. Anniversary date January 18, 1973.

No. 21415 - 400.48 acres, Sec. 1, T4S, R11E. Anniversary date January 18, 1973.

No. 21416 - 640.16 acres, Sec. 2, T4S, R11E. Anniversary date January 18, 1973.

No. 21604 - 320 acres, Sec. 32, T3S, R12E. Anniversary date March 8, 1973.

Total State Prospecting Permits - 2,812.40 Acres

North Butte Claim Group

Validation of the North Butte claim group (consisting of 109 claims) was completed on March 18, 1972.

Compilation of Previous Work

All available geologic information for the North Butte area has been reviewed and compiled on the accompanying maps. This compilation represents the combined efforts of the Florence Fagerland Mining Company (1913) Cerro Corporation, Calumet & Hecla, Duval Corporation and Penninsula Mining Company. In addition to information on 23 drill holes in the vicinity of the Pioneer area, geologic mapping by J. D. Lowell, A. R. Still and E. A. Schmidt (M.S. Thesis, University of Arizona) has been edited and compiled on the Geologic Map of the Ray West and North Butte Area (see Attachment 3).

Geologic Mapping and Sampling

In addition to the compilation described above, geologic mapping and sampling of premineral rocks was extended from the Gila River northward to the old Mineral Hill district and westward from Cochran to the premineral outcrops west of North Butte.

Basis for the North Butte Project

The Pioneer area near Cochran has been explored on a sporadic basis since the early 1900's and at least two attempts at production have been made.

Altered and mineralized Pinal Schist outcrops in a narrow band at the edge of postmineral cover (see Figure 2). Within this zone the schist is bleached, limonite stained and contains sparse copper oxides. Limonite textures suggest 1-2 percent original sulfides consisting principally of pyrite with minor chalcopyrite and chalcocite. Small irregular bodies of porphyritic rocks occur within and around the mineralized area, but only one example was noted in which the porphyry itself was significantly altered or mineralized. Outside the principal altered zone alteration intensity decreases sharply as shown in Figure 2 and the Hydrothermal Alteration Map Ray West and North Butte Areas (Attachment 2).

Early churn drilling in the Pioneer area indicated the presence of strong copper mineralization of the mixed oxide-sulfide type in the altered schist. Subsequent diamond drilling in the same area has tended to confirm the presence of anomalous copper mineralization, but indicates a grade of 0.15-0.20 percent--rather than 1.2-1.7 percent as suggested by the earlier work.

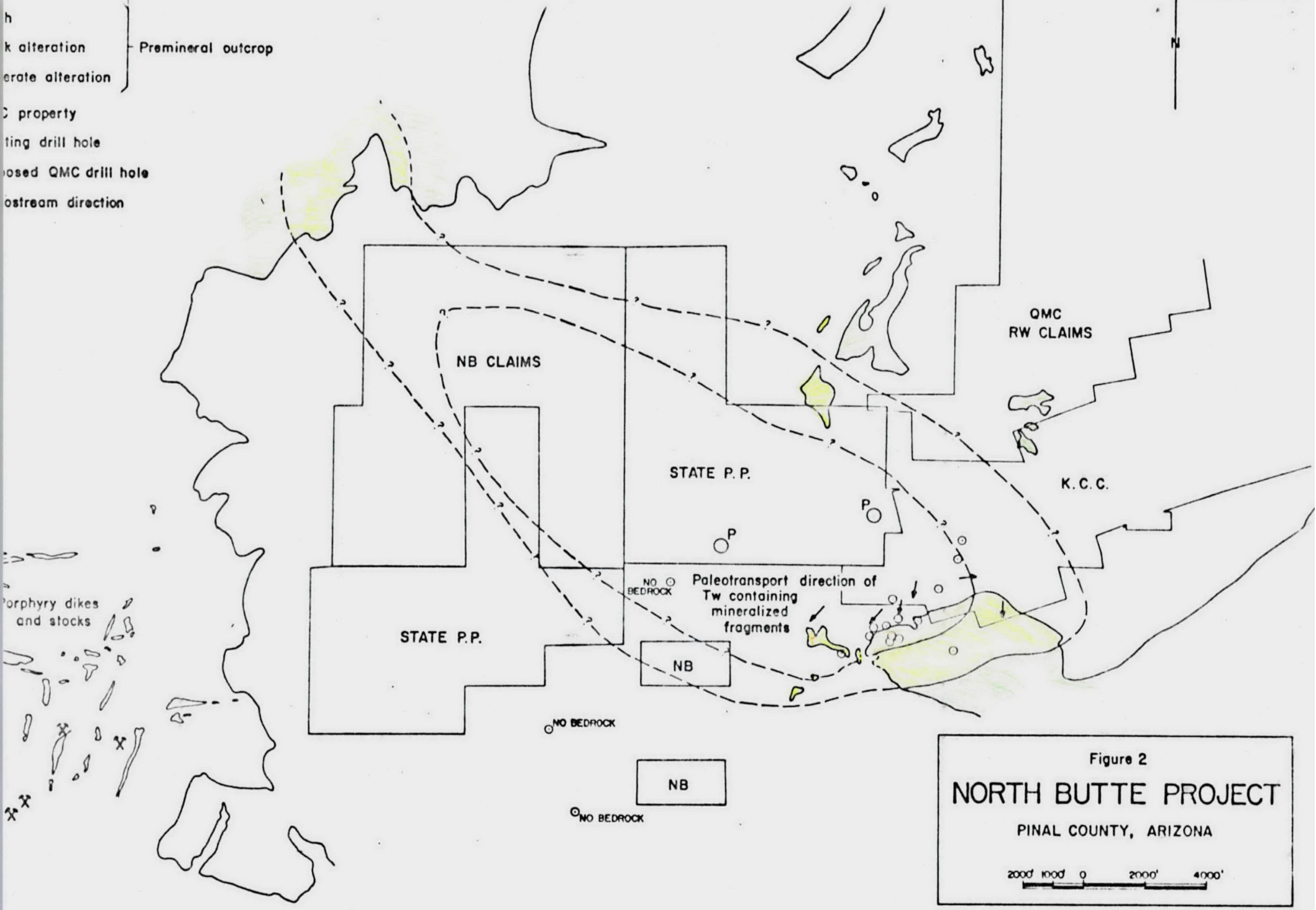
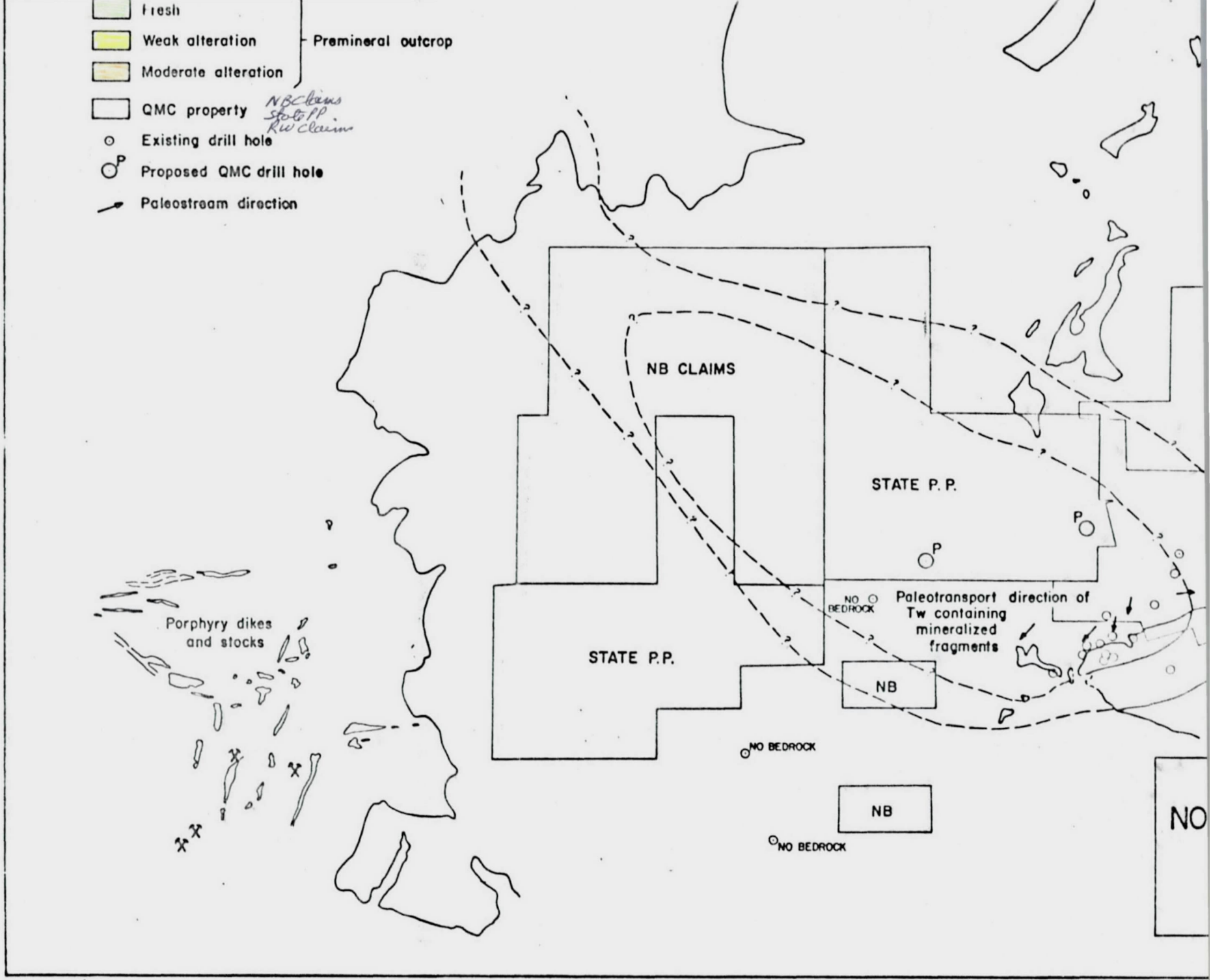


Figure 2

NORTH BUTTE PROJECT

PINAL COUNTY, ARIZONA

200' 100' 0 2000' 4000'


Fresh
Weak alteration
Moderate alteration
Premineral outcrop
QMC property
NB Claims
State PP
RW claims
Existing drill hole
Proposed QMC drill hole
Paleostream direction
NB CLAIMS
STATE P.P.
STATE P.P.
NB
NB
NO BEDROCK
NO BEDROCK
NO BEDROCK
Paleotransport direction of Tw containing mineralized fragments
Porphyry dikes and stocks
NO

Basis for the North Butte Project (Continued)

The Whitetail Conglomerate of the Pioneer area outcrops in a narrow irregular band parallel to the edge of premineral outcrop. The outcrops are principally composed of schist fragments with lesser amounts of granite and porphyry. Mineralized fragments are present but the outcrop area is small relative to the Ray West area, so that observation of a large number of widely separated exposures is not possible. Imbricated pebbles suggest a south or southwesterly paleotransport.

Several drill holes which penetrated the Whitetail Conglomerate intersected what appears to be exotic copper mineralization (see Attachment 7) near the base of the formation. This mineralization resembles that at Copper Butte and like the Copper Butte exotic mineralization, suggests derivation from a not-too-distant source of copper, probably in an oxidized state.

A second, much weaker zone of alteration has also been noted at the edge of postmineral cover in the Mineral Hill district about five miles northwest of the Pioneer area. Although lacking the copper mineralization of the Pioneer area, the alteration contrasts sharply with the unaltered rocks along much of the perimeter of the covered North Butte block.

Conclusion and Proposed Drilling Program

The geometry of the North Butte alteration zones (see Figure 2) suggests that the Pioneer altered zone may be the southeastern end of an elongate zone which extends northwestward beneath postmineral cover--possibly emerging at the south end of the Mineral Hill district.

All of the drilling to date has been within 1800 feet of premineral outcrop and drilling opposite the most favorable exposures is confined to within 900 feet of premineral outcrop. This drilling, which encountered 0.1-0.2 percent copper mineralization is open to the north and northwest and constitutes an attractive drilling target.

Two drill holes, NB-1 and NB-2 are proposed for 1972. The locations of these holes are shown on Attachment 1 and Figure 2. They are located respectively 4000 feet north and 6000 feet northwest of the Pioneer area. Subsequent work during 1973 will continue testing the North Butte area on widely spaced centers.

APPENDIX I

HYDROTHERMAL ALTERATION OF
OUTCROP SAMPLES
REFERENCE SUITE - RAY DEPOSIT
FOR SAMPLE LOCATIONS REFER TO ATTACHMENT 1

RW-104	Cu 102 ppm Mo 1 ppm	Granodiorite - rusty yellow brown. Biotite - shiny, no sign chlorite. Potassium Feldspar - dull surfaces, no well developed alteration product. Plagioclase - thoroughly altered to dull white pseudomorphs. General - tends to be very crumbly, has appearance of deep weathering.
RW-105 105 ↓ 106	Cu 15 Mo 1 Homogenous texture Lim/sul.	Schist - gray with dark rusty brown and yellow rusty brown surface iron stains. Dark stains resembling incipient dendrites, but no manganese oxide stains rub off. Fine grained - mixture of quartz and sericite. Foliation barely visible.
RW-106 106 ↓ 107	Cu 28 Mo 1 Chlorite	Schist - gray to dark gray with some manganese oxide and very very sparse limonite formed after pyrite on foliation planes. Also some powdery yellow jarosite present. Sample shows some homogenication of texture. Possible slight silification.
RW-107 107 ↓ 108	Cu 30 Mo 1 Well developed lim/sul. Bleaching Clay	Schist - silvery gray with rusty yellow-brown stain. Prominent blades of chlorite. Very very sparse limonite formed after pyrite on foliation surfaces. Surfaces accentuated and with soapy feel.
RW-108 108 ↓ 109	Cu 81 Mo 2 Lithology change.	Schist - silvery gray to white with brown iron stains. Local well developed limonite after sulfide on hairline fractures. Schist very homogenous. Foliation barely visible. Rock has strong clay and is probably silicified.

RW-109	Cu 107 Mo 4	Porphyry - gray, no iron stains. Biotite - prominent specks, shiny. Plagioclase - all clouded, porph. texture well developed, strong overall clay content. Potassium Feldspar - cloudy, some intergranular erosion.
109		
	Lithology change. Red limonite. Partly decomp. sul. Coarse texture.	
110		
RW-110	Cu 400 Mo 5	Schist - gray with rusty reddish-brown and yellow-brown limonite after sulfide. Also manganese oxide blebs. Definite coarsening of texture, coarse sericite and possible silification. Quartz eyes begin to form.
110		
	Lithology change. Change in texture. Quartz eyes form.	
111		
RW-111	Cu 246 Mo 5	Schist - gray with rusty yellow-brown stains. Pitchy botryoidal limonite after sulfide. Very coarse sericite or chlorite (?) gives speckled appearance.
111		
	Lithology change. Fresh biotite. Fresh plagioclase	
112		
RW-112	Cu 790 Mo 9	Porphyry - gray to gray-green with rusty yellow-brown limonite. Poorly developed ragged porph. texture. Biotite - shiny with some red limonite. Plagioclase - ragged crystals but with twin lines. Possibly some green sericite.
112		
	Lithology change. Change in habit of coarse sericite.	
113		
RW-113	Cu 26 Mo 3	Schist - dark gray to black. No iron stains. Some Manganese oxide. Coarse sericite limited to fractures. Fresh strong biotite, well distributed.
113		
	Lithology change. Fresh feldspar	
114		
RW-114	Cu 91 Mo 2	Precambrian granite - gray to pink, well developed, coarse granitic texture. Weak yellow and brown limonite and manganese oxide stains. Potassium Feldspar - very shiny. Plagioclase - general slight cloudiness, but with with lines and local chlorite.
114		
	Change to crumbly granite.	
115		

RW-115	Cu 193 Mo 2	Precambrian granite - gray to pink with weak yellow-orange iron stains. Potassium Feldspar - fresh.
115		Plagioclase - general cloudiness.
	Lithology change.	Biotite - chloritized with some oxidation of iron.
116		Rock tends to be crumbly and deeply weathered.
RW-116	Cu 17 Mo 4	Porphyry - gray with weak red and yellow limonite stains. Strong speckled chlorite.
116		Plagioclase - general cloudiness with some hemogenization of texture.
	Lithology change.	
117		Weak clay present. Possible silification.
RW-117	Cu 19 Mo 1	Precambrian granite - gray to pinkish gray. Potassium Feldspar and Plagioclase - cloudy, but intact. Sparse chlorite. Deeply weathered appearance.
RW-118	Cu 19 Mo 1	Precambrian granite - gray to pinkish gray. Potassium Feldspar and Plagioclase - cloudy, but intact.
	Lithology change.	Sparse chlorite. Deeply weathered appearance.
RW-119	Cu 45 Mo 3	Diorite - light gray-gray green. Speckled with fresh biotite. Plagioclase - very fine grained, cloudy.
119		Strong clay content.
120		
RW-120	Cu 44 Mo 4	Diorite - light gray-gray green. Speckled with fresh biotite. Plagioclase - fresh. No clay.

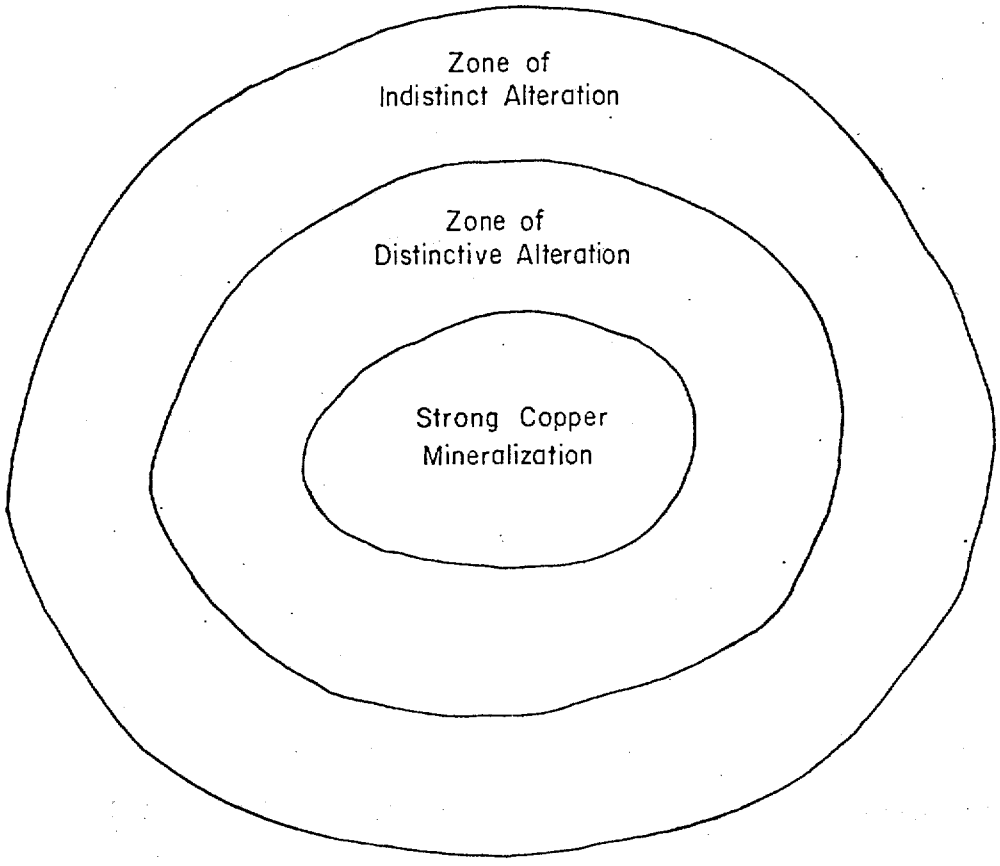
GENERAL CONCLUSIONS

1. Samples RW-107 through RW-111 show definitive alteration effects.

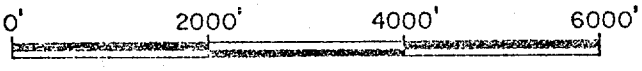
2. Samples RW-105-106 and RW-112-113 show less definitive effects. May or may not be interpreted in terms of strong mineralization.

3. Samples RW-104 and 114-120 show background effects typical of Ray district. Probably not useful in specific guide to mineralization.

4. Diagnostic alteration effects suggestive of strong mineralization have not been recognized in premineral outcrop of the Ray West project area.



"TYPICAL" PORPHYRY COPPER DEPOSIT AND ASSOCIATED HYDROTHERMAL ALTERATION ZONES



(Porphyry alteration model after Lowell and Guilbert, 1970)

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Lowell, J. D. and Guilbert, J. M., 1970, Lateral and Vertical Alteration-Mineralization Zoning in Porphyry Ore Deposits: Econ. Geol., Vol. 65, No. 4, Pages 373-408.

LIST OF ATTACHMENTS

1) Outcrop Geochemical Map - Ray West and North Butte Projects 1"=2000'

2) Hydrothermal Alteration - Ray West-North Butte Area 1"=2000'

3) Geologic Map of the Ray West-North Butte Area 1"=2000'

4) Composite of Drill Hole Assay Data - Ray West and North Butte Projects, Sheet 2 - East Half 1"=500'

5) Preliminary Cross Sections A-A and B-B - Ray West-North Butte Area 1"=2000'

6) Land Ownership - Ray West and North Butte Projects Pinal County, Arizona 1"=2000'

7) Composite of Drill Hole Assay Data - Ray West and North Butte Projects, Sheet 1 - West Half 1"=500'

PROGRESS REPORT
RAY WEST & RAY WEST ADAMS PROJECT
PINAL COUNTY, ARIZONA
10/30/72

BY: L. CLARK ARNOLD

Quintana Minerals Corporation
1892 WEST GRANT ROAD
TUCSON, ARIZONA 85705
602/622-4801

October 30, 1972

PROGRESS REPORT
RAY WEST & RAY WEST ADAMS PROJECT
PINAL COUNTY, ARIZONA

Summaries are attached for drill holes RW-1 and RW-2 which were drilled through postmineral cover into bedrock during the first stage of the Ray West Project.

Alteration and weak sulfide mineralization were encountered in RW-1 but diagnostic effects were not recognized. Results from this hole were essentially negative, but drilling did serve to prospect a large, previously untested block lying between hole CB-9 and the small premineral outcrop in the Rincon area.

Results from RW-2 were more encouraging. Porphyry alteration associated with weak but consistent sulfide mineralization was present. In most cases such results would warrant offset drilling. However, in the case of the Adams property, the combined geometry of unaltered outcrop and pre-existing drill holes, for which results are known, virtually eliminates the southern half of the Adams property as far as porphyry-type mineralization is concerned.

I suggest that during 1973, four (4) holes be drilled near Copper Butte in the approximate locations shown on the accompanying map. This work will test for a possible western extension of the Copper Butte exotic mineralization.

Also suggested for 1973 are three (3) scout holes(RW-3, 4 & 5)to be drilled at the locations shown on the accompanying 4000-scale map.

The locations for these holes have been selected on the basis of accessibility, as well as porphyry copper geometry. If all three are completed into bedrock as RW-1 and RW-2 were, the 5-hole group should constitute a reasonably good scout test of the RW-claim group. At that time, it should be possible to make a decision to hold or drop the property.

Unless substantial changes are necessary in the locations of RW-3, 4 and 5, minor road building will be required. Each site is located on or very close to one of the bulldozer roads constructed in the course of claim validation. Only slight improvement will be necessary to make the roads suitable for medium sized drilling equipment.

L. Clark Arnold

LCA/bb
Attachments

Quintana Minerals Corporation
1892 WEST GRANT ROAD
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September 26, 1972

SUMMARY OF RAY WEST DRILL HOLE RW-1

RW-1 was collared by the E. J. Longyear Company in Gila Conglomerate on May 2, 1972. Rotary drilling penetrated 280 feet of Gila Conglomerate and passed into Tertiary dacite. The basal vitrophyre unit of the dacite occupied the interval 960-1020. The interval 1020-2685 contained Whitetail Conglomerate.

The Whitetail section has been divided into three parts on the basis of attitude and lithology:

1020-1566...Conglomerate containing fragments representing a number of lithologies including limestone. Beds in this unit dip $\pm$ 20°. No copper mineralization was recognized but assays indicate 0.05 - 0.10% Cu.

1566-1909...Reworked clay pellet conglomerate-contorted - contains very few rock fragments. No copper mineralization observed but assays show 0.02 - 0.05% Cu.

1909-2685...Iron-stained conglomerate - principally composed of schist fragments. Beds dip $\pm$ 30°. Sparse native copper is present- Cu 0.01 - 0.13%.

From 2685 to the bedrock contact at 2827.5 Whitetail Conglomerate was cut repeatedly by one to ten foot sections of white tuff and black vitrophyre. Beds containing large amounts of strongly mineralized fragments were not intersected in the Whitetail section penetrated by hole RW-1.

At 2827.5 drilling intersected strongly brecciated and intensely deformed Pinal Schist. The schist is gray to gray-green to black, well foliated and intensely broken in a manner suggestive of a landslide or chaos deposit or even breccia pipe formation. No evidence of leached sulfides was recognized.

Fresh disseminated pyrite was first noted in the interval 2922-2973 and amounted to an estimated 1 - 2% of total rock volume. Geochemical values for the interval are shown below:

Interval 2922-2973	High	Low	Average
Cu	210ppm	31ppm	109ppm
Mo	5ppm	2ppm	3ppm

Pinal Schist continued to 3073 feet, still strongly deformed but unmineralized.

Interval 2973-3031	High	Low	Average
Cu	107 ppm	20 ppm	47 ppm
Mo	7 ppm	3 ppm	4 ppm

At 3073 feet drilling intersected an apparent intrusive contact and passed into a white quartz latite porphyry. The porphyry is thought to be of post mineral age but contains very, very sparse chrysocolla.

Interval 3073-3157	High	Low	Average
Cu	216	35	85
Mo	7	2	5

Drilling proceeded to 3157 T.D. and was terminated in the quartz latite porphyry at 10:00 A. M., August 1, 1972.

L. Clark Arnold

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LCA:lr

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1892 WEST GRANT ROAD
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September 26, 1972

SUMMARY OF RAY WEST - ADAMS DRILL HOLE RW-2

Drill hole RW-2 was collared in Quaternary alluvium by the E. J. Longyear Company on April 20, 1972. After penetrating 40 feet of alluvium material rotary drilling intersected Tertiary dacite and continued in that formation to core point at 746 feet. The interval 680 - 746 was characterized by a heavy water flow. Dacite, with weak flow banding dipping at ± 10° continued to 846 feet where the drill passed directly into Whitetail Conglomerate without intersecting the basal vitrophyre unit.

Whitetail Conglomerate occupied the interval from 846 to 2430. The conglomerate is composed of angular to subround fragments one to four inches in diameter set in a reddish or very dark brown matrix. Limestone is the principal rock type although schist, granite and quartzite are also present. Bedding attitude is uncertain but appears to be ± 15° in the upper part of the formation increasing to 30° near the base. Mineralized rock fragments are occasionally noted but no concentration of such fragments was observed in the section penetrated.

Sparse native copper was noted in the interval 1275 - 1517 the assay values for this interval are shown below:

	High	Low	Average
Cu	1760ppm	108ppm	792ppm
Mo	29ppm	8ppm	16ppm

The interval 1517 - 2430 contained copper values only slightly above background.

At 2430 drilling intersected Pinal Schist which was gray with a poorly developed foliation and very sparse disseminated fresh pyrite. At 2444 RW-2 passed out of the schist into a gray granodiorite which was weakly altered (propylitic alteration) and contained very sparse disseminated chalcopyrite.

Unmineralized diorite occupied the interval 2463 - 2497 where drilling again intersected weakly altered, mineralized granodiorite. Drilling proceeded in the granodiorite to a depth of 2641 feet where drilling stopped on September 7, 1972.

Assay values for the premineral portion of RW-2 are shown below:

Interval 2430 - 2641	High	Low	Average
Cu	590ppm	60ppm	257ppm
Mo	86ppm	5ppm	19ppm

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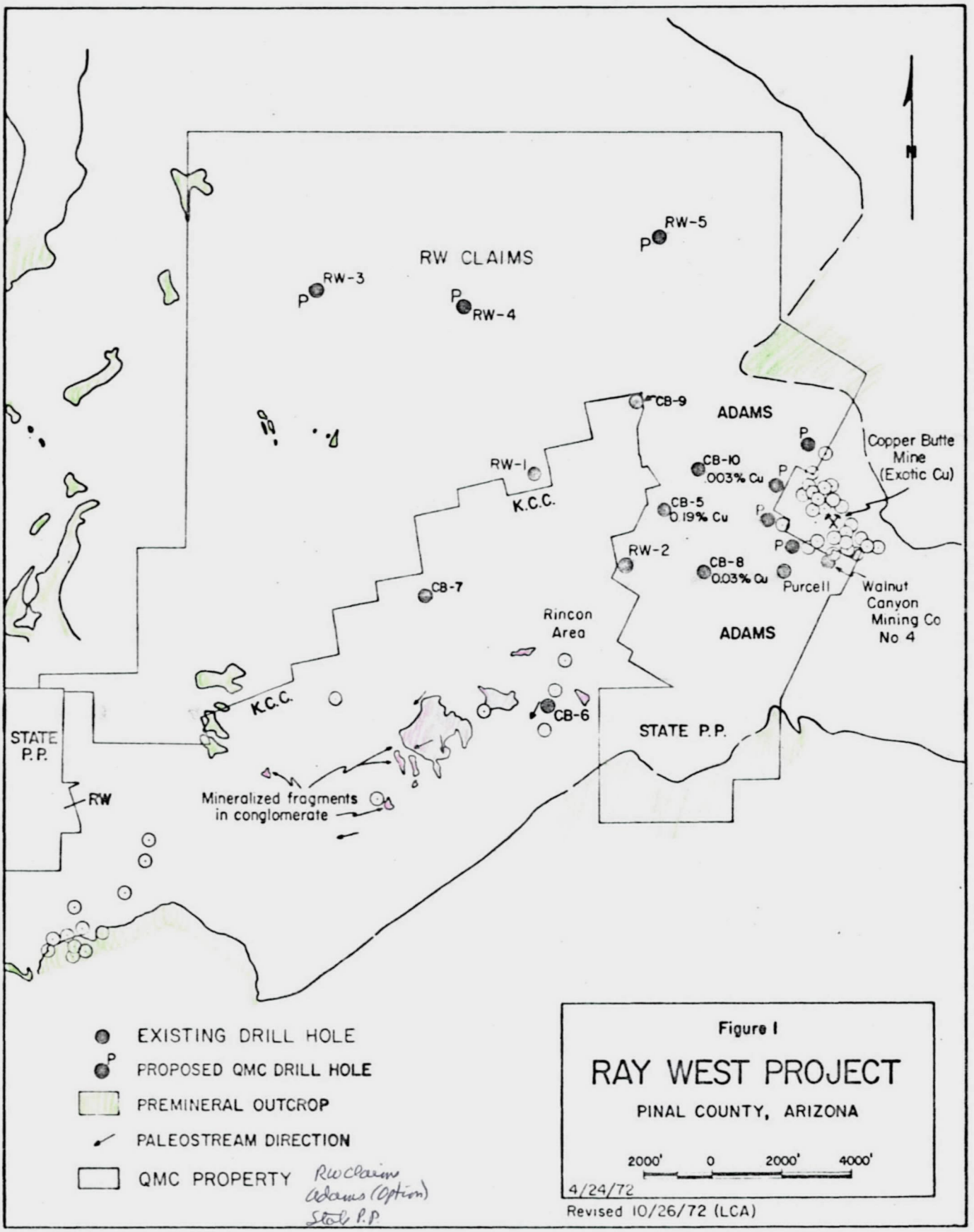
RW CLAIMS
RW-5
RW-3
RW-4
CB-9
ADAMS
RW-1
K.C.C.
CB-10
0.03% Cu
Copper Butte
Mine
(Exotic Cu)
CB-5
0.19% Cu
RW-2
CB-8
0.03% Cu
Purcell
Walnut
Canyon
Mining Co
No 4
CB-7
Rincon
Area
ADAMS
K.C.C.
CB-6
STATE
P.P.
STATE P.P.
RW
Mineralized fragments
in conglomerate
N
EXISTING DRILL HOLE
PROPOSED QMC DRILL HOLE
PREMINERAL OUTCROP
PALEOSTREAM DIRECTION
QMC PROPERTY
RW Claims
Adams (Option)
State P.P.
Figure 1
RAY WEST PROJECT
PINAL COUNTY, ARIZONA
2000' 0 2000' 4000'
4/24/72
Revised 10/26/72 (LCA)