CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
520-770-3500
http://www.azgs.az.gov
inquiries@azgs.az.gov

The following file is part of the

Richard Mieritz Mining Collection

ACCESS STATEMENT

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

CONSTRAINTS STATEMENT

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

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

QUALITY STATEMENT

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

A

GEOLOGIC, GEOCHEMICAL

and

GEOPHYSICAL

EVALUATION REPORT

on the

HORTENSIA CLAIMS

SUPERIOR DISTRICT

Pinal County, Arizona

by

R. E. Mieritz
Mining Consultant
Phoenix, Arizona

June 9, 1970

TABLE of CONTENTS

INCLUDED MAPS

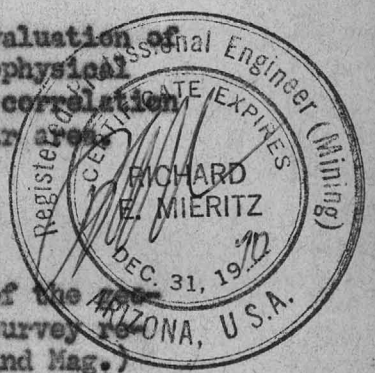
* These Maps reprinted and are part of Arizona Bureau of Mines Bulletin #151.

INTRODUCTION:

At the request and authorization, of and by, Mr. Sherwood B. Owens, Tucson, Arizona, the writer physically examined the Hortensia group of claims approximately 2½ airline miles north, northwest of Superior, Arizona. The property is adjacent to Magma Copper Company property along a major geologic fault of the Superior Mining District.

After the writers initial on-the-ground examination, it was suggested that the geologic conditions present should lend themselves to a preliminary geochemical survey as well as geophysical surveys in the area of greatest interest which exhibits major fault structures and rock types that should host and promote copper mineralization.

This report includes the results, interpretations and evaluation of the completed preliminary geochemical survey and the geophysical surveys (Induced Potential and Magnetic) as well as the correlation of these results with the known geology of the particular area.



CONCLUSIONS:

As a result of the writers field examination and study of the geologic conditions, the study of the preliminary geocham survey results, the study of the preliminary geophysical (I. P. and Mag.) surveys, the correlation of all known facts and results and the writers knowledge and experience, of and in, copper mineralisation in Arizona and elsewhere, the following conclusions for the Hortensia property are forwarded for your consideration.

(1) The Hortensia property is in close proximity with the famous, long life producing Magma Mine. The property hosts the rock types and major faults which are associated with the strong copper mineralization known to exist in the Magma Mine.

(2) Surface-wise, little to no copper mineralisation is evidenced, however, moderate alteration and fracturing of the diabase, the contained yellow to red and black, moderately "live" appearing limonite, derivatives of pyrite, chalcopyrite and bornite, the observance of some cross faults trending N-S to NE and the existance of the major faults are all indicators of mineral potential in the area.

(3) The foregoing criteria coupled with results and interpretations of both the preliminary geocham survey and the preliminary geophysical surveys completed, have isolated three distinct "Targets", and, suggested a fourth broad scale target.

(4) An expenditure from $125,000 to $150,000 would be required to complete an initial minimum exploratory drilling program of four 1500 foot holes to test the three isolated Targets for their condemnation or prove that mineralization worthy of further development does exist.

FORWARD:

High grade copper ores and high grade silver ores have been mined from fault fissures in the Superior District for in excess of 50 years. Magma Copper Mine produces approximately 1200 tons per day high grade copper ore from its 4800 foot deep mine. The company mines, mills and smelts this tonnage at Superior and employs approximately 1200 persons for the three phase operation.

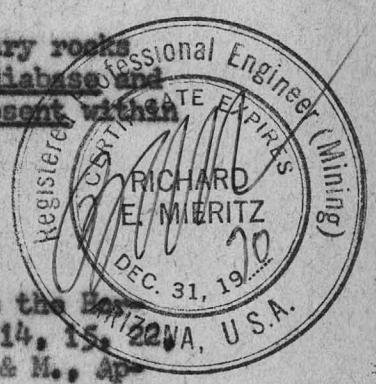
This production is mined from mineralized fault fissures (a very complex system -- See Map Nos. 2 through 5 and 7) containing the primary copper minerals bornite with chalcopyrite and some chalcocite. Lower grade, disseminated copper ore also exists in the known intrusive rocks of the mine. Five major faults, Main, Magma, Concentrator, Silveride and Parallel, are the controlling structural features in the district, however, the pattern is complicated by tremendous displacements along these faults, by minor complimentary faults and further by cross faults, all of which seem to exhibit displacement to some degree. The diabase intrusive appears to be the district disrupter. (See Surface Geology Map No. 7).

The Hortensia property, although northwest of Magma Copper Mine production, does host four of the above mentioned major faults, namely, Concentrator, Parallel, Silveride and by projection, possibly the Magma. By projection also, it is likely that the Conley Spring fault may also be present on the property.

Magma Copper is the only producer in the district. They, just recently, announced the delimitation of a 9,000,000 ton ore body of 7.0% copper content. They are currently sinking their new shaft (1½ miles ESE of the No. 1 Shaft now used) to the 6,000 foot level with projection to a 9,000 foot depth.

Magmas' production activity is east, southeast of the No. 1 Shaft near the mill, however, they, nor anyone else has completed any serious exploration to the northwest. Information has it that the Concentrator fault is under pressure and although it has been penetrated by the No. 7 Shaft and the 2000 foot level, it has not been possible to keep these workings open. It is reported that Magma lost much equipment in this endeavor and thus, has deterred development to the northwest. It is reported the Concentrator fault contained strong bornite mineralization where penetrated.

Mineralization at the Magma Mine occurs in the sedimentary rocks (Paleozoic) in the upper levels, whereas mostly in the diabase and Dripping Spring quartzite at depth -- the same rocks present within the Hortensia claims. (See Map Nos 2 through 5)



PROPERTY, LOCATION and ACCESSIBILITY:

The property includes 43 unpatented lode claims known as the Hortensia Nos. 1 through 43 which lie in parts of Sections 14, 15, 22, 23, 26 and 27 of T. 1 S., R. 12 E. of the G. & S. R. B. & M., Approximately 1⅛ to 2⅛ airline miles north, northwest of Superior.

Arizona. Travel to the property by automobile from the center of Superior is southwest on the main E-W street to U. S. Route 60-70, thence westerly one mile on U. S. 60-70 to the Silver King Road turnoff, thence north (right) past the Perlite Plant on the Silver King road for 2½ miles to a windmill and a 90° curve to the right. (See Property Map No. 6) This area is the southeast portion of the property.

The property is 70 miles by road east of Phoenix. Southern Pacific Railroad services Magma Copper Co. and town of Superior. A new electric highline passes 2/3 of a mile east of the property. No large quantity of water is developed nor is there gas on the property but gas is available in Superior.

No adequate, accurate map of the claims exists, consequently the property map included herein is approximate, particularly at the north end. Control of claim position at the south end is by Magmas' surveyed property line. Magma Copper Co. acknowledges and recognizes the Hortensia claims. The claims should be surveyed and the position of the outside corners accurately located.

Registered Professional Engineer (Mining) CERTIFICATE EXPIRES RICHARD E. MERITZ DEC. 31, 1970 ARIZONA, U.S.A.

DEVELOPMENT:

Except for a few shallow shafts, pits, discovery cuts and an 85' long adit (near north end of claims) the property is undeveloped.

The Adit shows chalcopyrite and bornite copper mineralization along the laminations of the silicified schist over a width of a few feet. Target-wise, this area has not been considered, however, it should be investigated when exploration is being completed on the other targets. A one piece character sample from the Adit dump assayed 0.82% copper, 0.005 ounces gold and 0.17 ounces silver to the ton. Mr. A. Buehl, co-owner of the property has stated that a former optionee drilled a few holes to the northwest of the Adit - on the northwest hill slope - and that these 100 to 200 foot (?) holes averaged 1.0% copper. However, there are no records.

GEOLOGY and MINERALIZATION:

The geology of the Superior district is quite complicated by the major, minor and cross faulting that has occurred as a result of the diabase intruding the area. (Surface Geology Map No. 7 shows this complexity). This intrusion caused the uptilting of the various sediments and the rock is exposed on the surface, particularly in the area of the Hortensia claims. In the vicinity of the property however, the complexity is somewhat reduced due to the lack or absense of several sedimentary formations. Rock types present within the property are diabase, Dripping Spring quartzite, Pioneer shale, Pinal schist, basalt and Whitetail conglomerate.

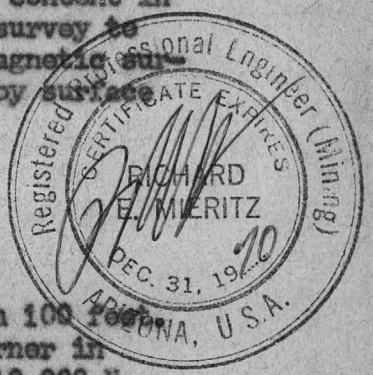
Structural features present within the property are: Concentrator Fault, Parallel Fault, Silveride Fault and possibly, by projection, and pattern, the Magma Fault and the Conley Spring Fault. All these

structures have a northwest trend and are known to be mineralized east and southeast of the Hortensia property. Cross faults have been observed by the writer, but have not been mapped in detail because of much surface cover.

Mineralization at the Magma Mine occurs in the fault zones as replacement of the shattered rocks. Above the 800 level the mineralization is in porphyry dikes and the Paleozoic sediments. From the 800 to the 4000 level the mineralization occurs in the fault zones mostly in the diabase and to some extent in the Troy quartzite. Below the 4000 level the wall rock is Pinal schist. Map No. 5 - Vertical Projection on an East-West Section - indicates that mineralization also occurs in the Dripping Spring quartzite and the Pioneer shale, both of which rocks are exposed on the Hortensia claims as well as the diabase and Pinal schist.

Although little to no copper mineralization is exposed on the faults or rock types within the property, there is no conclusive proof that it would not be present at depth. Strong mineralization at Magma was not encountered much before 400 feet. Other indicators of mineralization as rock alteration, the presense of iron oxides (after pyrite, magnetite and copper minerals), and a considerable display of closely spaced fractures, all point to potential mineralization below the surface.

With such evidence at hand, after the initial ground examination, the writer suggested a preliminary geochemical soil survey be completed to obtain, if possible, a "surface expression" of copper content in ppm and also to conduct a preliminary Induced Potential survey to possibly disclose "mineralization" at depth and also a Magnetic survey to indicate possible "cross faults" not discernable by surface observation.



GEOCHEMICAL and GEOPHYSICAL SURVEYS:
Geochemical:

An east-west base line was established with stations each 100 feet. (See Map Nos. 8 and 9). One of Magmas surveyed claim corner in Silver King Wash was assigned coordinates 10,000 E. and 10,000 N. - shortened to 10.0E. and 10.0N. The base line was run to 11.9E, 10.0N. Four north-south grid lines spaced 500 feet apart were run at coordinates 10.4E., 10.9E., 11.4E. and 11.9E. Each grid line was 3000 feet long with 100 foot spaced stations and so located as shown on Map Nos. 8 and 9.

Geochem soil samples were taken by the writer on these north-south grid lines at the 100 foot stations as indicated on Map No. 8. Soil samples were also taken on east-west grid lines at 100 foot stations but at 200 foot north-south intervals. A total of 166 samples were taken to complete a preliminary survey.

Geophysical:

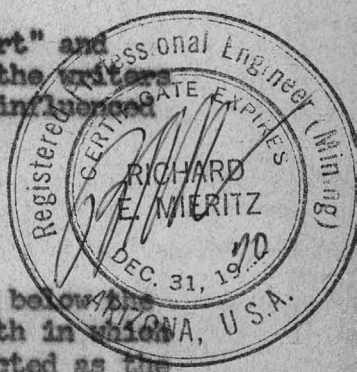
The I. P./Mag. surveys were completed by McPhar Geophysics Inc., Tuc-

son, Arizona. A crew of four completed the I. P. survey of the four 3000 foot north-south lines on May 11, 12 and 14, 1970. Dipole-dipole spreads up to 500 foot spacings and frequencies of 0.125 and 1.25 cycles per second, were used.

A one man magnetometer crew completed the magnetic survey on the same north-south grid lines at 100 foot intervals using a flux gate magnetometer. This work was completed on May 14 and 15, 1970.

McPhar has provided their report - including recommendations regarding additional geophysical or geological investigations and exploratory drilling as indicated by their interpretations of the survey results, maps, and drawings showing the geophysical measurements and the location of anomalus zones.

The writer has reviewed and studied McPhars "advance report" and recommendations. The conclusions and recommendations of the writers report are those of the writer which are not necessarily influenced by the McPhar report, except to utilize the factual data.



GEOCHEMICAL SURVEY RESULTS and INTERPRETATION:

Geochem samples were taken of the soil from 6 to 8 inches below the surface unless bedrock was encountered at a shallower depth in which case, material from 1 to 2 inches above bedrock was collected as the sample. These samples were analyzed by EFCO Laboratories, Tucson, Arizona and reported as ppm copper. The values ranged from a low of 51 ppm to a high of 1400 ppm. A short "sample discription" as to soil color, float rock, etc, were noted on each sample tag retained by the writer for reference and to be used as a guide for interpretation of the survey.

The ppm for each sample, the sample location, the rock type, the color, the surface drainage and erosion pattern, the structural fracture pattern and rock alteration degree are all considered and correlated to provide the basis for the interpretation of this survey.

The diabase rock in the surveyed area is highly altered and fractured. It also exhibits iron oxide (limonite) after magnetite, a constituent of the diabase. In places near the major faults and elsewhere, but not uniformily distributed, iron oxide (limonite) after pyrite and the copper minerals chalcopyrite, bornite and chalcocite were observed by the writer in moderate quantity. Lack of the uniform distribution of the limonite derivatives should not pre-conclude there is no strong continuous mineralization at depth - on the contrary - the minimal evidence would greatly suggest strong mineralization at depth as indicated and evidenced by the known characteristics of the Magma Mine. The writer would not expect strong mineralization above a 350 foot depth. Weaker, low grade, wide spread mineralization between the Concentrator Fault and the Silveride Fault at a shallower depth is a very strong possibility.

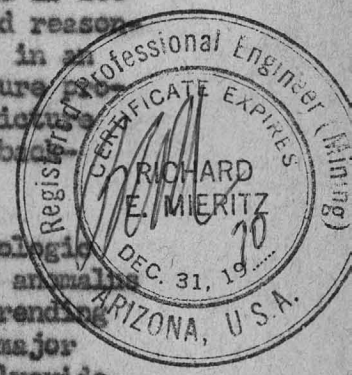
The soil sampled area has outcrops of Dripping Spring quartzite, dis-

base, Pioneer shale, basalt and Whitetail conglomerate. Soil sample values varied from a low to a high regardless of the rock type or soil type. Consequently, anomalus areas are not associated or limited to the rock types. Some grouping of ppm values are necessary to develop a reasonable and realistic anomalus pattern.

To this end, the writer has grouped the ppm values into five categories or ranges, which are: less than 150 ppm, 150 to 299 ppm, 300 to 499 ppm, 500 to 799 ppm and 800 plus ppm. A total of 166 samples were taken - as shown on Geochem-Geology Map No. 8. Of these, 17 samples had a content of less than 150 ppm copper, 49 samples had values from 150 to 299 ppm, 56 samples ranged from 300 to 499 ppm, 28 samples ranged from 500 to 799ppm and 16 samples were in excess of 800 ppm with five of these of 1000 ppm or more. One hundred, or 60% of the total number of samples are considered anomalus, as explained below.

A "background" ppm in this area is quite difficult to ascertain because of the concentrated presense of the "major" faults and several minor faults of interest in the area. The occurance of seven samples with ppm less than 100, is, in the opinion of the writer, quite indicative of a "background count". However, to provide a factor of safety in this regard, the writer has reasoned and assumed a background of 299 ppm or that anomalus areas to have values of 300 ppm or greater.

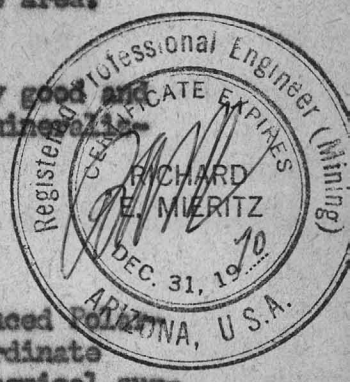
To confirm this reasoning, the writer attempted to locate some literature on this matter for this district. None is however available. To this end also, the writer contacted Mr. R. T. Moore of the Arizona Bureau of Mines in Tucson. Mr. Moore was not able to provide any verbal information nor references as to a "geochem background" in the Superior district. The writer telephoned Mr. Ralph Erickson, Chief of Exploration and Research, U. S. G. S. in Denver, Colorado to request any written material on the subject. Mr. Erickson could not provide any references so the subject was verbally discussed. The general picture of the geochem survey, its values, the structural and geologic conditions were explained to him. Mr. Erickson voiced the opinion that a count of 300 would or should be a "high background" and that it was possible and perhaps more realistic if 200 to 250 ppm were used. He also stated that the approach and reasoning used by the writer was coincidental with their methods in an unknown area. Mr. Erickson also stated if the 300 ppm figure provided a realistic pattern coincidental with the geologic picture and erosion surface, then consider the 300 figure as "top background".



With this assurance and criteria in mind as well as the geologic conditions present, the writer has developed the resulting anomalus pattern of alternate "strong and weak" zones (Map No. 8) trending in a northeast direction (more or less normal to the four major faults) between the limiting faults, - Concentrator and Silveride. In essense, the developed pattern strongly suggests and follows the trend of a "cross fault" pattern which geologically should be present since it is indicated that the Concentrator and the Silveride Faults are the limiting structures of what the writer believes to be

a large shear zone. The cross faults within such a shear zone, should develop at about 90° to the northwest trend - or northeast - and about 45° to the northwest trend - or north-south. The writer did find some evidence of the complimentary faults, - exhibit as N. 10° E., narrow silicified structure with copper stain in the shallow shaft at grid coordinates 10.0N., 10.3E., a fault at grid coordinates 9.4N. and 10.9E. striking N. 10°E. and iron stained, also a N. 50° E. iron stained fault at grid coordinates 8.6N. and 11.9E. Other such structures should exist and would be evidenced with a more detailed surface geologic map of the immediate area. (See Map No. 8, Geochem-Geology Map).

The results of the preliminary geochemical survey are very good and definitely suggest targets of both large area, low grade mineralization and fault fissure higher grade mineralization.



GEOPHYSICAL SURVEY RESULTS and INTERPRETATIONS:

McPhar Geophysical Inc., Tucson, Arizona completed an Induced Polarization survey and a Magnetic survey on the same east coordinate (10.4, 10.9, 11.4 and 11.9) lines as was most of the geochemical survey. McPhar have provided their own report, interpretations and recommendations as well as the explanatory ramifications of the two types geophysics used. These surveys were completed because the writer felt that the geochemical survey was not sufficient evidence alone and therefor needed supporting evidence. In the opinion of the writer, both the I. P. survey and Mag. survey results support and add to the results and confirmation of the geochem survey.

The interpretation of facts and figures for any geophysical method or survey is, in most cases, a supositional thought with many "ifs" and/or variations (Geophysists confirm this) - or in other words, the interpretations aren't always a "positive surity". These fickle concepts are derived using the facts and figures obtained from the survey which always enhance to many "unknowns". The geophysists try to minimize these unknowns and attempts to present the most realistic and reasonable interpretations to the best of the professions ability.

Individually however, presented with a set of facts and figures, where "unknowns" exist, no two persons will contrive the same, identical configurations.

As regards the I. P. survey, the writer agrees and is pleased with the anomalus results as shown by McPhar. The "unknown" in the anomalus areas are - what is at the indicated depths?. Surprisingly enough however, these I. P. anomalies correlate well in part, with the anomalus geochem zones. (See Map Nos. 8 and 9). Thus, we have a possible strong correlation between surface "highs" and subsurface "highs".

In the case of the preliminary Mag survey, the writer has some thoughts of disagreement as regards the contour interpretation of the set of "facts and figures" obtained from the survey.(refer to second

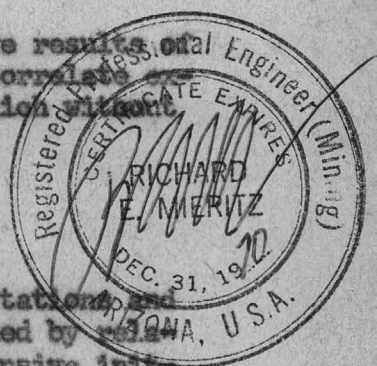
previous paragraph). (compare Map No. 9, Geophysical-Geology Map with McPhars' Vertical Intensity Magnetic Map).

The writer wishes to qualify that he has studied the surface geologic evidence and is more acquainted with same than McPhar. The writer also had the advantage of the geochem survey, however, an interpretation of the magnetics should be made on its own merit - coupled ofcourse - with the known surface geology. It is visioned that McPar has correlated the Mag survey values with the "major, structural geologic features". The writer has correlated the identical Mag survey values with a "cross fault" pattern which should exist in this immediate area.

Magnetic highs usually give rise to mineralization. Magnetic lows usually indicate faults or possibly rock contacts or changes. It can be seen by reviewing Map No. 9, Geophysics-Geology Map, that the writer has developed a pattern with a northeast trend for much of the area. Comparing Maps No. 8 and 9, it should be noted that the magnetic highs (plus figures and contours) are very much coincidental with the high copper ppm values and "anomalus" geochem zone pattern. The strong magnetic lows adjoining and paralleling the magnetic high patterns suggest strong faults or rock structures, both of which could be mineralized.

Viewing Map No. 9, it can also be seen that the possible MF (Metal Factor anomalies correlate with magnetic lows which parallel the Concentrator Fault. The probable MF anomaly correlates well with the very strong magnetic high. The I. P. survey has indicated five PFE (Percent Frequency Effect) "above background" anomalies in the grided area.(north of coordinate 9.5N.). By supposition, these anomalies may indicate a possible dip of the suspected mineralization indicated by the Mag highs and/or the Geochem highs in the respective vicinitys. At least they indicate a "disturbance" to the norm which the geophysist can not overlook and which must be investigated in some fashion.

In summary, the writer is convinced that the interprotive results of the geochemical survey and the two geophysical surveys correlate extremely well and isolate possible exploration targets which without such surveys, might have remained un-noticed.



EXPLORATION TARGETS:

The accuracy of the geochemical and geophysical interpretations and expectancy by McPhar and the writer can only be determined by relatively deep exploratory drilling. This would be an expensive initial phase, however, discovery of a large tonnage, low grade deposit and/or strong mineralization in vein form duplicating that of Magma is in the offering.

Three target areas ("A", "B" and "C" on Map No. 8 and 9) are selected by the writer by reason of analysis of the preliminary geochemical survey, the two geophysical surveys and the known surface geologic and structural conditions surrounding the area of interest.

Target "A":

In this area, close to the Concentrator Fault, several exceptional criteria are exhibited which isolate this area as a target. These are:
(1) An observed N. 10^0 E. fault with heavy iron oxide and clay near coordinates 9.4 N. and 10.9 E.
(2) Diabase outcrops in the area.
(3) The preliminary magnetic survey has its highest single plus gamma value (3893) of the survey at coordinates 9.4 N. and 10.9 E.
(4) The preliminary I. P. survey indicates the strongest anomaly of the survey which McPhar has classified as "probable mineralization" at a shallow depth - meaning 300 to 500 feet.
(5) Geochem-wise, the values range from 120 to 280 ppm in the immediate are - which the writer has assumed as "background". These samples may have been strongly diluted by the soil created from the very barren basalt outcropping immediately south and uphill from coordinates 9.4 N. and 10.9 E. A strong geochem zone does trend NE-SW and almost reaches coordinates 9.4 N. and 10.9 E. (See Map No. 8). The I. P. anomaly may indicate a rake at depth to the SW for the geochem "high" trending NE. A similar rake may be indicated by the above background PPE on line 11.4 E. between 9.6 N. to 10.1 N.

Target "B":

Target "B" is a broad area centered about and around coordinates 10.1 N. and 11.7 E. This target has been isolated by the writer for the following reasons:
(1) The close confluence of the Silveride and Magma (?) Faults.
(2) Contacts between diabase and quartzite, diabase and shale as well as a large exposure of diabase.
(3) The preliminary Mag survey indicates a broad area of moderate highs bounded on two sides (NW and SE) by magnetic lows which may indicate rock contacts and/or fault structures.
(4) McPhar indicate above background I.P. anomalies appear on lines 11.4 E. from 9.5 N. to 10.0 N. and on line 11.9 E. from 10.25 N. to 10.75 N. with moderate to shallow depths respectively.
(5) Geochem-wise, copper values for the soil samples range from 260 to 910 ppm. These cover a wide area except for a narrow "low" background zone which separates two broader, higher value zones, all three zones of which trend NE.

Target "C":

The choice of Area "C" as a target is controlled and justified by the following:
(1) The entire area hosts the Dripping Spring quartzite - underlain by diabase.
(2) The quartzite exhibits NE trending faults between the Parallel and Magma (?) faults.
(3) A NE trending magnetic anomaly - half value of Target "B", - is present near coordinates 8.9 N. on line 11.9 E.
(4) The I. P. preliminary survey indicates a shallow to moderate "possible" anomaly south of the "target" which could mean a rake of mineralization to the south at depth.

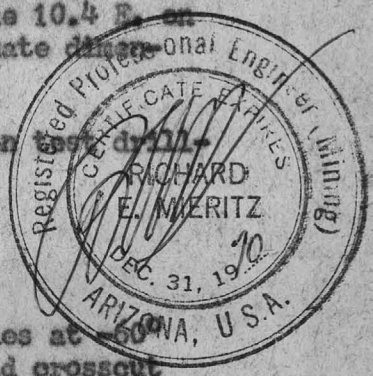
(5) The target enhances a broad area of high geochem soil sample values ranging from 310 to 1000 ppm.

Target "B":

This target, not labeled on the maps, includes the entire area as a unit - indicating the possibility of a large volume low strength mineralization which could well be sufficiently strong in primary mineralization to be classed as ore.

The above consideration is reasonable and justified by the following:
(1) The area hosts, for the most part, diabase which is a well mineralized rock in the Magma Mine.
(2) The area hosts four major NW trending faults which show strong movement of the intervening blocks.
(3) The preliminary I. P. survey indicates numerous places of "disturbance as anomalies ranging from "above background" PFE to possible and probable MF zones, from shallow to moderate depths (350 to 750 feet).
(4) The preliminary magnetic survey enhances a wide range of systematic "highs" and "lows" in favorable combinations - regardless of the opposite patterns developed by McPhar as one alternative and the writer as a second alternative - both using the same set of values.
(5) The preliminary geochem survey indicates an overall anomalus area with but three relatively narrow northeast trending "background" zones. This broad wide area lies between the Concentretor and Silveride Faults on the SW and NE respectively and from line 10.4 E. on the NW to line 11.9E. on the SE. - an area with approximate dimensions of 1300 feet NE-SW and 1800 feet NW-SE.

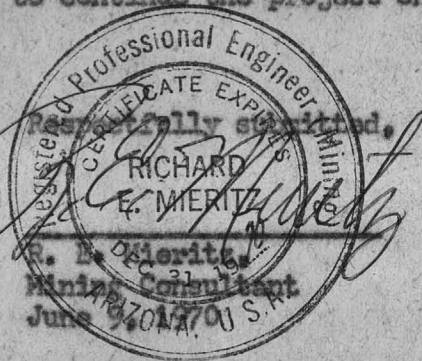
Part of this target would be simultaneously explored when test drilling Targets "A", "B" and "C".



EXPLORATION EXPENDITURE:

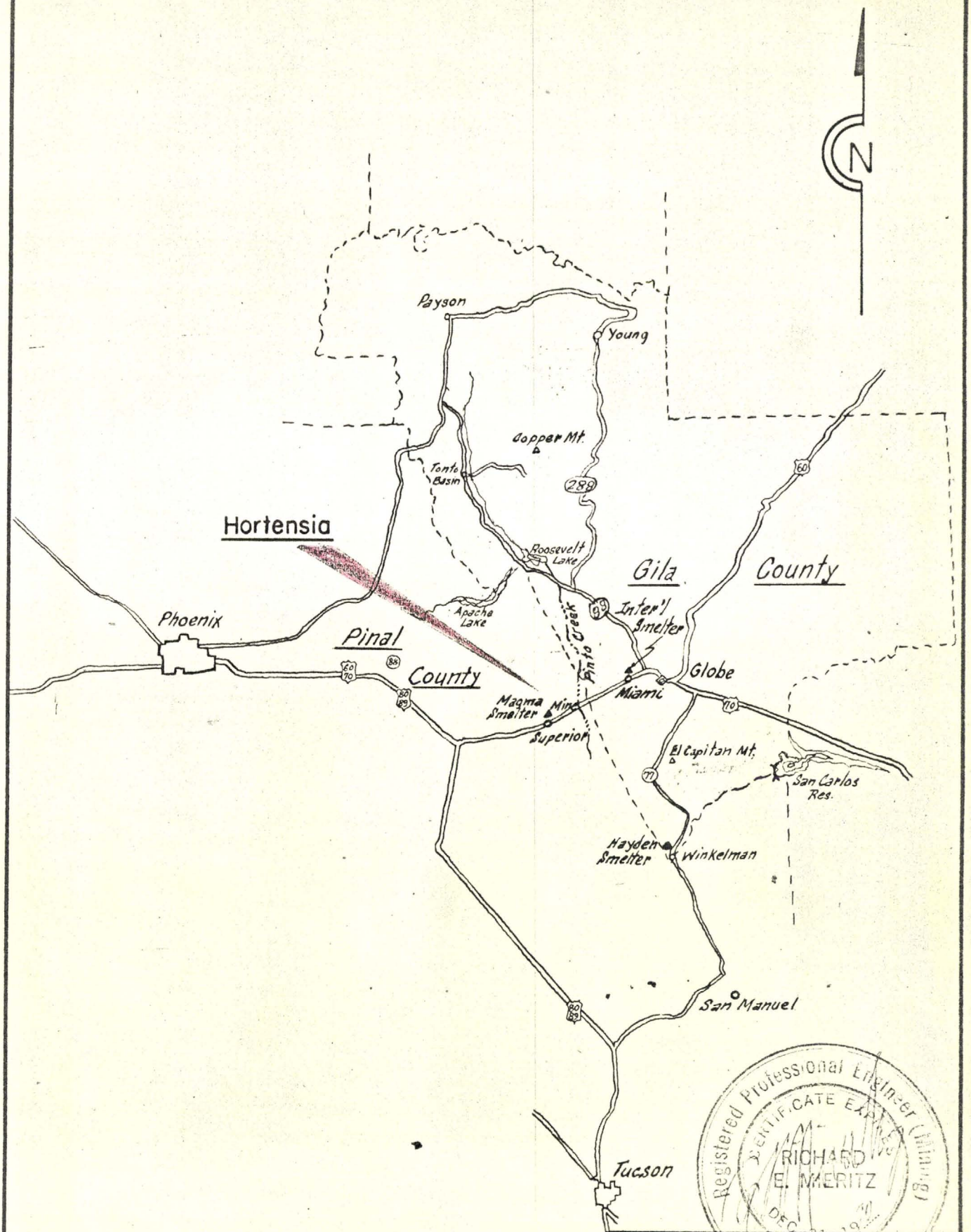
Initially, a minimum of four 1500 foot diamond drill holes at -60° angles in an eastern direction are envisioned which would crosscut the major faults, except the Concentrator Fault, as well as minor faults or zones trending NW, NE or N-S. East-west trending faults or zones have not been observed in the area, thus far.

This program would require an initial expenditure of from $125,000 to $150,000 for contract drilling and extras, drill site and road construction, sampling, assaying, supervision and geological work, perhaps additional geochemical and some additional geophysical work if required, as well as some aerial photography, claim surveying, etc. The last four items completed only if the initial drilling results are sufficiently encouraging to continue the project on a serious and systematic basis.



Respectfully submitted,

R. E. Mierits,
Mining Consultant
June 9, 1970



INDEX MAP
PORTION of ARIZONA

SCALE
1 INCH = ± 21 Mi.

MAY, 1970 R.E. MIERITZ

MAP № 1

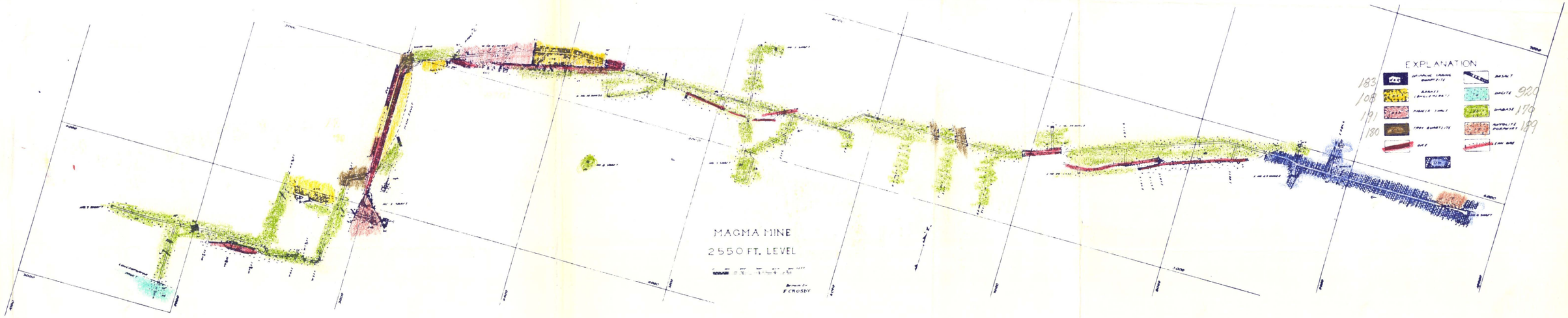


Plate XII.—Map of 2,550 level, Magma mine.

2550 LEVEL

MAP № 2

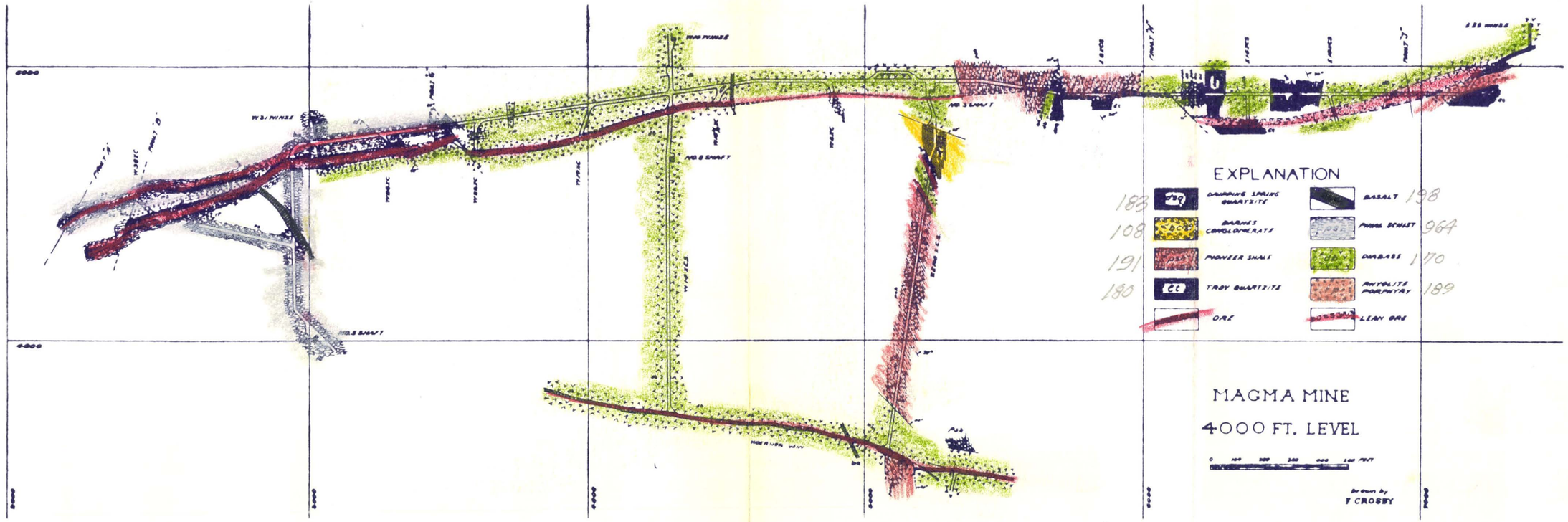


Plate XIII.—Map of 4,000 level, Magma mine.

4000 LEVEL

MAP Nº 3

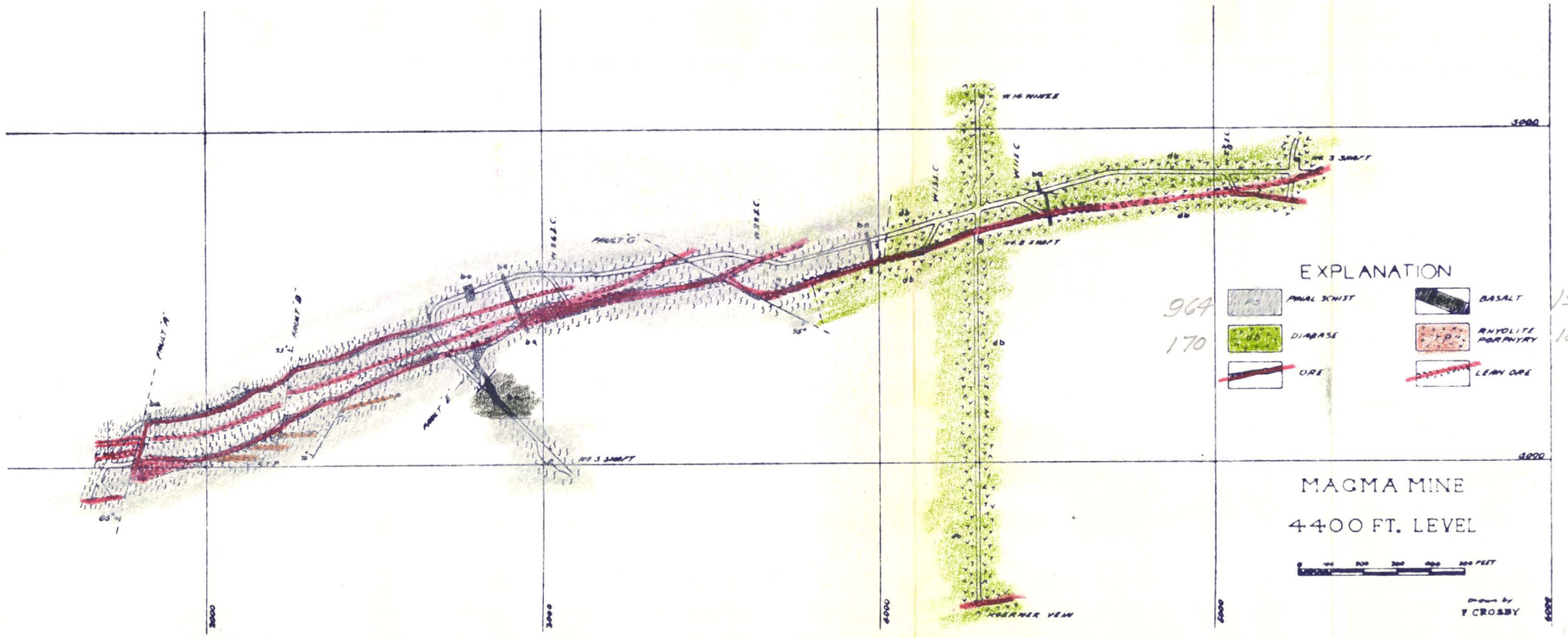


Plate XIV.—Map of 4,400 level, Magma mine.

4400 LEVEL

MAP No. 4

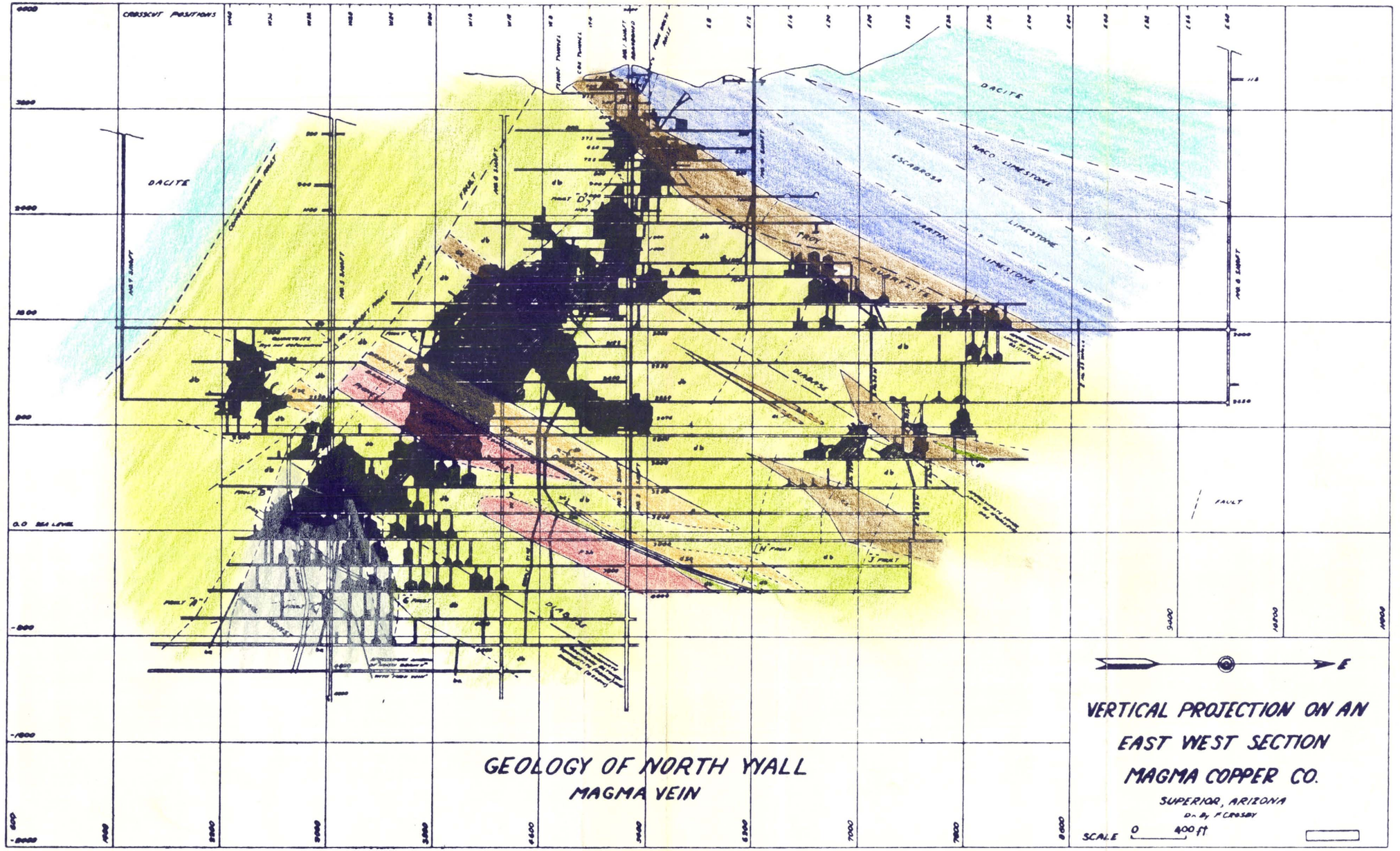


Plate II.—East-west projection showing geology of north wall, Magma vein.

MAP Nº 5

DUGAN CLAIMS

W. Cody CLAIMS

MAGMA CLAIMS

Chester Lobb CLAIMS

MAGMA CLAIMS

Whitford Wash

Peachville Wash

Happy Camp Canyon

Silver King Wash

Silver King

Adit

Pit

Flat

Apex shaft

3589 B.M.

3553 B.M.

3188

3151 B.M.

T. 1 S.

R. 12 E.

MAGMA COPPER MINES

PROPERTY MAP

HORTENSIA CLAIMS

Superior Mining District
Pinal County, Arizona

Scale: 1" = 1000 Ft.

APRIL, 1970

R. E. MIERITZ

MAP Nº 6

LEGEND

104	Qal	Alluvium
108	Tw	Whitetail conglomerate
150	Cn	Naco limestone
147	Ce	Escabrosa limestone
144	Dm	Martin limestone
180	Et	Troy quartzite
146	ml	Mescal limestone
188	dsq	Dripping Spring quartzite
191	psh	Pioneer shale
964	ps	Pinal schist
197	Qb	Basalt
920	Td	Dacite
173	Ta	Andesite
189	Tp	Porphyry intrusive
129	Tskp	Silver King porphyry
172	Tqd	Quartz diorite
170	db	Diabase
198	pEb	Basalt
		Faults

Whitford Wash
Grandfather Lead
Pit
Adit
Peachville Wash
Silver King
Conley Spring (?) Fault
Conley Spring Fault
Happy Camp Canyon
Concentrator Fault
Parallel Fault
Magma? Fault
Silverado Fault
Main Fault
Magma Fault
Silver King Wash
Apex shaft
No. 5 shaft
No. 7 Shaft 200' south
Note: No. 1 Shaft is 200' east of Sec. line on Magma Fault.
B.M. 3589
B.M. 3553
B.M. 3488
B.M. 9188
B.M. 9151
R.12 E.
T. I S.

SURFACE GEOLOGY MAP

HORTENSIA CLAIMS

Superior Mining District
Pinal County, Arizona

Scale: 1" = 1000 Ft.

APRIL, 1970

R. E. MIERITZ

MAP Nº 7

GEOCHEM-GEOLOGY MAP

Portion of

HORTENSIA CLAIMS

Superior Mining District
Pinal County, Arizona

Scale: 1" = 200 Ft.

MAY, 1970 — R.E. MIERITZ

MAP Nº 8

LEGEND

104	Qal	Gravel
108	Tw	Whitetail Conglomerate
183	dsq	Dripping Spring quartzite
191	Psh	Pioneer shale
964	Ps	Pinal schist
197	Qb	Basalt
970 170	db	Diabase
		Fault
		FeOx
		CuOx

Soil Sample
Copper Values, PPM

920	800 plus
680	500 to 799
350	300 to 499
166	150 to 299
95	less than 150
300+/300-	Contour

MAGMA

PROPERTY

HORTENSIA PROPERTY LINE

LINE

Base Line

Silver King Road

Silver King Wash

Concentrator Fault

Riverside Fault

Magma Fault ?

Parallel Fault

Well

12.0N. 11.5N. 11.0N. 10.5N. 10.0N. 9.5N. 9.0N. 8.5N. 8.0N.

10.4E. 10.9E. 11.4E. 11.9E. 10.0E.

GEOPHYSICS-GEOLOGY MAP

Portion of

HORTENSIA CLAIMS

Superior Mining District
Pinal County, Arizona

Scale: 1" = 200 Ft.

MAY, 1970

R.E. MIERITZ

MAP Nº 9

LEGEND

104	Qal	Gravel
108	Tw	Whitetail Conglomerate
183	dsq	Dripping Spring quartzite
191	Psh	Pioneer shale
964	Ps	Pinal schist
197	Qb	Basalt
170	db	Diabase

Fault
FeOx
CuOx

Geophysics (I.P. & Mag)

Mag Vertical Intensity
plus gamma contours
minus gamma contours
MF - metal factor PROBABLE / POSSIBLE
PFE (% frequency effect) ABOVE BACKGROUND
S Shallow depth
M Moderate depth

Base Line 10.0N
10.0E
11.0N
11.5N
10.5N
9.5N
9.0N
8.5N
8.0N
10.4E
10.9E
11.4E
11.9E
S-M
PROPERTY
HORTENSIA PROPERTY LINE
Silver King Wash
Silver King Road
Concentrator Fault
Parallel Fault
Silverlode Fault
Magma Fault ?
MAGMA
Well
N

A

GEOLOGIC, GEOCHEMICAL

and

GEOPHYSICAL

EXPLORATION REPORT

on the

HORTENSIA CLAIMS

SUPERIOR DISTRICT

Pinal County, Arizona

by

R. E. Mierits
Mining Consultant
Phoenix, Arizona

October 31, 1973

TABLE of CONTENTS

INCLUDED MAPS

* These Maps reprinted and are part of Arizona Bureau of Mines Bulletin #151.

INTRODUCTION:

At the request of and authorisation by Matador Exploration Ltd., Vancouver, B. C., Canada, the writer has prepared the following geologic and exploration report on the Hortensia group of claims approximately 2-1/2 airline miles north, northwest of Superior, Arizona. The property is adjacent to Magma Copper Company property along a major geologic fault of the Superior Mining District.

As part of the annual accessment work for year 1969-70, the writer completed a field examination of the subject property for the owner, Mr. Sherwood B. Owens, Tucson, Arizona. As a result of the writers recommendations, the owner authorized the writer to complete a geo-chemical sampling program and to have a limited geo-physical survey completed in the same area as the geo-chemical survey. The above work was completed during June, 1970.

This report includes the results, interpretations and evaluation of the completed preliminary geo-chemical survey and the geo-physical surveys (Induced Potential and Magnetic) as well as the correlation of these results with the known geology of the particular area.

The writer has permission from the owner to use the factual data of the writers earlier report (June, 1970) for the preparation of this report.

FORWARD:

High grade copper ores and high grade silver ores have been mined from fault fissures in the Superior District for in excess of 50 years. Magma Copper Mine produces approximately 1200 tons per day high grade copper ore from its 4800 foot deep mine. The company mines, mills and smelts this tonnage at Superior and employs approximately 1200 persons for the three phase operation.

This production is mined from mineralized fault fissures (a very complex system -- See Map Nos. 2 through 5 and 7) containing the primary copper minerals bornite with chalcopyrite and some chalcocite. Lower grade, disseminated copper ore also exists in the known intrusive rocks of the mine. Five major faults; Main, Magma, Concentrator, Silveride and Parallel are the controlling structural features in the district, however, the pattern is complicated by tremendous displacements along these faults, by minor complimentary faults and further by cross faults, all of which seem to exhibit displacement to some degree. The diabase intrusive appears to be the district disrupter. (See Surface Geology Map No. 7).

The Hortensia property, although northwest of Magma Copper Mine production, does host four of the above mentioned major faults, namely, Concentrator, Parallel, Silveride and by project, possibly the Magma. By projection also, it is likely that the Conley Spring fault may also be present on the property.

Magma Copper is the only producer in the district (in year 1970). They announced the delimitation of a 9,000,000 ton ore body of 7.0% copper content (which did not outcrop on surface). They have sunk their new shaft (1-1/2 miles ESE of the No. 1 Shaft now used) to the 6,000 foot level with projection to a 9,000 foot depth.

Magmas' production activity is east, southeast of the No. 1 Shaft near the mill, however, they, nor anyone else has completed any serious exploration to the northwest. Information has it that the Concentrator fault is under pressure and although it has been penetrated by the No. 7 Shaft and the 2000 foot level, it has not been possible to keep these workings open. It is reported that Magma lost much equipment in this endeavor and thus, has deterred development to the northwest. It is reported the Concentrator fault contained strong bornite mineralisation where penetrated.

Mineralisation at the Magma Mine occurs in the sedimentary rocks (Paleozoic) in the upper levels, whereas mostly in the diabase and Dripping Spring quartzite at depth - the same rocks present within the Hortensia claims. (See Map Nos 2 through 5).

PROPERTY, LOCATION and ACCESSIBILITY:

The property includes 43 unpatented lode claims known as the Hortensia Nos. 1 through 43 which lie in parts of Sections 14, 15, 22, 23, 26 and 27 of T. 1 S., R. 12 E. of the G. & S. R. B. & M., approximately 1-1/2 to 2-1/2 airline miles north, northwest of Superior, Arizona. Mr. Owens also has eight additional claims bordering the eastern side of the Hortensia claims. Three of these were located by Mr. Owens and known as the Fillin No. 1, Fillin No. 2 and Fillin No. 3, the other five are the Chester Lobb claims and known as the Cowan, Cowan No. 2, The Old Pal, Little Stream and the Superior claims.

Travel to the property by automobile from the center of Superior is southwest on the main E-W street to U. S. Route 60-70, thence westerly one mile on U. S. 60-70 to the Silver King Road turnoff, thence north (right) past the Perlite Plant on the Silver King road for 2-1/2 miles to a windmill and a 90° curve to the right. (See Property Map No. 6) This area is the southeast portion of the property.

The property is 70 miles by road east of Phoenix. Southern Pacific Railroad services Magma Copper Co. and town of Superior. A new electric highline passes 2/3 of a mile east of the property. No large quantity of water is developed nor is there gas on the property but gas is available in Superior.

No adequate, accurate map of the claims exists, consequently the property map included herein is approximate, particularly at the north end. Control of claim position at the south end is by Magmas' surveyed property line. Magma Copper Co. acknowledges and re-

cognises the Hortensia claims. The claims should be surveyed and the position of the outside corners accurately located.

DEVELOPMENT:

Except for a few shallow shafts, pits, discovery cuts and an 85 foot long adit (near north end of claims) the property is undeveloped.

The Adit shows chalcopyrite and bornite copper mineralisation along the laminations of the silicified schist over a width of a few feet. Target-wise, this area hasnnot been considered, however, it should be investigatedwwhen exploration is being completed on the other targets. A one piece character sample from the Adit dump assayed 0.82% copper, 0.005 ounces gold and 0.17 ounces silver to the ton. Mr. A. Buehl, co-owner of the property has stated that a former optionee drilled a few holes to the northwest of the Adit - on the northwest hill slope - and that these 100 to 200 foot holes averaged 1.0% copper. However, there are no records.

GEOLOGY and MINERALIZATION:

The geology of the Superior district is quite complicated by the major, minor and cross faulting that has occurred as a result of the diabase intruding the area. (Surface Geology Map No. 7 shows this complexity). This intrusion caused the uptilting of the various sediments and the rock is exposed on the surface, particularly in the area of the Hortensia claims. In the vicinity of the property however, the complexity is somewhat reduced due to the lack or absense of several sedimentary formations. Rock types present within the property are diabase, Dripping Spring quartzite, Pioneer shale, Pinal schist, basalt and Whitetail conglomerate.

Structural features present within the property are: Concentrator Fault, Parallel Fault, Silveride Fault and possibly, by projection, and pattern, the Magma Fault and the Conley Spring Fault. All these structures have a northwest trend and are known to be mineralised east and southeast of the Hortensia property. Cross faults have been observed by the writer, but have not been mapped in detail because of much surface cover.

Mineralisation at the Magma Mine occurs in the fault zones as replacement of the shattered rocks. Above the 800 level the mineralisation is in porphyry dikes and the Paleozoic sediments. From the 800 to the 4000 level the mineralisation occurs in the fault zones mostly in the diabase and to some extent in the Troy quartzite. Below the 4000 level the wall rock is Pinal schist. Map No. 5 - Vertical Projection on an East-West Section - indicates that mineralisation also occurs in the Dripping Spring quartzite and the Pioneer shale, both of which rocks are exposed on the Hortensia claims as well as the diabase and Pinal schist.

Although little to no copper mineralisation is exposed on the faults

or rock types within the property, there is no conclusive proof that it would not be present at depth. Strong mineralisation at Magma was not encountered much before 400 feet. Other indicators of mineralisation as rock alteration, the presence of iron oxides (after pyrite, magnetite and copper minerals), and a considerable display of closely spaced fractures, all point to potential mineralisation below the surface.

With such evidence at hand, after the initial ground examination, the writer suggested a preliminary geochemical soil survey be completed to obtain, if possible, a "surface expression" of copper content in ppm and also to conduct a preliminary Induced Potential survey to possibly disclose "mineralisation" at depth and also a Magnetic survey to indicate possible "cross faults" not discernable by surface observation.

GEOCHEMICAL and GEOPHYSICAL SURVEYS:

Geochemical:

An east-west base line was established with stations each 100 feet. (See Map Nos. 8 and 9). One of Magmas surveyed claim corner in Silver King Wash was assigned coordinates 10,000 E. and 10,000 N. - shortened to 10.0E. and 10.0N. The base line was run to 11.9E, 10.0N. Four north-south grid lines spaced 500 feet apart were run at coordinates 10.4E., 10.9E., 11.4E. and 11.9E. Each grid line was 3000 feet long with 100 foot spaced stations and so located as shown on Map Nos. 8 and 9.

Geochem soil samples were taken by the writer on these north-south grid lines at the 100 foot stations as indicated on Map No. 8. Soil samples were also taken on east-west grid lines at 100 foot stations but at 200 foot north-south intervals. A total of 166 samples were taken to complete a preliminary survey.

Geophysical:

The I.P./Mag. surveys were completed by McPhar Geophysics Inc., Tucson, Arizona. A crew of four completed the I. P. survey of the four 3000 foot north-south lines on May 11, 12 and 14, 1970. Dipole-dipole spreads up to 500 feet spacings and frequencies of 0.125 and 1.25 cycles per second, were used.

A one man magnetometer crew completed the magnetic survey on the same north-south grid lines at 100 feet intervals using a flux gate magnetometer. This work was completed on May 14 and 15, 1970.

McPhar has provided their report - including recommendations regarding additional geophysical or geological investigations and exploratory drilling as indicated by their interpretations of the survey results, maps, and drawings showing the geophysical measurements and the location of anomalus zones.

The writer has reviewed and studied McPhars "advance report" and

recommendations. The conclusions and recommendations of the writer's report are those of the writer which are not necessarily influenced by the McPhar report, except to utilize the factual data.

GEOCHEMICAL SURVEY RESULTS and INTERPRETATION:

Geochem samples were taken of the soil from 6 to 8 inches below the surface unless bedrock was encountered at a shallower depth in which case, material from 1 to 2 inches above bedrock was collected as the sample. These samples were analysed by EPCO Laboratories, Tucson, Arizona and reported as ppm copper. The values ranged from a low of 51 ppm to a high of 1400 ppm. A short "sample discription" as to soil color, float rock, etc., were noted on each sample tag retained by the writer for reference and to be used as a guide for interpretation of the survey.

The ppm for each sample, the sample location, the rock type, the color, the surface drainage and erosion pattern, the structural fracture pattern and rock alteration degree are all considered and correlated to provide the basis for the interpretation of this survey.

The diabase rock in the surveyed area is highly altered and fractured. It also exhibits iron oxide (limonite) after magnetite, a constituent of the diabase. In places near the major faults and elsewhere, but not uniformily distributed, iron oxide (limonite) after pyrite and the copper minerals chalcopyrite, bornite and chalcocite were observed by the writer in moderate quantity. Lack of the uniform distribution of the limonite derivatives should not pre-conclude there is no strong continuous mineralisation at depth - on the contrary - the minimal evidence would greatly suggest strong mineralisation at depth as indicated and evidenced by the known characteristics of the Magma Mine. The writer would not expect strong mineralisation above a 350 foot depth. Weaker, low grade, wide spread mineralisation between the Concentrator Fault and the Silveride Fault at a shallower depth is a very strong possibility.

The soil sampled area has outcrops of Dripping Spring quartzite, diabase, Pioneer shale, basalt and Whitetail conglomerate. Soil samples values varied from a low to a high regardless of the rock type or soil type. Consequently, anomalus areas are not associated or limited to the rock types. Some grouping of ppm values are necessary to develop a reasonable and realistic anomaluspattern.

To this end, the writer has grouped the ppm values into five categories or ranges, which are: less than 150 ppm, 150 to 299 ppm, 300 to 499 ppm, 500 to 799 ppm and 800 plus ppm. A total of 166 samples were taken - as shown on Geochem-Geology Map No. 8. Of these, 17 samples had a content of less than 150 ppm copper, 49 samples had values from 150 to 299 ppm, 56 samples ranged from 300 to 499 ppm, 28 samples ranged from 500 to 799 ppm and 16 samples were in excess

of 800 ppm with five of these of 1000 ppm or more. One hundred, or 60% of the total number of samples are considered anomalus, as explained below.

A "background" ppm in this area is quite difficult to ascertain because of the concentrated presense of the "major" faults and several minor faults of interest in the area. The occurrence of seven samples with ppm less than 100, is, in the opinion of the writer, quite indicative of a "background count". However, to provide a factor of safety in this regard, the writer has reasoned and assumed a background of 299 ppm or that anomalus areas to have values of 300 ppm or greater.

To confirm this reasoning, the writer attempted to locate some literature on this matter for this district. None is however available. To this end also, the writer contacted Mr. R. T. Moore of the Arizona Bureau of Mines in Tucson. Mr. Moore was not able to provide any verbal information nor references as to a "geochem background" in the Superior district. The writer telephoned Mr. Ralph Erickson, Chief of Exploration and Research, U. S. G. S. in Denver, Colorado to request any written material on the subject. Mr. Erickson could not provide any refemences so the subject was verbally discussed. The general picture of the geochem survey, its values, the structural and geologic conditions were explained to him. Mr. Erickson voiced the opinion that a count of 300 would or should be a "high background" and that it was possible and perhaps more realistic if 200 to 250 ppm were used. He also stated that the approach and reasoning used by the writer was coincidental with their methods in an unknown area. Mr. Erickson also stated if the 300 ppm figure provided a realistic pattern coincidental with the geologic picture and erosion surface, then consider the 300 figure as "top background".

With this assurance and criteria in mind as well as the geologic conditions present, the writer has developed the resulting anomalus pattern of alternate "strong and weak" zones (Map No. 8) trending in annortheast direction (more or less normal to the four major faults) between the limiting faults, - Concentrator and Silveride. In essence, the developedppattern strongly suggests and follows the trend of a "cross fault" pattern which geologically should be present since it is indicated that the Concentrator and the Silveride Faults are the limiting structures of what the writer believes to be a large shear zone. The cross faults within such a shear zone, should develop at about 90° to the northwest trend - or northeast - and about 45° to the northwesttttrend - or north-south. The writer did find some evidence of the complimentary faults, - exhibit as N. 10° E., narrow silicified structure with copper stain in the shallow shaft at grid coordinates 10.0N., 10.3E., a fault at grid coordinates 9.4N. and 10.9E, striking N. 10°E, and iron stained, also a N.50° E. iron stained fault at grid coordinates 8.6N. and 11.9E. Other such structures should exist and would be evidenced with a more detailed surface geologic map of the immediate area.

(See Map No. 8, Geochem-Geology Map).

The results of the preliminary geochemical survey are very good and definitely suggest targets of both large area, low grade mineralisation and fault fissure higher grade mineralisation.

GEOPHYSICAL SURVEY RESULTS and INTERPRETATIONS:

McPhar Geophysical Inc., Tucson, Arizona completed an Induced Polarisation survey and a Magnetic survey on the same east coordinate (10.4, 10.9, 11.4 and 11.9) lines as was most of the geochemical survey. McPhar have provided their own report, interpretations and recommendations as well as the explanatory ramifications of the two types geophysics used. These surveys were completed because the writer felt that the geochemical survey was not sufficient evidence alone and therefor needed supporting evidence. In the opinion of the writer, both the I. P. survey and Mag. survey results supports and add to the results and confirmation of the geochem survey.

The interpretation of facts and figures for any geophysical method or survey is, in most cases, a supositional throught with many "ifs" and/or variations (Geophysicists confirm this) - or in other words, the interpretations aren't always a "positive surity". These fickle concepts are derivedusing the facts and figures obtained from the survey which always enhance to many "unknowns". The geophysicists try to minimise these unknowns and attempts to present the most realistic and reasonable interpretations to the best of the professions ability.

Individually however, presented with a set of facts and figures, where "unknowns" exist, no two peasons will contrive the same, identical configurations.

As regards the I. P. survey, the writer agrees and is pleased with the anomalus results as shown by McPhar. The "unknown" in the anomalus areas are - what is at the indicated depths?. Surprisingly enough however, these I. P. anomalies correlate well in part, with the anomalus geochem zones. (See Map Nos. 8 and 9). Thus, we have a possible strong correlation between surface "highs" and subsurface "highs".

In the case of the preliminary Mag survey, the writer has some thoughts of disagreement as regards the contour interpretation of the set of "facts and figures" obtained from the survey. (refer to second previous paragraph). (Compare Map No. 9, Geophysical-Geology Map with McPhars' Vertical Intensity Magnetic Map).

The writer wishes to qualify that he has studied the surface geologic evidence and is more acquainted with same than McPhar. The writer also had the advantage of the geochem survey, however, an interpretation of the magnetics should be made on its own merit - coupled of course - with the known surface geology. It is visioned

that McPhar has correlated the Mag survey values with a "major, structural geologic features". The writer has correlated the identical Mag survey values with a "cross fault" pattern which should exist in this immediate area.

Magnetic highs usually give rise to mineralisation. Magnetic lows usually indicate faults or possibly rock contacts or changes. It can be seen by reviewing Map No. 9, Geophysics-Geology Map, that the writer has developed a pattern with a northeast trend for much of the area. Comparing Maps No. 8 and 9, it should be noted that the magnetic highs (plus figures and contours) are very much coincidental with the high copper ppm values and "anomalus" geochem zone pattern. The strong magnetic lows adjoining and paralleling the magnetic high patterns suggest strong faults or rock structures, both of which could be mineralised.

Viewing Map No. 9, it can also be seen that the possible MF (Metal Factor)anomalies correlate with magnetic lows which parallel the Concentrator Fault. The probable MF anomaly correlates well with the very strong magnetic high. The I. P. survey has indicated five PFE (Percent Frequency Effect) "above background" anomalies in the grided area. (North of coordinate 9.5N.). By supposition, these anomalies may indicate a possible dip of the suspected mineralisation indicated by the Mag highs and/or the Geochem highs in the respective vicinities. At least they indicate a "disturbance" to the norm which the geophysicist can not overlook and which must be investigated in some fashion.

In summary, the writer is convinced that the interpretive results of the geochemical survey and the two geophysical surveys correlate extremely well and isolate possible exploration targets which without such surveys, might have remained un-noticed.

EXPLORATION TARGETS:

The accuracy of the geochemical and geophysical interpretation and expectancy by McPhar and the writer can only be determined by relatively deep exploratory drilling. This would be an expensive initial phase, however, discovery of a large tonnage, low grade deposit and/or strong mineralisation in vein form duplicating that of Magna is in the offering.

Three target areas ("A", "B" and"C" on Map No. 8 and 9) are selected by the writer by reason of analysis of the preliminary geochemical survey, the two geophysical surveys and the known surface geologic and structural conditions surrounding the area of interest.

Target "A":

In this area, close to the Concentrator Fault, several exceptional criteria are exhibited which isolate this area as a target. They are:

(1) An observed N. 10°E. fault with heavy iron oxide and clay near coordinates 9.4 N. and 10.9 E.
(2) Diabase outcrops in the area.
(3) The preliminary magnetic survey has its highest single plus gamma value (3893) of the survey at coordinates 9.4 N. and 10.9 E.
(4) The preliminary I. P. survey indicates the strongest anomaly of the survey which McPhar has classified as "probable mineralisation" at a shallow depth - meaning 300 to 500 feet.
(5) Geochem-wise, the values range from 120 to 280 ppm in the immediate are - which the writer has assumed as "background". These samples may have been strongly diluted by the soil created from the very barren basalt outcropping immediately south and uphill from coordinates 9.4 N. and 10.9 E. A strong geochem zone does trend NE-SW and almost reaches coordinates 9.4N. and 10.9 E. (See Map No. 8). The I. P. anomaly may indicate a rake at depth to the SW for the geochem "high" trending N.E. A similar rake may be indicated by the above background PFE on line 11.4 E. between 9.6 N. to 10.1 N.

Target "B":

Target "B" is a broad area centered about and around coordinates 10.1 N. and 11.7 E. This target has been isolated by the writer for the following reasons:

(1) The close confluence of the Silveride and Magma (?) Faults.
(2) Contacts between diabase and quartzite, diabase and shale as well as a large exposure of diabase.
(3) The preliminary Mag survey indicates a broad area of moderate highs bounded on two sides (NW and SE) by magnetic lows which may indicate rock contacts and/or fault structures.
(4) McPhar indicates above background I.P. anomalies appear on lines 11.4 E. from 9.5 N. to 10.0 N. and on line 11.9 E. from 10.25 N. to 10.75 N. with moderate to shallow depths respectively.
(5) Geochem-wise, copper values for the soil samples range from 260 to 910 ppm. These cover a wide area except for a narrow "low" background zone which separates two broader, higher value zones, all three zones of which trend NE.

Target "C":

The choice of Area "C" as a target is controlled and justified by the following:
(1) The entire area hosts the Dripping Spring quartzite - underlain by diabase.
(2) The quartzite exhibits NE trending faults between the Parallel and Magma (?) faults.
(3) A NE trending magnetic anomaly - half value of Target "B", - is present near coordinates 8.9 N. on line 11.9 E.
(4) The I. P. preliminary survey indicates a shallow to moderate "possible" anomaly south of the "target" which could mean a rake of mineralisation to the south at depth.
(5) The target enhances a broad area of high geochem soil sample value ranging from 310 to 1000 ppm.

Target "D":

This target, not labeled on the maps, includes the entire area as a unit - indicating the possibility of a large volume low strength mineralisation which could well be sufficiently strong in primary mineralisation to be classed as ore.

The above consideration is reasonable and justified by the following:
(1) The area hosts, for the most part, diabase which is a well mineralized rock in the Magma Mine.
(2) The area hosts four major NW trending faults which show strong movement of the interveding blocks.
(3) The preliminary I. P. survey indicates numerous places of "disturbance as anomalies ranging from "above background" PFE to possible and probable MF zones, from shallow to moderate depths (350 to 750 feet).
(4) The preliminary magnetic survey enhances a wide range of systematic "highs" and "lows" in favorable combinations - regardless of the opposite patterns developed by McPhar as one alternative and the writer as a second alternative - both using the same set of values.
(5) The preliminary geochem survey indicates an overall anomalus area with bet three relatively narrow northeast trending "background" zones. This broad wide area lies between the Concentrator and Silveride Faults on the SW and NE respectively and from line 10.4 E. on the NW to line 11.9E. on the SE. - an area with approximate dimensions of 1300 feet NE-SW and 1800 feet NW-SE.

Part of this target would be simultaneously explored when test drilling Targets "A", "B" and "C".

EXPLORATION EXPENDITURE:

Initially, a minimum of four 1500 foot diamond drill holes at 60° angles in an eastern direction are envisioned which would crosscut the major faults, except the Concentrator Fault, as well as minor faults or zones trending NW, NE or N-S. East-west trending faults or zones have not been observed in the area, thus far.

The initial exploration program can be considered as Phase I - drilling four holes to test the three targets, A, B and C. Hole 4 may or may not be drilled - dependent on results of the first three holes, however, hole 4 is considered as part of this phase. The estimated costs for this program would approximate the following:

Phase I	
Drill site preparation and road construction	$5,000.-
Four drill holes @ 1500 feet each, 6000 feet diamond drilling, @ $20.00/foot, including sampling and assaying	$120,000.-
Field Supervision, Consultant, (Geology, etc.) Fee and expenses @ $1,500.-/mo. (Part time)	$ 9,000.-
Contingencies, overrun of work - underestimating	$ 16,000.-
Phase I total	$150,000.-

If Phase I has produced encouraging or successful results, then a much more energetic Phase II must be completed. It is difficult to forward and exploration program not knowing whether shallow (500-700 ft.) drilling would be required or whether additional deep (1500 ft.) drilling would be required. Other than drilling, additional geo-chem surveys should be completed as well as additional geo-physical surveys. The writer envisions the following program and costs as Phase II.

Phase II	
Expanded Geo-chem survey	$4,500.-
Geo-physical survey, more detail, deeper penetration, same general area	12,000.-
10,000 feet diamond drilling, 15 shallow drill holes or 7 deep holes, @ $20.00/foot, including sampling, and assaying	$200,000.-
Field supervision, Consultant (Geology, etc.) Fee and Expenses, $1500.-/mo. (part time) 10 months	$ 15,000.-
Contingencies, overrun of work, underestimating	$43,500.-
Phase II total	$275,000.-

CONCLUSIONS:

As a result of the writers field examination and study of the geologic conditions, the study of the preliminary geochem survey results, the study of the preliminary geophysical (I.P. and Mag.) surveys, the correlation of all known facts and results and the writers knowledge and experience, of and in, copper mineralisation in Arizona and elsewhere, the following conclusions for the Hortensia property are forwarded for your consideration.

(1) The Hortensia property is in close proximity with the famous, long life producing Magma Mine. The property hosts the rock types and major faults which are associated with the strong copper mineralisation known to exist in the Magma Mine.

(2) Surface-wise, little to no copper mineralisation is evidenced, however, moderate alteration and fracturing of the diabase, the contained yellow to red and black, moderately "live" appearing limonite, derivatives of pyrite, chalcopyrite and bornite, the observance of some cross faults trending N-S to NE and the existance of the major faults are all indicators of mineral potential in the area.

(3) The foregoing criteria coupled with results and interpretations of both the preliminary geochem survey and the preliminary geophysical surveys completed, have isolated three distinct "Targets", and, suggested a fourth broad scale target.

(4) An expenditure from $125,000 to $150,000 would be required to complete an initial minimum exploratory drilling program of four 1500 foot holes to test the three isolated Targets for their condemnation or prove that mineralization worthy of further development does exist.

Respectfully submitted,

R. E. Mierits,
Mining Consultant
Phoenix, Arizona
October 31, 1973

A

GEOLOGIC, GEOCHEMICAL

and

GEOPHYSICAL

EXPLORATION REPORT

on the

HORTENSIA CLAIMS

SUPERIOR DISTRICT

Pinal County, Arizona

by

R. E. Mieritz
Mining Consultant
Phoenix, Arizona

October 31, 1973

TABLE of CONTENTS

INCLUDED MAPS

* These Maps reprinted and are part of Arizona Bureau of Mines Bulletin #151.

INTRODUCTION:

At the request of and authorization by [redacted], the writer has prepared the following geologic and exploration report on the Hortensia group of claims approximately 2-1/2 airline miles north, northwest of Superior, Arizona. The property is adjacent to Magma Copper Company property along a major geologic fault of the Superior Mining District.

As part of the annual accessment work for year 1969-70, the writer completed a field examination of the subject property for the owner. As a result of the writers recommendations, the owner authorized the writer to complete a geo-chemical sampling program and to have a limited geo-physical survey completed in the same area as the geo-chemical survey. The above work was completed during June, 1970.

This report includes the results, interpretations and evaluation of the completed preliminary geo-chemical survey and the geo-physical surveys (Induced Potential and Magnetic) as well as the correlation of these results with the known geology of the particular area.

The writer has permission from the owner to use the factual data of the writers earlier report (June, 1970) for the preparation of this report.

FORWARD:

High grade copper ores and high grade silver ores have been mined from fault fissures in the Superior District for in excess of 50 years. Magma Copper Mine produces approximately 1200 tons per day high grade copper ore from its 4800 foot deep mine. The company mines, mills and smelts this tonnage at Superior and employs approximately 1200 persons for the three phase operation.

This production is mined from mineralized fault fissures (a very complex system — See Map Nos. 2 through 5 and 7) containing the primary copper minerals bornite with chalcopyrite and some chalcocite. Lower grade, disseminated copper ore also exists in the known intrusive rocks of the mine. Five major faults; Main, Magma, Concentrator, Silveride and Parallel are the controlling structural features in the district, however, the pattern is complicated by tremendous displacements along these faults, by minor complimentary faults and further by cross faults, all of which seem to exhibit displacement to some degree. The diabase intrusive appears to be the district disrupter. (See Surface Geology Map No. 7).

The Hortensia property, although northwest of Magma Copper Mine production, does host four of the above mentioned major faults, namely, Concentrator, Parallel, Silveride and by project, possibly the Magma. By projection also, it is likely that the Conley Spring fault may also be present on the property.

Magma Copper is the only producer in the district (in year 1970). They announced the delimitation of a 9,000,000 ton ore body of 7.0% copper content (which did not outcrop on surface). They have sunk their new shaft (1-1/2 miles ESE of the No. 1 Shaft now used) to the 6,000 foot level with projection to a 9,000 foot depth.

Magmas' production activity is east, southeast of the No. 1 Shaft near the mill, however, they, nor anyone else has completed any serious exploration to the northwest. Information has it that the Concentrator fault is under pressure and although it has been penetrated by the No. 7 Shaft and the 2000 foot level, it has not been possible to keep these workings open. It is reported that Magma lost much equipment in this endeavor and thus, has deterred development to the northwest. It is reported the Concentrator fault contained strong bornite mineralization where penetrated.

Mineralization at the Magma Mine occurs in the sedimentary rocks (Paleozoic) in theupper levels, whereas mostly in the diabase and Dripping Spring quartzite at depth - the same rocks present within the Hortensia claims. (See Map Nos 2 through 5).

PROPERTY, LOCATION and ACCESSIBILITY:

The property includes 43 unpatented lode claims known as the Hortensia Nos. 1 through 43 which lie in parts of Sections 14, 15, 22, 23, 26 and 27 of T. 1 S., R. 12 E. of the G. & S. R. B. & M., approximately 1-1/2 to 2-1/2 airline miles north, northwest of Superior, Arizona. Mr. Owens also has eight additional claims bordering the eastern side of the Hortensia claims. Three of these were located by Mr. Owens and known as the Fillin No. 1, Fillin No. 2 and Fillin No. 3, the other five are the Chester Lobb claims and known as the Cowan, Cowan No. 2, The Old Pal, Little Stream and the Superior claims.

Travel to the property by automobile from the center of Superior is southwest on the main E-W street to U. S. Route 60-70, thence westerly one mile on U. S. 60-70 to the Silver King Road turnoff, thence north (right) past the Perlite Plant on the Silver King road for 2-1/2 miles to a windmill and a 90° curve to the right. (See Property Map No. 6) This area is the southeast portion of the property.

The property is 70 miles by road east of Phoenix. Southern Pacific Railroad services Magma Copper Co. and town of Superior. A new electric highline passes 2/3 of a mile east of the property. No large quantity of water is developed nor is there gas on the property but gas is available in Superior.

No adequate, accurate map of the claims exists, consequently the property map included herein is approximate, particularly at the north end. Control of claim position at the south end is by Magmas' surveyed property line. Magma Copper Co. acknowledges and re-

cognizes the Hortensia claims. The claims should be surveyed and the position of the outside corners accurately located.

DEVELOPMENT:

Except for a few shallow shafts, pits, discovery cuts and an 85 foot long adit (near north end of claims) the property is undeveloped.

The Adit shows chalcopyrite and bornite copper mineralisation along the laminations of the silicified schist over a width of a few feet. Target-wise, this area hasnot been considered, however, it should be investigatedwwhen exploration is being completed on the other targets. A one piece character sample from the Adit dump assayed 0.82% copper, 0.005 ounces gold and 0.17 ounces silver to the ton. Mr. A. Buehl, co-owner of the property has stated that a former optionee drilled a few holes to the northwest of the Adit - on the northwest hill slope - and that these 100 to 200 foot holes averaged 1.0% copper. However, there are no records.

GEOLOGY and MINERALIZATION:

The geology of the Superior district is quite complicated by the major, minor and cross faulting that has occurred as a result of the diabase intruding the area. (Surface Geology Map No. 7 shows this complexity). This intrusion caused the uptilting of the various sediments and the rock is exposed on the surface, particularly in the area of the Hortensia claims. In the vicinity of the property however, the complexity is somewhat reduced due to the lack or absense of several sedimentary formations. Rock types present within the property are diabase, Dripping Spring quartzite, Pioneer shale, Pinal schist, basalt and Whitetail conglomerate.

Structural features present within the property are: Concentrator Fault, Parallel Fault, Silveride Fault and possibly, by projection, and pattern, the Magma Fault and the Conley Spring Fault. All these structures have a northwest trend and are known to be mineralised east and southeast of the Hortensia property. Cross faults have been observed by the writer, but have not been mapped in detail because of much surface cover.

Mineralisation at the Magma Mine occurs in the fault zones as replacement of the shattered rocks. Above the 800 level the mineralization is in porphyry dikes and the Paleozoic sediments. From the 800 to the 4000 level the mineralization occurs in the fault zones mostly in the diabase and to some extent in the Troy quartzite. Below the 4000 level the wall rock is Pinal schist. Map No. 5 - Vertical Projection on an East-West Section - indicates that mineralization also occurs in the Dripping Spring quartzite and the Pioneer shale, both of which rocks are exposed on the Hortensia claims as well as the diabase and Pinal schist.

Although little to no copper mineralization is exposed on the faults

or rock types within the property, there is no conclusive proof that it would not be present at depth. Strong mineralization at Magma was not encountered much before 400 feet. Other indicators of mineralization as rock alteration, the presence of iron oxides (after pyrite, magnetite and copper minerals), and a considerable display of closely spaced fractures, all point to potential mineralization below the surface.

With such evidence at hand, after the initial ground examination, the writer suggested a preliminary geochemical soil survey be completed to obtain, if possible, a "surface expression" of copper content in ppm and also to conduct a preliminary Induced Potential survey to possibly disclose "mineralization" at depth and also a Magnetic survey to indicate possible "cross faults" not discernable by surface observation.

GEOCHEMICAL and GEOPHYSICAL SURVEYS:

Geochemical:

An east-west base line was established with stations each 100 feet. (See Map Nos. 8 and 9). One of Magmas surveyed claim corner in Silver King Wash was assigned coordinates 10,000 E. and 10,000 N. - shortened to 10.0E. and 10.0N. The base line was run to 11.9E, 10.0N. Four north-south grid lines spaced 500 feet apart were run at coordinates 10.4E., 10.9E., 11.4E. and 11.9E. Each grid line was 3000 feet long with 100 feet spaced stations and so located as shown on Map Nos. 8 and 9.

Geochem soil samples were taken by the writer on these north-south grid lines at the 100 foot stations as indicated on Map No. 8. Soil samples were also taken on east-west grid lines at 100 foot stations but at 200 foot north-south intervals. A total of 166 samples were taken to complete a preliminary survey.

Geophysical:

The I.P./Mag. surveys were completed by McPhar Geophysics Inc., Tucson, Arizona. A crew of four completed the I. P. survey of the four 3000 foot north-south lines on May 11, 12 and 14, 1970. Dipole-dipole spreads up to 500 foot spacings and frequencies of 0.125 and 1.25 cycles per second, were used.

A one man magnetometer crew completed the magnetic survey on the same north-south grid lines at 100 foot intervals using a flux gate magnetometer. This work was completed on May 14 and 15, 1970.

McPhar has provided their report - including recommendations regarding additional geophysical or geological investigations and exploratory drilling as indicated by their interpretations of the survey results, maps, and drawings showing the geophysical measurements and the location of anomalus zones.

The writer has reviewed and studied McPhars "advance report" and

recommendations. The conclusions and recommendations of the writer's report are those of the writer which are not necessarily influenced by the McPhar report, except to utilize the factual data.

GEOCHEMICAL SURVEY RESULTS and INTERPRETATION:

Geochem samples were taken of the soil from 6 to 8 inches below the surface unless bedrock was encountered at a shallower depth in which case, material from 1 to 2 inches above bedrock was collected as the sample. These samples were analyzed by EFCO Laboratories, Tucson, Arizona and reported as ppm copper. The values ranged from a low of 51 ppm to a high of 1400 ppm. A short "sample discription" as to soil color, float rock, etc., were noted on each sample tag retained by the writer for reference and to be used as a guide for interpretation of the survey.

The ppm for each sample, the sample location, the rock type, the color, the surface drainage and erosion pattern, the structural fracture pattern and rock alteration degree are all considered and correlated to provide the basis for the interpretation of this survey.

The diabase rock in the surveyed area is highly altered and fractured. It also exhibits iron oxide (limonite) after magnetite, a constituent of the diabase. In places near the major faults and elsewhere, but not uniformily distributed, iron oxide (limonite) after pyrite and the copper minerals chalcopyrite, bornite and chalcocite were observed by the writer in moderate quantity. Lack of the uniform distribution of the limonite derivatives should not pre-conclude there is no strong continuous mineralization at depth - on the contrary - the minimal evidence would greatly suggest strong mineralization at depth as indicated and evidenced by the known characteristics of the Magma Mine. The writer would not expect strong mineralization above a 350 foot depth. Weaker, low grade, wide spread mineralization between the Concentrator Fault and the Silveride Fault at a shallower depth is a very strong possibility.

The soil sampled area has outcrops of Dripping Spring quartzite, diabase, Pioneer shale, basalt and Whitetail conglomerate. Soil samples values varied from a low to a high regardless of the rock type or soil type. Consequently, anomalus areas are not associated or limited to the rock types. Some grouping of ppm values are necessary to develop a reasonable and realistic anomaluspattern.

To this end, the writer has grouped the ppm values into five categories or ranges, which are: less than 150 ppm, 150 to 299 ppm, 300 to 499 ppm, 500 to 799 ppm and 800 plus ppm. A total of 166 samples were taken - as shown on Geochem-Geology Map No. 8. Of these, 17 samples had a content of less than 150 ppm copper, 49 samples had values from 150 to 299 ppm, 56 samples ranged from 300 to 499 ppm, 28 samples ranged from 500 to 799 ppm and 16 samples were in excess

of 800 ppm with five of these of 1000 ppm or more. One hundred, or 60% of the total number of samples are considered anomalus, as explained below.

A "background" ppm in this area is quite difficult to ascertain because of the concentrated presense of the "major" faults and several minor faults of interest in the area. The occurrance of seven samples with ppm less than 100, is, in the opinion of the writer, quite indicative of a "background count". However, to provide a factor of safety in this regard, the writer has reasoned and assumed a background of 299 ppm or that anomalus areas to have values of 300 ppm or greater.

To confirm this reasoning, the writer attempted to locate some literature on this matter for this district. None is however available. To this end also, the writer contacted Mr. R. T. Moore of the Arizona Bureau of Mines in Tucson. Mr. Moore was not able to provide any verbal information nor references as to a "geochem background" in the Superior district. The writer telephoned Mr. Ralph Erickson, Chief of Exploration and Research, U. S. G. S. in Denver, Colorado to request any written material on the subject. Mr. Erickson could not provide any refesences so the subject was verbally discussed. The general picture of the geochem survey, its values, the structural and geologic conditions were explained to him. Mr. Erickson voiced the opinion that a count of 300 would or should be a "high background" and that it was possible and perhaps more realistic if 200 to 250 ppm were used. He also stated that the approach and reasoning used by the writer was coincidental with their methods in an unknown area. Mr. Erickson also stated if the 300 ppm figure provided a realistic pattern coincidental with the geologic picture and erosion surface, then consider the 300 figure as "top background".

With this assurance and criteria in mind as well as the geologic conditions present, the writer has developed the resulting anomalus pattern of alternate "strong and weak" zones (Map No. 8) trending in annortheast direction (more or less normal to the four major faults) between the limiting faults, - Concentrator and Silveride. In essence, the developedppattern strongly suggests and follows the trend of a "cross fault" pattern which geologically should be present since it is indicated that the Concentrator and the Silveride Faults are the limiting structures of what the writer believes to be a large shear zone. The cross faults within such a shear zone, should develop at about 90° to the northwest trend - or northeast - and about 45° to the northwesttrend - or north-south. The writer did find some evidence of the complimentary faults, - exhibit as N. 10° E., narrow silicified structure with copper stain in the shallow shaft at grid coordinates 10.0N., 10.3E., a fault at grid coordinates 9.4N. and 10.9E, striking N. 10°E, and iron stained, also a N.50° E. iron stained fault at grid coordinates 8.6N. and 11.9E. Other such structures should exist and would be evidenced with a more detailed surface geologic map of the immediate area.

(See Map No. 8, Geochem-Geology Map).

The results of the preliminary geochemical survey are very good and definitely suggest targets of both large area, low grade mineralisation and fault fissure higher grade mineralisation.

GEOPHYSICAL SURVEY RESULTS and INTERPRETATIONS:

McPhar Geophysical Inc., Tucson, Arizona completed an Induced Polarisation survey and a Magnetic survey on the same east coordinate (10.4, 10.9, 11.4 and 11.9) lines as was most of the geochemical survey. McPhar have provided their own report, interpretations and recommendations as well as the explanatory ramifications of the two types geophysics used. These surveys were completed because the writer felt that the geochemical survey was not sufficient evidence alone and therefor needed supporting evidence. In the opinion of the writer, both the I. P. survey and Mag. survey results supports and add to the results and confirmation of the geochem survey.

The interpretation of facts and figures for any geophysical method or survey is, in most cases, a supositional throught with many "ifs" and/or variations (Geophysicists confirm this) - or in other words, the interpretations aren't always a "positive surity". These fickle concepts are derivedusing the facts and figures obtained from the survey which always enhance to many "unknowns". The geophysicists try to minimise these unknowns and attempts to present the most realistic and reasonable interpretations to the best of the professions ability.

Individually however, presented with a set of facts and figures, where "unknowns" exist, no two peesons will contrive the same, identical configurations.

As regards the I. P. survey, the writer agrees and is pleased with the anomalus results as shown by McPhar. The "unknown" in the anomalus areas are - what is at the indicated depths?. Surprisingly enough however, these I. P. anomalies correlate well in part, with the anomalus geochem zones. (See Map Nos. 8 and 9). Thus, we have a possible strong correlation between surface "highs" and subsurface "highs".

In the case of the preliminary Mag survey, the writer has some thoughts of disagreement as regards the contour interpretation of the set of "facts and figures" obtained from the survey. (refer to second previous paragraph). (Compare Map No. 9, Geophysical-Geology Map with McPhars' Vertical Intensity Magnetic Map).

The writer wishes to qualify that he has studied the surface geologic evidence and is more acquainted with same than McPhar. The writer also had the advantage of the geochem survey, however, an interpretation of the magnetics should be made on its own merit - coupled of course - with the known surface geology. It is visioned

that McPhar has correlated the Mag survey values with a "major, structural geologic features". The writer has correlated the identical Mag survey values with a "cross fault" pattern which should exist in this immediate area.

Magnetic highs usually give rise to mineralization. Magnetic lows usually indicate faults or possibly rock contacts or changes. It can be seen by reviewing Map No. 9, Geophysics-Geology Map, that the writer has developed a pattern with a northeast trend for much of the area. Comparing Maps No. 8 and 9, it should be noted that the magnetic highs (plus figures and contours) are very much coincidental with the high copper ppm values and "anomalus" geochem zone pattern. The strong magnetic lows adjoining and paralleling the magnetic high patterns suggest strong faults or rock structures, both of which could be mineralized.

Viewing Map No. 9, it can also be seen that the possible MF (Metal Factor)anomalies correlate with magnetic lows which parallel the Concentrator Fault. The probable MF anomaly correlates well with the very strong magnetic high. The I. P. survey has indicated five PFE (Percent Frequency Effect) "above background" anomalies in the grided area. (North of coordinate 9.5N.). By supposition, these anomalies may indicate a possible dip of the suspected mineralization indicated by the Mag highs and/or the Geochem highs in the respective vicinities. At least they indicate a "disturbance" to the norm which the geophysicist can not overlook and which must be investigated in some fashion.

In summary, the writer is convinced that the interpretive results of the geochemical survey and the two geophysical surveys correlate extremely well and isolate possible exploration targets which without such surveys, might have remained un-noticed.

EXPLORATION TARGETS:

The accuracy of the geochemical and geophysical interpretation and expectancy by McPhar and the writer can only be determined by relatively deep exploratory drilling. This would be an expensive initial phase, however, discovery of a large tonnage, low grade deposit and/or strong mineralization in vein form duplicating that of Magma is in the offering.

Three target areas ("A", "B" and"C" on Map No. 8 and 9) are selected by the writer by reason of analysis of the preliminary geochemical survey, the two geophysical surveys and the known surface geologic and structural conditions surrounding the area of interest.

Target "A":

In this area, close to the Concentrator Fault, several exceptional criteria are exhibited which isolate this area as a target. They are:

(1) An observed N. 10°E. fault with heavy iron oxide and clay near coordinates 9.4 N. and 10.9 E.
(2) Diabase outcrops in the area.
(3) The preliminary magnetic survey has its highest single plus gamma value (3893) of the survey at coordinates 9.4 N. and 10.9 E.
(4) The preliminary I. P. survey indicates the strongest anomaly of the survey which McPhar has classified as "probable mineralization" at a shallow depth - meaning 300 to 500 feet.
(5) Geochem-wise, the values range from 120 to 280 ppm in the immediate are - which the writer has assumed as "background". These samples may have been strongly diluted by the soil created from the very barren basalt outcropping immediately south and uphill from coordinates 9.4 N. and 10.9 E. A strong geochem zone does trend NE-SW and almost reaches coordinates 9.4EN. and 10.9 E. (See Map No. 8). The I. P. anomaly may indicate a rake at depth to the SW for the geochem "high" trending N.E. A similar rake may be indicated by the above background PPE on line 11.4 E. between 9.6 N. to 10.1 N.

Target "B":

Target "B" is a broad area centered about and around coordinates 10.1 N. and 11.7 E. This target has been isolated by the writerffor the following reasons:

(1) The close confluence of the Silveride and Magma (?) Faults.
(2) Contacts between diabase and quartzite, diabase and shale as well as a large exposure of diabase.
(3) The preliminary Mag survey indicates a broad area of moderate highs bounded on two sides (NW and SE) by magnetic lows which may indicate rock contacts and/or fault structures.
(4) McPhar indicates above background I.P. anomalies appear on lines 11.4 E. from 9.5 N. to 10.0 N. and on line 11.9 E. from 10.25 N. to 10.75 N. with moderate to shallow depths respectively.
(5) Geochem-wise, copper values for the soil samples range from 260 to 910 ppm. These cover a wide area except for a narrow "low" background zone which separates two broader, higher value zones, all three zones of which trend NE.

Target "C":

The choice of Area "C" as a target is controlled and justified by the following:
(1) The entire area hosts the Dripping Spring quartzite - underlain by diabase.
(2) The quartzite exhibits NE trending faults between the Parallel and Magma (?) faults.
(3) A NE trending magnetic anomaly - half value of Target "B", - is present near coordinates 8.9 N. on line 11.9 E.
(4) The I. P. preliminary survey indicates a shallow to moderate "possible" anomaly south of the "target" which could mean a rake of mineralization to thessouth at depth.
(5) The target enhances a broad area of high geochem soil sample value ranging from 310 to 1000 ppm.

Target "D":

This target, not labeled on the maps, includes the entire area as a unit - indicating the possibility of a large volume low strength mineralization which could well be sufficiently strong in primary mineralization to be classed as ore.

The above consideration is reasonable and justified by the following:
(1) The area hosts, for the most part, diabase which is a well mineralized rock in the Magma Mine.
(2) The area hosts four major NW trending faults which show strong movement of the intervening blocks.
(3) The preliminary I. P. survey indicates numerous places of "disturbance as anomalies ranging from "above background" PFE to possible and probable MF zones, from shallow to moderate depths (350 to 750 feet).
(4) The preliminary magnetic survey enhances a wide range of systematic "highs" and "lows" in favorable combinations - regardless of the opposite patterns developed by McPhar as one alternative and the writer as a second alternative - both using the same set of values.
(5) The preliminary geochem survey indicates an overall anomalus area with bet three relatively narrow northeast trending "background" zones. This broad wide area lies between the Concentrator and Silveride Faults on the SW and NE respectively and from line 10.4 E. on the NW to line 11.9E. on the SE. - an area with approximate dimensions of 1300 feet NE-SW and 1800 feet NW-SE.

Part of this target would be simultaneously explored when test drilling Targets "A", "B" and "C".

EXPLORATION EXPENDITURES:

Initially, a minimum of four 1500 foot diamond drill holes at 60° angles in an eastern direction are envisioned which would crosscut the major faults, except the Concentrator Fault, as well as minor faults or zones trending NW, NE or N-S. East-west trending faults or zones have not been observed in the area, thus far.

The initial exploration program can be considered as Phase I - drilling four holes to test the three targets, A, B and C. Hole 4 may or may not be drilled - dependent on results of the first three holes, however, hole 4 is considered as part of this phase. The estimated costs for this program would approximate the following:

Phase I	
Drill site preparation and road construction	$5,000.-
Four drill holes @ 1500 feet each, 6000 feet diamond drilling, @ $20.00/foot, including sampling and assaying	$120,000.-
Field Supervision, Consultant, (Geology, etc.) Fee and expenses @ $1,500.-/mo. (Part time)	$ 9,000.-
Contingencies, overrun of work - underestimating	$ 16,000.-
Phase I total	$150,000.-

If Phase I has produced encouraging or successful results, then a much more energetic Phase II must be completed. It is difficult to forward and exploration program not knowing whether shallow (500-700 ft.) drilling would be required or whether additional deep (1500 ft.) drilling would be required. Other than drilling, additional geo-chem surveys should be completed as well as additional geo-physical surveys. The writer envisions the following program and costs as Phase II.

Phase II

Expanded Geo-chem survey	$4,500.-
Geo-physical survey, more detail, deeper penetration, same general area	12,000.-
10,000 feet diamond drilling, 15 shallow drill holes or 7 deep holes, @ $20.00/foot, including sampling, and assaying	$200,000.-
Field supervision, Consultant (Geology, etc.) Fee and Expenses, $1500.-/mo. (part time) 10 months	$ 15,000.-
Contingencies, overrun of work, underestimating	$43,500.-
Phase II total	$275,000.-

CONCLUSIONS:

As a result of the writers field examination and study of the geologic conditions, the study of the preliminary geochem survey results, the study of the preliminary geophysical (I.P. and Mag.) surveys, the correlation of all known facts and results and the writers knowledge and experience, of and in, copper mineralization in Arizona and elsewhere, the following conclusions for the Hortensia property are forwarded for your consideration.

(1) The Hortensia property is in close proximity with the famous, long life producing Magma Mine. The property hosts the rock types and major faults which are associated with the strong copper mineralization known to exist in the Magma Mine.

(2) Surface-wise, little to no copper mineralization is evidenced, however, moderate alteration and fracturing of the diabase, the contained yellow to red and black, moderately "live" appearing limonite, derivatives of pyrite, chalcocpyrite and bornite, the observance of some cross faults trending N-S to NE and the existance of the major faults are all indicators of mineral potential in the area.

(3) The foregoing criteria coupled with results and interpretations of both the preliminary geochem survey and the preliminary geophysical surveys completed, have isolated three distinct "Targets", and, suggested a fourth broad scale target.

(4) An expenditure from $125,000 to $150,000 would be required to complete an initial minimum exploratory drilling program of four 1500 foot holes to test the three isolated Targets for their condemnation or prove that mineralization worthy of further development does exist.

Respectfully submitted,

R. E. Mierits,
Mining Consultant
Phoenix, Arizona
October 31, 1973

REPLY TO:
11031 WHITE MOUNTAIN RD.
SUN CITY, ARIZONA 85351
TELEPHONE (602) 977-1711

Richard E. Mieritz

MINING CONSULTANT

ARIZONA REGISTERED
MINING ENGINEER AND GEOLOGIST

GEOLOGY
EXPLORATION
EVALUATION
FEASIBILITY
OPERATION

October 31, 1973

LETTER of CERTIFICATION

TO WHOM IT MAY CONCERN, let it be known that:

I, Richard E. Mieritz with residence at 1634 West Hazelwood Street, Phoenix, Arizona, Maricopa County, 85015, with telephone number AC 602-277-6053, does hereby certify:

That:

(1) I have visted the Hortensia mining property on several occasions as early as 1966 and more specifically during April, May and June, 1970 at which time I personally completed a geo-chem sampling program on the property.

(2) I have no direct or indirect interest in the property.

(3) I graduated from the Univeristy of Wisconsin with a B. S. degree in Mining Engineering, June, 1939, became an Arizona Registered Mining Engineer in 1956 and An Arizona Registered Geologist in 1970, and,

(4) The report to which this letter is attached and part of, has been prepared on the basis of the writers personal knowledge of the property, his having visited same on several occasions, his work on the property and the writers general knowledge of the area in which this property is located.

Respectfully submitted,

R. E. Mieritz,
Mining Consultant,
Phoenix, Arizona

June 21, 1974

LETTER of CERTIFICATE

I, Richard E. Mieritz of 1634 W. Haselwood Street, #2, Phoenix, Maricopa County, Arizona, does hereby certify that:

(1) I am a mining engineer, graduated from the University of Wisconsin with the degree of Bachelor of Science in 1939.

(2) I have practised my profession continuously since then, receiving my Arizona State Registration as a Mining Engineer in 1956, being a member in good standing, and my Arizona State Registration as a Geologist in 1970, also being a member in good standing.

(3) The letter report to which this letter is attached and part of, has been prepared by the writer and is based on first hand information because the writer completed the work personally.

(4) I have no direct nor indirect interest in the property.

(5) I have no direct nor indirect interest, nor do I expect to receive and interest, direct or indirect in the properties or the securities of Laura Industries & Resources Ltd., Vancouver, B. C., Canada, or its affiliates.

Respectfully submitted,

R. E. Mieritz,
Mining Consultant
Phoenix, Arizona.

June 21, 1974

Laura Industries and Resources Ltd.
Suite 1700
777 Hornsby Street
Vancouver, B. C., CANADA

Re: Hortensia Project
Pinal County, Arizona
Matador Explorations Ltd.

Gentlemen:

The writer has been permitted by the officials of Matador Explorations Ltd, Vancouver, B. C. to use and provide the included factual data information to Laura Industries and Resources Ltd., Vancouver, B. C., Canada, which company has requested such data in order to joint venture with Matador Explorations Ltd. to further the exploration of the Hortensia Project, Pinal County, Arizona.

The writer prepared a Geological, Geochemical and Geophysical Report on the Hortensia claims, Superior District, Pinal County, Arizona on October 31, 1973 which is on file at the Vancouver Stock Exchange. This report suggested exploration to include 6000 feet of diamond drilling, sampling, assaying and overall professional supervision of the project.

Matador Explorations Ltd., under the writers general supervision, commenced physical exploration activities as diamond drilling on January 29, 1974, with the collaring of the drill hole on February 2, a974.

By March 6, 1974, a S. 57° E., -70°, NXWL size hole had been drilled to 1500 feet at which depth it was stopped. The writer personally logged the drill core both physically and geologically and also personally sampled, by core splitting, the core at specific depths where justified. One hundred sixty some odd boxes containing the 1500 feet of core from the hole are stored in Phoenix. Fieldwise, two additional drill hole locations have been prepared. Fieldwise also, expenditures in excess of $20,000.- were made to cover diamond drill contract work, drill hole location preparation, samp-

ling and assaying and professional supervision rendered.

The attached is a Composite Drill Log of the Hortensia Diamond Drill Hole No. 1. The total depth of this hole has not penetrated the oxidized zone in this particular area -- iron oxide minerals still wholly present.

Additional exploration as deep diamond drilling should be carried forward to test the potential targets within the confines of the property.

Respectfully submitted,

R. E. Mierits,
Mining Consultant
Phoenix, Arizona.

Composite Drill Log

Hole No. 1 TYPE DRILL HOLE Diamond

PROPERTY: Hortensia DEPOSIT: COORDINATES: N. E.

BEARING: S. 57° E. ANGLE: -70° ELEV: 3070 feet TOTAL DEPTH: 1500 feet

DATE STARTED: Feb. 2, 1974 DATE COMPLETED: March 6, 1974 DRILLED BY: Boyles Bros.

HOLE DEPTH	LEVEL ELEV.	HOLE. REAM. CASING	CORE PULLS	CORE REC. %	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	ASSAYS % Cu.	ASSAYS % Mo.
10		N.C.				No. overburden but no core for first 30 ft. Very broken, ground up.		
20								
30			30.0			-30 Diabase, wh. & blk., stgly alt'd, much FeO,	0.02	
40		NXWL	35.0			some yel and red, mostly brown. Many Frac.		
			41.5			-40 Fault, mud, gouge at 40 ft.		
50			48.5					
60			55.0			-57 Fault, ½" breccia.		
			60.0					
70	9000		64.0					
			71.0					
80			76.0			Pcs, bright red mineral and pale	0.03	
			82.5			-82.5 Fault yellow mineral.		
90			88.0			-92 Fault		
			95.0			-99 Fault, breccia 0° to axis. Brwn FeO_x		
100			103.0					
110			111.0			-112 -113 Faults, diabase fresh. Broken 118-19.5		
			116.0					
120			125.0			Diabase more siliceous from 125 ft., some		
130						frac. have yel lim. now, more red lim.	0.03	
			135.0			than brwn. Frac about 1" apart. Calcite		
140			143.0			seams, 1/16, 1/8" quite prevalent.		
150			153.0					
160			160.0					
			165.0			Blk mineral 167-73, less calcite seams, many		
170			173.2			FeO seams but no frac though. Diabase	Tr.	
180	2900		182.0			more blue-gray now.		
190			191.0					
			198.0			1/8 to ½" FeO bands all angles.		
200			205.0					
210			214.0			Many calcite seams from 214 ft.	0.02	Tr.
220			219.5					
			224.0					
230			229.0					
			235.0			-234 Fault, 1 ft. wide.		
240			240.0					
250			245.0					
			252.0			-251 Fault, 1 ft. wide		
260			259.0			-259 Fault.	0.02	
			264.0					
270			273.0					
280	2800		280.5					
			285.0					
290			290.0			-293 Pink hue to rock at 293 feet (FeO?), quite		
300			299.0			broken, calcite seams, frac. about 4"		
			308.0			-307 Rock gray-white at 307, less FeO.	0.03	
310			316.0					
320			321.0					
330			328.5					
			335.0					
340			345.0			-345 Yellow mineral on frac. (MoO)?		
350			355.0				Tr.	
			362.0			-356 Fault, more alt'd below fault, more calcite		
360						veinlets, wider.	0.02	
370			370.5					
			376.0					
380			385.0			-387 Fault, calcite, brecciated, ±10° to axis.		
390	2700		395.0			-392 Fault, same as above.	0.04	
400						3 spks blue min (Azurite), yel, metallic also.		

R.E.M.

Composite Drill Log

Hole No. 1

TYPE DRILL HOLE Diamond

PROPERTY: Hortensia DEPOSIT: COORDINATES: N. E.

BEARING: S. 57° E. ANGLE: -70° ELEV: 3070 feet TOTAL DEPTH: 1500 feet

DATE STARTED: Feb. 2, 1974 DATE COMPLETED: March 6, 1974 DRILLED BY: Boyles, Bros.

HOLE DEPTH	LEVEL ELEV.	HOLE.— REAM.-- CASING.=	CORE PULLS	CORE REC.% 20 40 60 80	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	ASSAYS % Cu.	ASSAYS % Mo.
410		NXWL	402.0			Diabase with pink, brown bands in green matrix badly broken 400-02, 406-07.		
			407.0					
			412.0					
420			421.0			Greenish calcite at 419.		
430			431.0			Diabase now bluish-green.		
			434.0					
440			444.0					
450			450.0			450		
			456.0					
460					457			
			465.0		462	Fault, mud, Hy rd & brwn FeO, mod. calcite,	0.03	
470			473.0			Hy. red FeO band, 6" at 470 ft.		
480			478.0			Much calcite seams throughout.		
			485.0					
490			493.0			Contact between blue-grn and light to blk		
500	2600		501.0			diabase, 24°, streaks tan, red FeO. Spks	500 0.02	
			507.0			Py (pyrite) near contact., badly broken		
510			510.0			500 to 512. some brecciation, much calcite		
520			517.0			seams to 518.		
			522.0					
530			530.0					
			534.0					
540			538.0					
			542.0			Diabase becomes dk grn at 546.	0.02	
550			549.0			550		
			555.0					
560								
			565.0					
570			578.0		570	Fault, breccia, mud, calcite, light gray rock		
580			580.0			fine grained, soft, 1 ft. brwn-tan porphyritic		
			585.0			breccia, alt'd, FeO band @ 579. Gry, soft rock		
590			595.0			below 572 (shale), brwnsh shale 589-94..		
600	2500					Bluish-gry 594-601. 600	0.03	
			605.0		603	Brownish-gry 601-23, badly broken, mud. (Fault)		
610						Fault zone. Cleavage 70°, some frag. limey.		
620			615.0					
			625.0		623	Diabase, soft, gry, alt'd, fine grained, FeO		
630			635.0			seams now in calcite seams. Red FeO 627.		
			639.0			Very broken 637 to 690.		
640			644.0					
650			647.5			650		
			654.0					
660							Tr..	
			664.5					
670			670.0					
			675.0		676	676, 1 ft. breccia, sugary and pebbly beyond.		
680			683.0			½" FeO at 685, 60° to axis.		
690			690.0			Varied colored, pk, gry, grn, light orange,		
			696.0		696'	soft, sugary monzonite? at 696, banding	700	
700			702.0			35°		
	2400							
710			710.0				0.02	
			715.0			Highly alt'd below 715, like mud to 736		
720			728.0					
730			731.0					
			736.0		736	Diabase, highly alt'd, much FeO & calcite		
740			743.0			seams. @ 743 diabase fresh but rotten.		
750			750.0			750		
			755.0		756	Fault, mud, red-brwn FeO on H.W. side.		
760			765.0		768	Diabase, gray, much calcite.		
770			775.0			Hy FeO zone 772-785, mottled, Shale?	0.02	
780			783.0		785	Diabase, greenish, many FeO with calcite seams		
790			793.0			fresh.		
800								

R.E.M.

Composite Drill Log

Hole No 1 — Type Drill: Diamond

Property: Hortensia — Depth: — Coordinates: —

Bearing: S. 57° E. — Angle: -70° — Elev: 3070 Feet — Total Depth: 1500 Feet

Date Started: Feb. 2, 1974 — Date Completed: March 6, 1974 — Drilled By: Boyles Bros.

Hole Depth	Elev.	Hole — Beam -- Casing =	Core Pcs	Core Rec %	Rock Type	Geologic Description & Remarks	Assays Cu.	Assays Mo.
810	2300	NXWL	803.0			811.0 Fault, 2" wide, Dk grn rock below, (pyroxinite?), fresh mica to 843. Heavy calcite crystals, vugs at 826		
820			813.0					
830			821.0					
840			827.0					
850			836.0			Stgly alt'd 845-50 with pcs pk Por, mud & gravelly, very broken 850-53.	0.04	
860			845.0					
870			850.0					
880			853.0			858.0 Schist, gray, void of calcite and FeO.		
890			861.0					
900			867.0					
910			875.0					
920	2200		882.0					
930			890.0					
940			894.0					
950			904.0					
960			914.0					
970			924.0				0.03	
980			931.0					
990			941.0					
1000			951.0					
1010			955.0					
1020	2100		965.0					
1030			975.0					
1040			985.0					
1050			995.0				Tr.	
1060			1004.0					
1070			1014.0					
1080			1024.0			1025 Small fault.	0.03	
1090			1026.0					
1100			1035.0			Quartz seams 1044, some of which are pink and red.		
1110			1045.0					
1120			1055.0					
1130	2000		1065.0			1067 Thin, orange-red-brwn FeO seams to 1072	Tr.	
1140			1074.0			1072 Fault, gouge, brwn-red.		
1150			1084.0					
1160			1094.0			Schist splintery 1090-92. Yel-brwn spks 1094-98		
1170			1104.0					
1180			1114.0			Thin frac & mud slip 1120. Some barren white qtz seams with minor FeO below.	0.02	
1190			1124.0					
1200			1132.0					
			1142.0					
			1152.0					
			1161.0					
			1171.0					
			1180.0					
			1190.0					
			1199.0					

P.E.M.

Composite Drill Log

Hole No 1 — TYPE DRILL HOLE Diamond

PROPERTY Hortensia — DEPOSIT — COORDINATES N — E

BEARING S. 57° E. — ANGLE -70° — ELEV 3070 Feet — TOTAL DEPTH 1500 Feet

DATE STARTED Feb. 2, 1974 — DATE COMPLETED March 6, 1974 — DRILLED BY Boyles Bros.

HOLE DEPTH	ELEV ELEV	HOLE — REAM — — CASING =	CORE PULLS	CORE REC. %	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	ASSAYS % Cu.	ASSAYS % Mo.
1210		NXWL	1205.0			½ to 4" Qtz seams, 1202-15 ft.		
			1210.0				0.02	
1220			1215.0			1215 Fine grained schist below 1215.		
			1224.0					
1230	1900		1233.0			1232.5 Fault, purplish gouge, 2 to 4" wide. Qtz seams 1233-40. Chloritic is spots. Schist thinly laminated for most part. Quite broken.		
1240			1248.0					
1250			1249.0			1250		
			1254.0					
1260			1264.0					
1270			1274.0					
1280			1284.0					
1290			1294.0					
1300			1304.0			1303-05 Fault gouge. 1300		
1310			1311.0			Occasional shite barren Qtz seams 2-3" wide. Small amount of specular hematite.		
1320			1321.0			Quite broken 1308-10, 1335-40.		
1330			1331.0					
1340	1800		1338.0					
			1345.0			1344 Dense, soft, grn-blk (shale), 60° to axis.		
1350			1355.0			1347.5 Some calcite veinlets with FeO. 1350		
1360			1362.0			Schist below 1347.5 with many veilets org-brwn FeO to 1353.		
1370			1370.0					
			1375.0					
1380			1385.0					
1390			1394.0					
1400			1401.0			Badly broken 1395-1405, Some FeO on 1400		
1410			1408.0			schistosity 1406-23.		
			1415.0					
1420			1423.0			1423		
1430			1429.0			1430 Fault, hy FeO, breccia, broken, gouge, thinly laminatedwith much FeO on schistosity		
			1435.0			giving pinl color to 1438. Schist below		
1440	1700		1441.0			1430. Broken 1443-49. Schist darker grey		
1450			1447.0			1450 below 1449, no FeO.		
1460			1455.0					
			1461.0					
1470			1471.0					
1480			1476.0			1481 Diabase, greenish, calcite seams with org-brwn-red FeO. Fair amount olivine		
			1484.0					
1490			1490.0					
			1495.0					
1500			1500.0			Total depth, 1500 feet. March 6, 1974.		
1510								
1520								
1530								
1540								
1550	1600							
1560								
1570								
1580								
1590								
1600								

REM

October 31, 1973

LETTER of CERTIFICATION

I, Richard E. Mieritz, of 1634 W. Hazelwood Street, #2, Phoenix, Maricopa County, Arizona, does hereby certify that:

(1) I am a mining engineer, graduated from the University of Wisconsin with the degree of Bachelor of Science in 1939.

(2) I have practised my profession continuously since then, receiving my Arizona State Registration as a Mining Engineer in 1956 and my Arizona State Registration as a Geologist in 1970, being a member in good standing.

(3) The report to which this letter is attached and part of, has been prepared on the basis of personal observations on and of the property on several occasions as early as 1966, having personally completed much work on the property in 1970 and on the writers personal knowledge of the general geology of the district in which the property is located.

(4) I have no direct nor indirect interest in the property.

(5) I have no direct nor indirect interest, nor do I expect to receive and interest, direct or indirect in the properties or the securities of Matador Development Ltd., Vancouver, B. C., Canada, or its affiliates.

Respectfully submitted,

R. E. Mieritz,
Mining Consultant
Phoenix, Arizona.

(AC. 602, 277-6053)

Geology

to the property. Road conditions require use of 4-wheel drive vehicles.

CLIMATE AND VEGETATION

The climate has considerable annual variation. Temperatures range from near zero degrees in the winter to summer highs around 110 degrees. Rainfall is scant averaging around 20 inches per year. The rainfall normally occurs in torrential showers creating hazardous conditions in the numerous gullies and washes in the prospect area.

Vegetation is sparse and variable. A few cottonwoods are scattered along the main washes. The lower slopes are sprinkled with saguaro, cholla and prickly pear cacti, ocotillo, cat claw and mesquite. Gullies higher up the slope often contain thickets of scrub oak. The tops of the ridges north of the prospect are sparsely covered with scrub cedar.

GENERAL GEOLOGY

The prospect lies within the Basin and Range Province of Arizona which is divided into the mountain region and the plains or desert region in the southwest portion of the state. The latter region is characterized by narrow mountain ranges separated by broad valleys. The mountain region is transitional from the stable elevated mass of the Colorado Plateau to the low desert region. It is made up of numerous mountain ranges which

Tipperary Resources -
200 W. Illinois - Midland, Texas
C. P. Williams - Geol. Bill Zebinski

are roughly parallel to each other and to the curved edge of the plateau. In this area, the ranges trend NNW. The prospect lies just within the mountain region adjacent to the lower desert.

The area south of Superior presents a complicated picture of numerous small fault blocks composed of Precambrian and Paleozoic sediments and irregular intrusions. Detailed mapping of the prospect indicates that this complex structure extends at least as far north as the property, but the sedimentary units which make the complexity so evident to the south have been eroded away.

The geologic section in the Superior Mining District consists of excellent exposures of Precambrian and Paleozoic rocks which are overlain by an extensive cover of Tertiary dacite flows east of Superior. Precambrian exposures consist of the Pinal Schist and the Apache group of conglomerates, shales, quartzites, and limestones. Two diabase sills totalling over 3000 feet in thickness intrude the Upper Precambrian section. Overlying the Upper Precambrian rocks is a quartzite probably equivalent to the Bolsa or Abrigo Formation of Cambrian age. The quartzite is overlain by the Devonian Martin Limestone (340'), Mississippian Escabrosa Limestone (420'), Pennsylvanian Naco Limestone (1200'), and the dacite flows of Tertiary age. A number of Cretaceous quartz monzonite porphyry dikes and Tertiary

basalt dikes crop out in this area. The latter dikes are postmineralization.

During the Laramide, faulting and tilting of the sediments resulted in east-west faults which were invaded by quartz monzonite magmas and subsequent ascending ore fluids. The source of the monzonitic magmas and ore fluids is believed to have been a large buried pluton represented surficially by a quartz diorite stock which crops out two miles north of the mine. Post ore faulting, associated with the dacitic activity produced the north to northwest trending structures.

ORE DEPOSITS AT MAGMA

Two parallel east-west faults control the mineralization at the Magma mine. Mineralization is present along a strike length of 9000 feet and a vertical dimension of 5000 feet. Ore filled open spaces along the fault zone and reacted with the wall rocks to form replacement deposits which constitute the bulk of mineralization.

The Devonian Martin Limestone was apparently highly favorable for replacement, as a zone ranging from 30 to 50 feet in thickness is the host for an extensive manto deposit localized along a subsidiary branch of the Magma fault. The manto averages 20 feet thick by 950 feet in strike length and is over 5000 feet in dip length.

Geology

Mineral distribution is irregular and numerous zonal mineralogical assemblages are present. In general, ore minerals consist of massive sulfide ore-bornite, chalcopyrite, pyrite, sphalerite, enargite, tennantite, galena, chalcocite, digenite, and stromeyerite. Mineral zoning was apparently produced by a temperature gradient and by wall-rock chemistry.

Production of base metals from the Superior district from 1875-1965 approaches a value of $280 million of which $230 million was copper production.

GEOLOGY OF THE SUPERIOR PROSPECT

Because the Magma ores were deposited by ascending hydrothermal fluids that travelled along east-west faults created by Laramide disturbances, and because of the apparent association with the buried plutonic mass, a portion of which crops out north of the mine, a geological study was undertaken to examine the structure of the area north of the diorite porphyry stock to ascertain whether similar mineralized structures exist north of the pluton as are present south of the pluton.

The current study has disclosed the presence of a number of fault zones, two of which show some mineralization.

Exposures in the prospect area consist of Precambrian Pinal Schist, diabase, and quartz rhyolite porphyry. Immediately south of the property, exposures of Cambrian quartzite and the Pioneer

Geology

Shale occur along complex fault zones. Also to the south is a wide, complexly sheared and altered zone of Pinal Schist with abundant chlorite-epidote alteration.

The dominant rock type in the Superior Prospect is the Pinal Schist. The schist has been extensively fractured and faulted. Repeated movement along the faults has resulted in the broken nature of the rocks. Only the major structural features could be inferred due to the absence of contacts and the generally poor exposure of the schist.

Following is a review of the basic petrology in the Superior Prospect.

Pinal Schist

The Pinal Schist crops out over approximately 80 percent of the prospect area. It is generally a bluish-gray sericitic schist although a couple of loose fragments of garnet schist were found near the north edge of the property. The schist often has a knotted appearance due to andalusite inclusions. Outcrops are highly altered, folded and faulted. Iron staining is common as are cross foliation microfractures filled with quartz. Foliation and joint patterns are pronounced and are shown on the enclosed geologic map.

Irregular bands of milky white quartz parallel to the foliation are common. Although exposures are poor, these bands may comprise as much as 50 percent of the rock in a few spots.

Geology

trail exhibited oxide copper mineralization. The area appears to be intersected by several important faults.

One thin, irregular vein of malachite and azurite with quartz was noted in a prospect adit on the east side of the property about 1/3 of the way up Peachville Mountain. The Pinal Schist adjacent to the vein exhibited malachite along fractures and foliation planes for several yards. The vein strikes east-west and assayed approximately 20 percent copper. It was offset and then cut off by a NNW striking system of fractures which are probably associated with the active Concentrator fault. As is the case at the Magma mine, the faults exhibit an insignificant leached outcrop pattern. The main Magma ore body formed an apex 450 feet below the surface.

Alteration

The types of alteration observed were limited. Chloritization and epidotization of the Pinal Schist are evident, particularly along a line trending ENE parallel to and cutting across the southern boundary of the prospect.

There is a rusty hue over many of the flatter slopes. This is due primarily to iron staining on quartz fragments weathered out of decomposed schist. Talus fragments from a few inches below the surface generally exhibit iron staining along fractures and to a lesser degree along planes of foliation. The staining

Geology

appears to be more extensive on the west side of Whitford Canyon, but differences in the soil cover make this observation uncertain. The iron staining is probably associated with the NNW striking faults which sometimes contain breccia zones with an iron rich cement.

PREVIOUS EXPLORATION

Two shallow core holes were drilled on the property in the mid 1950's. Reliable results from the tests are unavailable. The property owner provided information in locating the drill holes and stated that both drill holes encountered significant copper mineralization. Drill Hole No. 1 located approximately 3175' FEL and 100' FSL of Section 9 reportedly cored 235 feet of copper oxide mineralization. No assay data is available. Drill Hole No. 2 located approximately 2750' FEL and 3050' FSL of Section 9 reportedly encountered mineralization totalling 170 feet in a 315 foot drill hole. Both of these drill holes were cored with AX wireline equipment and were located on the fault zones discussed above.

TIPPERARY PROGRAM

Tipperary initiated a detailed reconnaissance mapping program of the claim area and surrounding property during June, 1970. (see Geologic Map) A number of samples were taken for subsequent analysis for copper-silver mineralization. In addition, a series of geophysical IP Lines were established across

Geology

fault traces. Geophysical surveys were conducted by Heinrich's Geoexploration and results and data sheets are compiled in "Preliminary Induced Polarization Survey - Superior Prospect".

A second phase geophysical program was conducted following the initial report. Phase II results are reported in "Induced Polarization Survey of the Superior Prospect - Phase II".

CONCLUSIONS

The Superior Prospect shows indications of possible subsurface disseminated mineralization similar to the porphyry copper type deposits in addition to vein type mineralization along northwest trending faults. Exploratory efforts to date have been limited to detailed mapping, sampling and induced polarization surveys. Results of the preliminary program are sufficiently encouraging to warrant additional exploration.

Geologic mapping has shown the presence of mineralized fault traces and the IP coverage has reflected possible disseminated mineralization.

Additional geophysical coverage has been completed on the prospect and results dictate future exploratory procedure to incorporate a drilling program designed to evaluate the highest priority geophysical targets.

to the "Basis of the Induced Polarization Method" appended to the report.

GEOEX personnel involved in the field work were G. Hix, geophysical crew chief, W. Hitchcock and J. Masciandaro, technical assistants. Initial site and office supervision by P. Head, Geophysicist. Final report by C. Ludwig, Senior Geophysicist, assisted by Mr. Head and the GEOEX staff. We hereby wish to express our appreciation to Mr. Zelinski of Tipperary for his assistance to the crew in the field.

CONCLUSIONS

No Induced Polarization response typical of the Magma Vein type of massive sulfide mineralization was located in the area surveyed. However, interesting polarization effects more typical of disseminated mineralization have been partially delineated. The strongest response is noted east of Line 4 on Lines 1 and 2 in an ill-defined complex zone which crudely correlates with a rather heavily fractured and iron stained portion of the Pinal Schist bordering on and south of the rhyolite intrusive as based on the geology map.

Insufficient geophysical coverage is available to interpret this anomalous zone in detail and the zone is open-ended to the east on Line 2 and to the north on Line 4. Based on available data, the strongest response on Line 1 seems to be roughly between 0.0NE/SW and 5.0SW, perhaps bounded on the northeast by the southwest contact of the rhyolite intrusive, and is likely directly related to the heavily iron stained NNW fracture mapped near station 2.5SW. The strongest response on Line 2 is mainly east of 17.5NE to at least 30.0NE and is not obviously related to any particular mapped geologic feature within the schist although several iron stained fractures project into the area of anomalism.

No significant appearing polarization response is noted on Line 3 thereby defining a southern limit to the zone of anomalism noted on Lines 1 and 2. Line 4 is likely just within the western limit of anomalism or may even be a lateral response from polarizable material just to the east.

The cause of the anomalous I.P. response is probably metallic lustered sulfides. However, the lack of well defined directly correlating resistivity lows plus the lack of any correlating self potential lows, suggests that non-sulfide polarizers should not be ruled out as a cause of the anomalism. Metallic lustered non-sulfide polarizers would include magnetite and other iron or manganese oxides and graphite. In rare cases, clay can contribute to the response.

If sulfide caused, the stronger portion of the anomaly suggests roughly from 1 to 3% total sulfide by volume (approximately 2 to 6% by weight) based on the interpreted source geometry and on a comparison with "typical" disseminated sulfide zones in the Southwest. These estimated percentages are only meant to be a crude relative guide and in practice are often found to be at variance with actual average assays for sulfide. Regardless, the indicated polarizer concentration, if mainly sulfide, is high enough to be of economic interest providing the ratio between ore polarizers such as chalcopyrite, molybdenite, etc., to the non-ore polarizers such as pyrite, magnetite or graphite is reasonably high.

The depth to the top of the anomalous source is probably within 150 feet of the surface on the Line 1 anomaly and possibly as deep as 250 feet on the Line 2 anomaly. The Line 1 anomaly appears to be caused by a rather steeply dipping tabular source having good depth persistence and which is probably 250 to 500 feet in width in the strongest portion. The Line 2 anomaly has the aspect of a broad, relatively flat lying, source perhaps with limited thickness as evidenced by the decreased PFEs and MCFs on the deeper readings. A thickness of 200 or 300 feet is suggested.

Conceivably, this layered aspect on the Line 2 anomaly could be reflecting a supergene enriched sulfide blanket although other possibilities such as a weathering phenomenon or lithologic or structural control of mineral emplacement need be considered.

The apparent resistivities show several features of possible interest. Line 1, particularly on Spread 2, shows

two level changes (interfaces) suggesting rock type changes near 2.5SW and 5.0NE which are probably related to the rhyolite intrusive and the iron stained fracture near the southwest margin of the intrusive. East of 5.0NE, the resistivities are very high - perhaps indicating that the intrusive is tight, relatively unaltered and unmineralized. The zone between 5.0NE and 2.5SW is intermediate in resistivity level and west of 2.5SW the resistivity becomes even lower perhaps reflecting rather altered or weathered schist. The stronger portion of the Line I.P. anomaly seems to closely correlate with or be related to the resistivity interface near 2.5SW. Much of the other coverage shows a general increase in apparent resistivity with increased depth, likely the effect of decreased weathering with depth.

The self potentials show only background variations suggestive of a lack of significant quantities of actively oxidizing relatively interconnected sulfides in the vicinity of the lines within several hundred feet of the surface. This is not necessarily in opposition to the anomalous I.P. results which, even if sulfide caused, could possibly be too disseminated and/or too deep for appreciable S.P. effects to develop or be detected. Of course, a non-sulfide cause of the I.P. anomalism would also explain the lack of S.P. response.

RECOMMENDATIONS

Ideally more I.P. coverage should be obtained to better define the zone of anomalism before selecting drilling targets. Additional coverage is particularly recommended between Lines 1, 2 and 3 plus extending Line 2 (and perhaps Line 1) further east to find the eastern limit of the anomalous zone. Some coverage should also be considered north of Line 1.

In lieu of more coverage, some preliminary drilling could be done to see if the anomalism located to date is of enough interest to warrant additional follow up I.P. coverage. In this regard, two drilling recommendations are given in order of geophysical priority:

IPI

Proposed Drill Hole #1: A vertical drill hole collared near station 26.0NE on Line 2 is recommended to test the most interesting portion of the Line 2 anomaly. This hole should be programmed to go 500 feet in total depth to evaluate the zone of interest unless the anomalism has obviously been explained at a shallower depth.

Proposed Drill Hole #2: A vertical hole collared near 2.5SW on Line 1 is recommended to evaluate the Line 1 anomaly. This hole should be drilled to at least 500 feet in depth to test the zone of interest although polarizable material should be seen within 150 feet or so of the surface. In that steep dips may be involved in the anomaly, angle drilling could be considered to increase the chances of intersection, particularly if there is any geologic data as to expected dip directions. See the drilling comments section below for further points to consider in this regard.

If either of these two holes produce interesting results, the additional I.P. coverage as recommended above should be obtained to aid in delineating other targets. Two other lower priority drill holes are also suggested depending on results of the initial drilling:

Proposed Drill Hole #3: A vertical hole collared near 21.0NE on Line 2 should sample a geophysically similar zone to proposed hole #1. Likewise, the hole should be programmed to go 500 feet in depth.

Proposed Drill Hole #4: A 500 foot plus vertical hole could be considered on the fringe of the I.P. anomaly on Line 2 near station 14.0NE on a MCF high within a zone of intermediate PFEs and resistivities.

All of the above drilling should of course depend on the results of drilling higher priority holes, or any existing drilling results plus any geological and geochemical or additional geophysical information available, all of which should be in constant correlation.

Additional geophysical drill targets can be located by reference to the surface projected plan interpretation and its correlation with all information to date. The weaker

fringes of the I.P. anomalism should also be given some consideration especially if in an area having evidence of a favorable copper to iron ratio. In some mining areas, it is found that the weaker I.P. zones are of more interest than the stronger portions which may only be reflecting high pyrite concentrations. In this area, initial attention has been focused on the stronger zones in the hope that they would have the highest probability of being economically interesting.

Consideration should also be given to obtaining ground magnetic coverage to further help in delineating the geology and determine if there is any magnetite relating to the polarizable zones. A geochemical survey may also prove useful in defining the more cupriferous areas of the anomalous zone particularly if it is sulfide caused.

COMMENTS ON DRILLING I.P. TARGETS

To maximize the probability that a recommended drill hole will intersect the source of an induced polarization anomaly, the following points should be considered:

1. The anomaly has been caused by some physical property, hopefully a polarizable body containing economically interesting metallic mineralization, and this property should be determined before abandoning the anomaly.

2. Location of drill holes should be made relative to the actual sending and receiving electrode positions as they exist on the ground.

3. Due to inherent limitations in the I.P. method, depth interpretations are only approximate and the determination of dip is severely limited, particularly for angles greater than 45^{o}. Also, targets can generally be laterally resolved no finer than the station spacing (dipole length). Because of these limitations, targets less than one dipole spacing in width, particularly when steeply dipping or deeper than the dipole length, may be difficult to intersect. In these cases, several drill holes in a fence line should be considered. For the steeply dipping cases, angle drilling may also prove advantageous, mainly where the direction of

I.P. II

INTRODUCTION

At the request of Mr. C.R. Williams of Tipperary Resources Corporation, Heinrichs GEOEXploration Company conducted a second phase of more detailed induced polarization coverage, as recommended in our initial report dated December 1970, over parts of the Superior Prospect near Superior, Pinal County, Arizona. This Phase II field work was accomplished during the interim December 28, 1970 to January 15, 1971.

Lines 1 and 2 were extended to the east and five new lines (Lines 5 through 9) were run all roughly parallel to and near Lines 1, 2 and 3. A total of 14 new spreads were completed. All the new coverage is on 250 foot dipoles except Line 9 which was run on 500 foot dipoles. The total lineal coverage of both phases, counting both dipole spacings used, is 15.1 line miles of which 10.7 line miles are "subsurface" plotted data.

The new coverage was tied to and is presented with the Phase I coverage and the same sending frequencies of 0.3 and 3.0 Hz were used on both phases. For completeness, all data from both phases is presented in this Phase II report. The "Induced Polarization Location and Interpretation Plan" has been modified to show all coverage and the surface projected relative anomaly strength has been schematically contoured to help show the interpreted sulfide distribution in plan.

GEOEX personnel involved in the Phase II field work were W. Freeman, Geophysicist-Crew Chief; T. Freeman and A. Gotmer, technical assistants. Computations, compilation and final report by C. Ludwig, Senior Geophysicist, assisted by W. Freeman and the GEOEX staff.

CONCLUSIONS

The more detailed coverage of Phase II has outlined a complexly shaped probable sulfide zone, within the Pinal schist, flanking and likely intimately related to the rhyolite intrusive mainly on the south and west but also on the southeast.

As seen in plan, there are two stronger lobes of the anomaly. The more westerly lobe is quite elongate and strikes NNW and lies in the schist along the southwest contact of the

I.P. II

intrusive and its SSE projection. To the SSE, the west lobe truncates somewhere between Lines 9 and 6 and continues to the NNW past Line 7 but is apparently becoming gradually weaker. The source of this anomaly appears to be steeply dipping (with a suggestion of a westerly dip) and has good depth persistence. The anomalous response is perhaps reflecting mineralization in and near the iron stained fracture mapped nearby.

The easterly strong lobe is somewhat elongate in a NNE direction but is considerably broader than the west lobe. The source has a pronounced layered aspect perhaps being 200 or 300 feet in thickness below which the sulfide content is expected to decrease somewhat. As discussed in the Phase I report, this layered aspect could conceivably be reflecting an enriched sulfide blanket or may only be a weathering or structural phenomenon.

There is a pronounced deepening to the top of these anomalous sources southerly from the intrusive suggesting a gentle southerly dip on the east lobe and a slight southward slope of the top of the west lobe.

The most shallow appearing response is noted on Line 5 in both lobes although response on Lines 1, 7 and 8 is nearly as shallow and the interpreted depth to the top of the sulfide zone is probably within 100 feet of the surface on these four lines. The deepest resolvable response is noted on Line 6 where 300 to 400 feet or so is expected to the top of the polarizable zone.

Strength of sulfide indicated in the strongest portions of the two anomalies (Lines 5 and 8) is only slightly more than was estimated in the Phase I report (based on Lines 1 and 2 mainly), that is, roughly 1.5 to 4% total sulfide by volume rather than 1 to 3%. This content would be roughly 3 to 8% total sulfide by weight and is based on the interpreted source geometries and a comparison with "typical" disseminated sulfide zones in the Southwest and is subject to considerable variance based on specific mineralogic parameters, etc.

As suspected and mentioned in the Phase I report, the Phase II data verifies that Line 4 is mainly responding laterally to polarizable material east thereof. Line 9 cuts off most of the significant appearing response to the south

I.P. II

and the eastern cutoff is fairly well defined by Lines 1, 2,5,6 and 8. The anomalous zones are still open to the northwest and northeast but are apparently becoming weaker in that direction.

A weak but possibly interesting anomaly is seen on the east end of Line 1 and on Spread 2 of Line 7 which is similar to and perhaps related to but discrete from the east lobe of the main anomaly. This zone is open to the north, south and east.

The additional coverage on the rhyolite intrusive shows it to be very non-conductive and apparently not significantly mineralized where traversed. The resistivities associated with the stronger I.P. effects in the schist are somewhat lower than the surroundings possibly reflecting the content of conductive sulfide material and associated alteration products or perhaps only increased weathering effects.

The new coverage shows no significant appearing self potential response. This furthers the Phase I conclusion that no appreciable quantities of near surface relatively oxidizing interconnected sulfides occur in the area surveyed. This, of course, does not rule out disseminated sulfides being present as indicated by the I.P. response.

RECOMMENDATIONS

Six drill holes are suggested, in order of geophysical priority, to initially test the two main sources of the anomalous I.P. effects. These holes are mainly designed to evaluate the zones of stronger I.P. response. However, drilling anywhere within the schematic boundaries of the weak response as shown on the plan map should intersect strong enough polarizable mineralization that, if consisting of mainly sulfide ore minerals, could be economically interesting. Initial attention is given to the zones of strongest response in the hope they would have the best chance of being of economic interest but the weaker fringes should not be ignored in the initial drilling, particularly is there is interesting correlating geology or geochemistry.

1. A vertical drill hole collared near 28.5NE on Line 8 is recommended to test a strong portion of the east lobe. This hole should be programmed to go at least 400 feet in depth to completely test the section of interest.

2. To help evaluate the west lobe, a vertical drill hole collared near 10NE on Line 5 is recommended and should go to about 500 feet to sample the zone of interest. Alternately (or even preferably if the dip is geologically expected to be near vertical) a 45° easterly angle hole collared near 6.75NE on Line 5 is suggested assuming a steep westerly dip and should be at least 700 feet in length to pass through the zone of interest. If the dip is expected to be vertical or steeply to the east a 45° westerly angle hole collared near 12.5NE may be preferable and would take better advantage of the topographic slope.

3. If the results of recommendation 1.) are interesting, a 400 foot vertical hole near 31NE on Line 5 would test a geophysically equivalent target on the east lobe.

4. If drilling recommendation 2.) proves encouraging the west lobe could be further tested in a strongly anomalous area with a vertical hole about 500 feet in length collared near 11E on Line 8. An east or west angle alternate may be preferable if steep dips and a narrow target is expected.

5. Depending on the results of the above recommended drilling, the east lobe could be further evaluated in a deeper but broader, moderately strong portion by a 500 foot vertical hole collared near 28.75NE on Line 2.

6. The west lobe could be further evaluated by vertical (or angle) drilling on Line 1 near the rhyolite contact. A 500 foot or deeper vertical hole collared near 2.5SW should sample the zone of geophysical interest unless there are adverse depth and width factors which would best be circumvented by angle drilling.

The above drilling should, of course, depend on the results of testing higher priority holes or any other existing drilling information, geological and geochemical or additional geophysical information available, all of which should be in constant correlation.

Additional geophysical drill targets can be chosen by reference to the schematic anomaly strength contours on the interpretation plan correlated with all information to date.

Based on these drilling results, additional I.P. coverage could be justified. Fill in lines between Lines 1 and

5, Lines 2 and 6 and Lines 1 and 7 on 250 feet dipoles would add useful detail in the main sulfide areas. Further coverage of a reconnaissance nature near Spread 5, Line 1 and Spread 2, Line 7 would help evaluate the apparently discrete weak I.P. anomaly in the area.

COMMENTS ON DRILLING I.P. TARGETS

To maximize the probability that a recommended drill hole will intersect the source of an induced polarization anomaly, the following points should be considered:

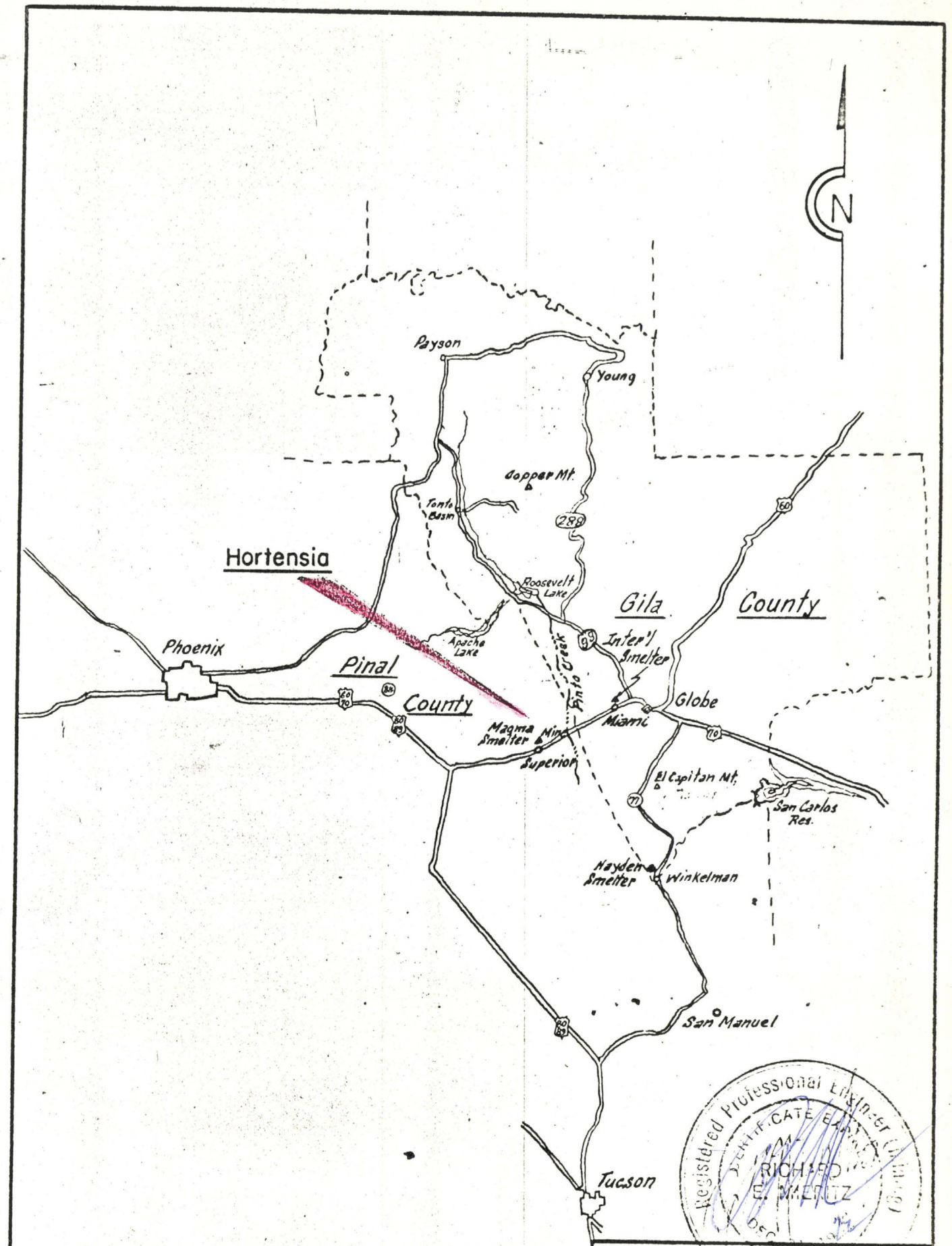
1. The anomaly has been caused by some physical property, hopefully a polarizable body containing economically interesting metallic mineralization, and this property should be determined before abandoning the anomaly.

2. Location of drill holes should be made relative to the actual sending and receiving electrode positions as they exist on the ground.

3. Due to inherent limitations in the I.P. method, depth interpretations are only approximate and the determination of dip is severely limited, particularly for angles greater than 45^{o}. Also, targets can generally be laterally resolved no finer than the station spacing (dipole length). Because of these limitations, targets less than one dipole spacing in width, particularly when steeply dipping or deeper than the dipole length, may be difficult to intersect. In these cases, several drill holes in a fence line should be considered. For the steeply dipping cases, angle drilling may also prove advantageous, mainly where the direction of dip can be geologically inferred and the drill hole oriented such that an optimum intersection of the zone of interest is obtained.

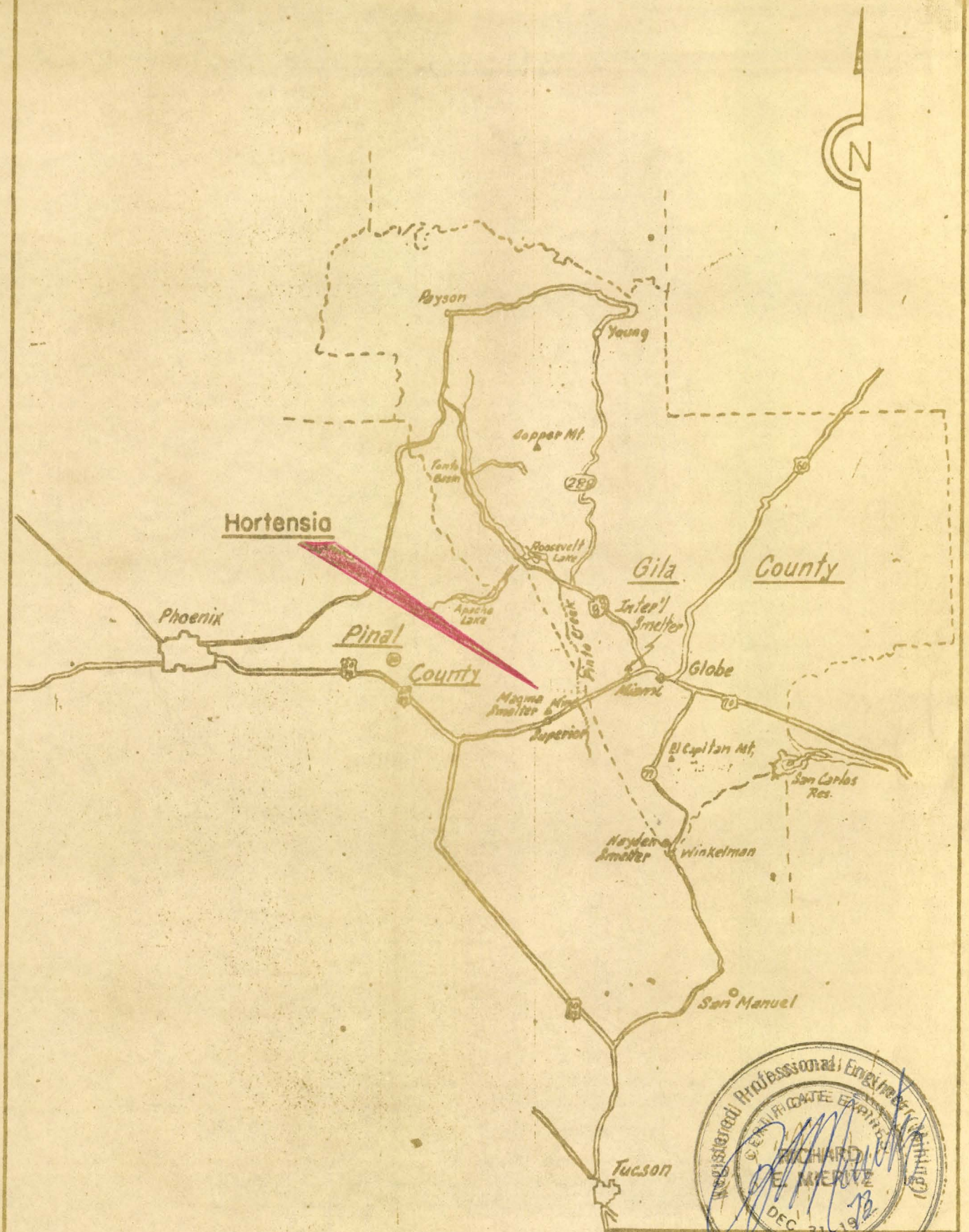
4. An observed anomaly can be the effect of a polarizable body laterally offset to the side of a line and therefore if practical, drilling should be confined to those portions of the anomalous zones well defined by several lines. Also, it should be noted that a single line cannot define the strike direction of an elongate anomalous zone - another reason for utilizing several parallel lines.

5. Logging of the drill core must be done with special



INDEX MAP
PORTION of ARIZONA
SCALE
1 INCH = ± 21 Mi.
MAY, 1970 R.E. MIERITZ

MAP № 1



Registered Professional Engineer
CERTIFICATE EXPIRES
RICHARD E. MIERITZ
DEC. 31, 19
ARIZONA U.S.A.

MAP Nº 1

INTRODUCTION:

At the request of and authorization by Alex Skinner, P. O. Box 111, Beatty, Nevada, the writer has prepared the following geologic and exploration report on the Hortensia group of claims approximately 2-1/2 airline miles north, northwest of Superior, Arizona. The property is adjacent to Magma Copper Company property along a major geologic fault of the superior Mining District.

As part of the annual accessment work for year 1969970, the writer completed a field examination of the subject property for the owner, Mr. Sherwood B. Owens, Tucson, Arizona. As a result of the writer recommendations, the owner authorized the writer to complete a geo-chem sampling program and to have a limited geo-physical survey completed in the same area as the geo-chemical survey. The above work was completed during June, 1970.

This report includes the results, interpretations and evaluation of the completed preliminary geochemical survey and the geophysical surveys (Induced Potential and Magnetic) as well as the correlation of these results with the known geology of the particular area.

The writer has permission from the owner to use the factual data of the writer's earlier report (June, 1970) for the preparation of this report.

FORWARD:

High grade copper ores and high grade silver ores have been mined from fault fissures in the Superior District for in excess of 50 years. Magma Copper Mine produces approximately 1200 tons per day high grade copper ore from its 4800 foot deep mine. The company mines, mills and smelts this tonnage at Superior and employs approximately 1200 pessons for the three phasw operation.

This production is mined from mineralised fault fissures (a very complex system -- See Map Nos. 2 through 5 and 7) containing the primary copper minerals bornite with chalcopyrite and some chalcocite. Lower grade, disseminated copper ore also exists in the known intrusive rocks of the mine. Five major faults, Main, Magma, Concentrator, Silveride and Parallel, are the controlling structural features in the district, however, the pattern is complicated by tremendous displacements along these faults, by minor complimentary faults and further by cross faults, all of which seem to exhibit displacement to some degree. The diabase intrusive appears to be the district disrupter. (See Surface Geology Map No. 7).

The Hortensia property, although northwest of Magma Copper Mine production, does host four of the above mentioned major faults, namely, Concentrator, Parallel, Silveride and by projection, possibly the Magma. By projection also, it is likely that the Conley Spring fault may also be present on the property.

Magma Apex Group
Apex Mine
Silver King Mine
Apache Mine
Comstock
Wash
Canyon
Camp
Spring
Superior
Smelter
Station
Water
Magma Copper Mines
High Sch
Superior Water Tank
Queen Creek Mine
Davidson Group
Cross
Canyon
APACHE
Queen Creek
Red Brick
Placer
Ball Park
Creek
TELEPHONE
LINE
Queen
Superior Airport
SUPERIOR AIRPORT
Pinal County Land
Old Pinal Townsite
Well
Creek
Cemetery
ZERO COORDINATE NORTH
King
Wash
Ridge

6/70