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PROPOSED EXPLORATION BUDGET AND PRELIMINARY
EVALUATION OF THE SAN FRANCISCO MOUNTAINS

BEAVER COUNTY

UTAH

FOR
ESSEX INTERNATIONAL INC.

JUNE 1970

BY

HEINRICHS GEOEXPLORATION COMPANY
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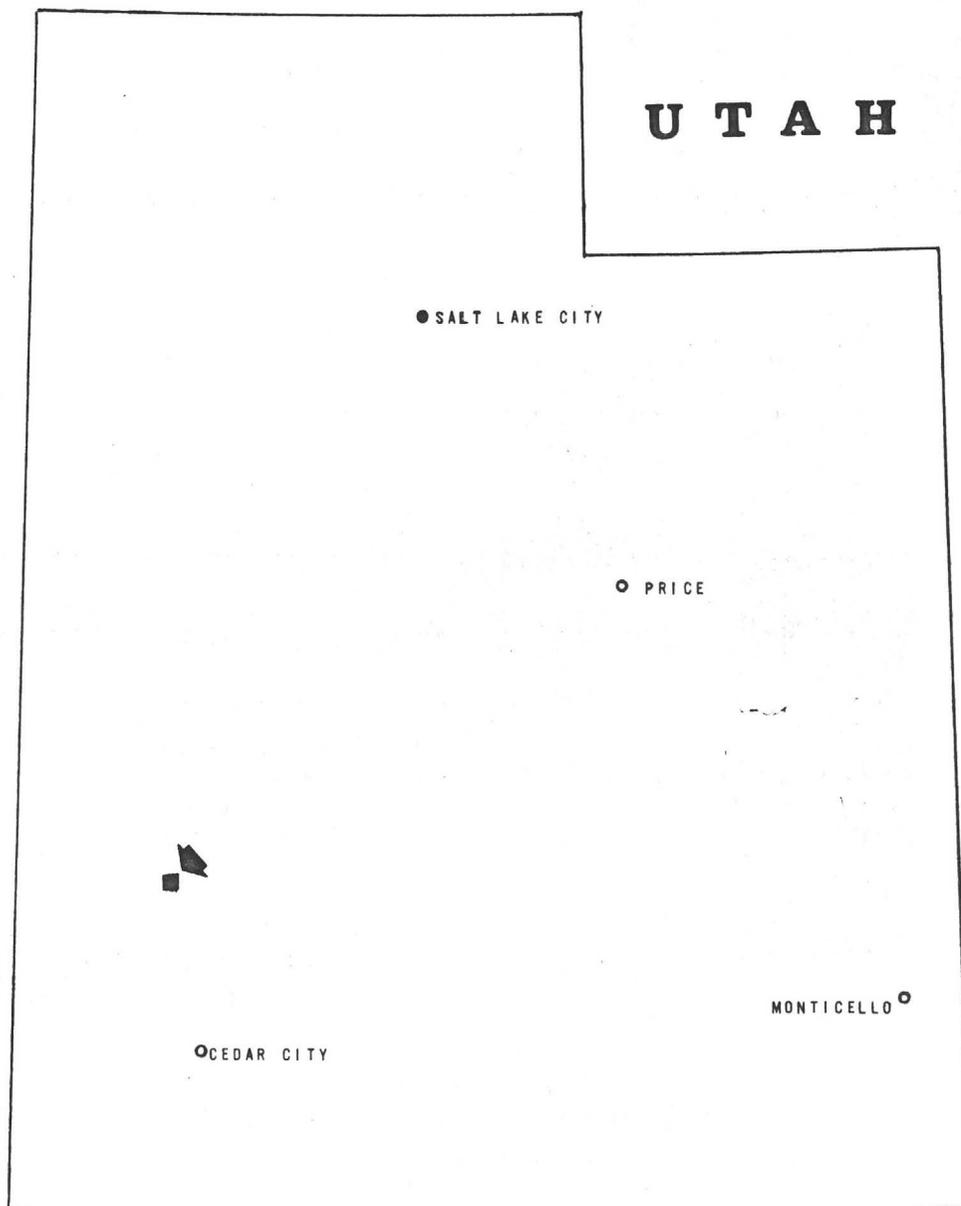
MIL FORD

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Fold out maps
Reduced scale aeromagnetics
Reduced scale topography

GENERAL LOCATION
of
SAN FRANCISCO MOUNTAINS
BEAVER COUNTY, UTAH
for
ESSEX INTERNATIONAL



HEINRICHS
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INTRODUCTION

On behalf of Essex International, Heinrichs GEOEXploration Company evaluated possible areas of future copper exploration in the San Francisco Mountains area, near Milford, Beaver County, Utah. As a result of this evaluation, a tentative exploration budget has been outlined.

This was completed in the time period June 1 - 19, 1970 by the GEOEX staff in Tucson under the direction of Mr. Grover Heinrichs and Mr. Paul A. Head.

The material utilized for this evaluation includes the United States Geological Survey Aeromagnetic Survey Map GP-598, published in 1966; the State of Utah Geological Map (southwest quarter), 1963; Frisco, Milford, Frisco Peak and Beaver Lake Mountains 15 minute U.S.G.S. topographic quadrangles and the report "American Mining Company Mines and Prospects, Beaver and Tooele Counties, Utah", of Joralemon, 1966. The Milford Area is an old and active mining area and considerable additional published data probably exists.

The costs of the projected budget discussed in this report are based on a comprehensive regional exploration program. The program has been arranged by specific areas of interest on a priority basis. The exploration of these areas may be implemented individually with a slight increase in cost per unit area.

CONCLUSIONS

The aeromagnetic anomalies can be separated into three characteristic regions:

(a) The magnetically low and featureless region north of the prominent east striking gradient of $38^{\circ}30'$ exists over Paleozoic sedimentary rocks, Tertiary volcanics, alluvium and lake deposits.

(b) The region bounded on the north by the steep east striking gradient and a prominent parallel low in the south at about $38^{\circ}18'$, is characterized by higher intensity and steeper gradient anomalies of several hundred gammas enclosing most of the known mineralization and intrusive outcrops.

(c) The region south of (b) at the edge of the airmagnetic map appears to have higher intensity anomalies than area (a) and the Escalante Valley could be of interest, but this cannot be well determined with the information at hand.

The east striking gradient seems to represent a regional demarcation between exposed intrusive rocks and "barren" areas. This general area of intrusives is 15 - 20 miles wide. A barren area to the north is 50 miles wide. The barren area to the south is 35 miles wide. This relation seems to persist if these trends are extrapolated to the east beyond the Mineral Mountains. The Tertiary intrusive zone is either delineated by these trends or the intrusives are structurally deeper under the apparent "barren" regions.

North trending lineations parallel the topography and are likely related to recent structure. Prominent northeast and northwest lineations also exist. There are at least four significant lineation intersections.

(1) At least 6 to 8 lineations intersect in the topographically low lying area between the San Francisco Mountains and Beaver Lake Mountains. At least three of them are related to known mineralization in other areas. The west Beaver Lake Mountains may also be included.

(2) South of Rocky Range the Star Range magnetic high, Beaver Lake Mountains magnetic high, northwestern, eastern and northeastern lineaments intersect. Much of this general area is under alluvium though areas to the southwest (Star Range) and north (Rocky Range) have considerable mineralization.

(3) Southwest of the Star Range and north of the Shauntie Hills, east, north and northeast trending lineaments intersect. Much of the area is under volcanics and alluvium.

The most prominent magnetic anomalies indicate shallow depths and are locally closely related to the previous mining activity. The related rocks are identified as Tertiary granitic and porphyritic intrusive rocks on the State Geological Map and called quartz monzonites by Joralemon. In fact, mining activity and intrusive outcrops seem restricted to:

- (a) above the 2800 gamma contour line in the east;
- (b) about the 800 - 1000 gamma high over the San Francisco Mountains in the west.

The conclusions derived from these data are gross, rather striking correlations of aeromagnetic and geologic data. Nearly "textbook" type correlation would be a description of the relationship of the magnetic data to larger geologic structures.

RECOMMENDATIONS

The order of priority given to specific areas of interest within the San Francisco Mountains area is based on known areas and trends of mineralization, extrapolation of apparent intrusive related anomalies, lineament intersections and structural relationships. It should be emphasized that this assigned priority is based on broad scale regional data, and that one of the initial assignments of the field geologist will be to reassess priorities based on fresh and possibly new data derived on site in the field. Also, the availability of open ground, or presently controlled ground will dictate the actual exploration priorities followed. Thus an up to date, complete and accurate land status study and compilation are of primary importance. A detailed aeromagnetic survey as suggested over the northern portion could also alter the general order of exploration priority.

In order to prepare the following proposed budget we have estimated the following rates:

1. Land status compilation - initially - 10 man weeks at \$500.00 to \$1000.00/week estimated.
2. Aerial magnetics: \$7.00 per line mile.
3. Surface magnetics: \$225.00 per field day assuming a two man, independently operating crew, or \$40.00 per field day if the magnetics are done by the I.P. crew at the time the I.P. survey is in process.
4. Induced Polarization charges are \$390.00 per crew day using 5 electrode dipole-dipole spreads.

Items 2, 3 and 4 costs include expenses and report.

5. Geological and geophysical supervision is \$150.00 per man day plus expenses.
6. Geochemical survey costs have not been estimated for the purpose of this budget.
7. Diamond Drill costs are estimated at \$15.00 per foot, including logging and some assaying. The actual number of drill holes and their depths in each area will be individually determined by combined discussions of the geologist and geophysicist. For the present purpose we have arbitrarily assumed three 1000 foot drill holes per area to be the minimum required.

One additional assumption is made, each claim staked, bought, leased, or optioned will cost a minimum of \$100.00 to locate or to acquire control, plus a minimum expenditure of \$100.00 per claim each year to hold. Each area may require on the order of 100 claims, or equivalent expenditure to acquire a firm mineral rights position. Therefore, we recommend that \$250,000.00 be allocated for this purpose, to be drawn upon as the situation demands during the first year or two of the program.

PROPOSED BUDGET ALLOCATION

	<u>Total all methods</u>
Land Acquisition all areas-----	\$ 250,000.00
Area 1-----	52,300.00
Area 2(a)-----	50,200.00
Area 2(b)-----	55,750.00
Area 3-----	61,800.00
Area 4(a)-----	49,280.00
Area 4(b)-----	50,540.00
Area 4(c)-----	48,620.00
Area 5(a)-----	51,980.00
Area 5(b)-----	51,560.00
Area 6-----	52,500.00
Area 7-----	106,600.00
Area 8(a)-----	54,133.00
Area 8(b)-----	55,733.00
Area 8(c)-----	52,560.00
 Total Proposed Budget-----	 <u>\$1,043,190.00</u>

	<u>Total all areas</u>	
Total Land Acquisition-----	\$250,000.00	= 24%
Total Geology-----	9,000.00	= 1%
Total Geophysics-----	109,190.00	= 10%
Total Drilling-----	675,000.00	= 65%
 Total Proposed Budget-----	 <u>\$1,043,190.00</u>	 = 100%

Approximate area of proposed exploration 325 sq. miles

Cost per sq. mile \$3,200.00

GENERAL CONSIDERATIONS AND METHODS

The U.S.G.S. Aeromagnetic Survey was flown at 9000' constant elevation with one mile line intervals. The topography of the area is generally 4000' - 6000' altitude. This type of survey brings into focus the larger scale and deeper structures. Even though magnetite rich contact skarns, which are commonly associated with massive mineralization, may cause high intensity (up to several thousand gammas) magnetic anomalies, they would not necessarily be differentially detected by such a high altitude widely spaced survey. Aeromagnetic surveys flown at low constant terrain clearance generally resolve a more detailed picture of shallow and small scale structures such as skarns. Even more detailed data can be provided by a surface magnetic survey, and may be more practical over areas of limited size.

In a comprehensive exploration program of this general area, a preliminary geological investigation must be made prior to any additional geophysical program. This includes library research for available published data regarding the area and followup check of this data with on site field observations. In certain instances a small sub-area may warrant a detailed geologic mapping program prior to doing reconnaissance geophysics. However, it is not possible to study the geology of one small area alone without bringing into perspective the surrounding regional geology. Even in areas with alluvial cover, nearby exposed geology must be considered.

For this reason it has been difficult to break down projected geologic costs into small target areas. We have therefore tried to prorate the total estimated geologic program for each small area discussed. The possible costs for two adjacent areas is only slightly greater than the cost for one of the areas. Two adjacent areas would cost less than two widely separated areas.

The usefulness of any newly acquired data will to a large degree depend on the availability of suitable base maps or preparing them from aerial photographs. Usually the U.S.G.S. topographic maps serve quite well for reconnaissance work but may be inadequate for semi-detailed exploration. Acquisition of generally available aerial photographs from government agencies and obtaining detailed new color aerial photographic coverage may be recommended by the geologist in the preliminary investigations as the situation demands.

Drilling targets can be picked on the basis of magnetics and geology in the case of very intense local magnetic anomalies, where magnetite rich skarns may be associated with massive mineralization. However, without a proven magnetite and copper association, disseminated mineralization cannot be traced by means of a magnetic survey only.

Induced Polarization techniques provide a means of direct detection of metallic lustered minerals, either as massive or disseminated deposits. Metallic lustered sulfides include pyrite, chalcopyrite and chalcocite. Some oxide minerals such as magnetite and manganite are also detected by I.P., although more weakly than the sulfides. We strongly recommend that the weak or moderate magnetic anomalies be explored by reconnaissance I.P. prior to starting a drilling program. This would increase overall exploration costs only slightly whereas a non-productive or misplaced drill hole could easily cost \$15,000.00. This could have paid for 35 days or 50 miles of I.P. surveying based on reconnaissance coverage.

The exact line layout and electrode configuration for I.P. should be determined by preliminary geologic and aeromagnetic data for each area considered. Reconnaissance I.P. over alluvial covered areas may be done using 1000' or 1500' dipole-dipole electrode spacings, whereas check profiles over exposed skarns may be with 250' dipole-dipole spreads.

Western Oregon

A simultaneous ground magnetometer survey could run at the same time using 200' station spacing at a modest extra expense amounting to about 10% of the I.P. costs per day. This combination would help differentiate disseminated magnetite and sulfide deposits as well as determining depths to bedrock over alluvium and additional structural information with which to base an analysis of economic potential and how best to achieve it.

Geochemical surveying could be one of the first or final phases of the entire exploration program and would be dependent on the preliminary or more detailed findings and recommendations of the on site geologist and geophysicist. Depending on these aspects, geochemistry may or may not be a very expensive phase of an exploration program. Geochemical prospecting methods are not generally productive in areas with thick alluvium, as is the case in most of the areas of interest discussed in this report, and it is therefore not included in the budget at this time.

Testing the interpretation of the geophysical and geologic portions of the program by means of diamond drilling will conclude the preliminary exploration work set forth in the budget.

For the purpose of providing a possible drilling budget, it has been assumed that at least one drill target will be found in each area or major portion of an area. At least three core holes would be necessary to check a target in the most elemental sense.

DISCUSSION OF AREAS OF INTEREST

The following is a brief discussion of specific areas of interest in the San Francisco Mountains and a statement of exploration techniques that can be used to advantage. An estimate of the cost of each technique is also presented.

AREA 1

Location: Valley between Beaver Lake Mountains and San Francisco Mountains; Tertiary volcanics; alluvium; low relief.

Discussion:

This is the site of the intersection of several magnetic lineations which trend through the San Francisco Mountains area. Mineralization has been well documented east, west and south of this area.

Magnetic lineations indicate fracture patterns or zones of weakness and the sites of their intersections are often the location or key to the location of mineralization. Adjacent areas have reported disseminated and massive skarn mineralization. This area actually includes the east flank of the San Francisco Mountains and the west flank of the Beaver Lake Mountains, both primary areas of interest.

Geology:

Since the area is covered by the alluvium, prorated geological investigation of the San Francisco Mountains and Beaver Lake Mountains for this area is \$1,000.00.

Geophysics:

I.P. and ground magnetics would cover the area adequately for \$6,300.00. This area overlaps Areas 2, 4 and Area 6. The cost would depend on whether these overlapping areas were also chosen to be examined.

Drilling:

Assuming a minimum of three 1000' holes; \$45,000.00.

AREA 2

Location: South end of Rocky Range to southwest end of Star Range; Paleozoic sedimentary rocks; Tertiary quartz monzonite and volcanics; alluvium; terrain flat to very rugged hills.

Description:

This area includes much of the previous mining activity in the Star and Rocky Ranges. Two local magnetic highs exist, one over the Star Range and the other south of Rocky Range in "The Big Wash" valley. Known mineralization in contact skarns occurs on the north flank of the Big Wash high whereas the crest of the high is under alluvium to the south. The flanks of the

Star Range anomaly have been mined considerably and deposits have been disseminated, skarns and veins. Much of the anomaly extends below alluvium to the northwest and under volcanics in the southwest. Previous geology, geophysics and drilling indicate that the trends in the structure and mineralization in the north and the southwest intersect at the Big Wash.

Geology:

Preliminary geological investigation prorated from the Rocky Range and the Star Range for this area is \$2,000.00. A geochemical survey in this area is feasible and may be eventually recommended by the geologist. The estimated costs for this area excludes geochemical analysis.

Geophysics:

Reconnaissance I.P. and ground magnetics coverage would cost approximately \$4,200.00 for the Big Wash Area 2(a).

In Area 2(b), over the north and southwest flanks of the Star Range I.P. would cost \$9,750.00. The total for the entire area is \$13,950.00 for 36 square miles.

Drilling:

Assuming a minimum of 3 holes in each of the two portions of the area, 1000 foot deep, \$90,000.00.

Total cost \$110,150.00

AREA 3

Location: Wah Wah Valley; little relief; alluvium and Tertiary volcanics on its western edge.

Description:

This area is south of the East-striking gradient. The magnetic anomalies are similar to those in the vicinities of the Star and Beaver Lake Ranges. The nearest intrusive outcrops are five miles to the east and west. It intersects the East striking gradient, though the latter is not as steep as it is to the east. The area's resemblance to the productive eastern intrusive caused anomalies warrants interest.

Geology:

Preliminary investigations of the Wah Wah Mountains, might lead to eventual geochemical analysis though this must be determined by the geophysical data also.

Probable cost, \$1000.00, excluding geochemical analysis.

Geophysics:

An initial aeromagnetic or ground magnetic survey is necessary to further delineate the subsurface structure in more detail. I.P. coverage over portions of interest would cost approximately \$13,000.00. Detailed magnetic coverage could reduce I.P. costs by indicating more accurately possible target areas perhaps by as much as one half. Aeromagnetic coverage would cost \$2,800.00 for 400 line miles. Maximum total cost; \$15,800.00.

Drilling:

Assuming a minimum of three 1000 foot holes, estimated cost \$45,000.00.

Grand total \$66,800.00.

AREA 4

Location: Beaver Lake Mountains; Paleozoic sedimentary rocks, Tertiary quartz monzonite and volcanics, alluvium; terrain rugged to flat.

Discussion:

This area includes the old mining areas of the Beaver Lake Mountains. It can be divided into 3 sections on a basis of topography and geology. A magnetic high merges with the East-west trend with mineralization in magnetite rich skarns on the flanks and disseminated copper on the crests. The intersection of the anomalies and the east trend is the site of considerable mining activity, some mineralization occurring in breccia pipes.

The anomalies extend under the volcanics and alluvium on the flanks of the Mountains.

Geology:

Preliminary geological investigations prorated for Beaver Lake Mountains: \$1,500.00. Geochemical analysis may be possible in some sections of the mountains. The costs do not include geochemical analysis.

Geophysics:

Sections 4(a) and 4(b) are over alluvium and I.P. and ground magnetics could cover both areas at a cost of \$3,780.00 and \$5,040.00 respectively.

Section 4(c) is over volcanics. I.P. coverage would cost \$3,120.00.

Total for entire area, \$11,940.00.

Drilling:

Assuming a minimum of three 1000 foot holes per section for a total of 9 holes: \$135,000.00.

Grand total \$148,440.00.

AREA 5

Location: Star Range foothills and Escalante Valley; Paleozoic sedimentary rocks; Tertiary quartz monzonite and volcanics; alluvium; low relief.

Discussion:

A magnetic high is centered on a quartz monzonite outcrop. Much mining activity is located on its northern and western flanks. The anomaly indicates the intrusives continue under the alluvium to the south and east. A less intense circular high is offset to the south by a low and may be a faulted continuation of the intrusives in the north.

Geology:

Preliminary geologic investigation prorated from the Star Range to the Star Range Foothills; \$1000.00.

Geophysics:

Detailed aeromagnetic coverage of the whole area would

delineate the southern high's relation to structure in the north as well as finer structure on the intense high to the north; approximate cost \$1,100.00.

I.P. should be run over the northern half, 5(a), in any case; probable cost \$5,880.00. Total coverage of the southern portion, 5(b), would be \$5,460.00. The I.P. costs could be lowered considerably by the results of the aeromagnetics. Maximum total cost; \$12,440.00.

Drilling:

Assuming a minimum of three 1000 foot holes in each half of the area, total cost: \$90,000.00.

Grand total \$103,440.00.

AREA 6

Location: South of San Francisco Mountains, west of Star Range, east of Wah Wah Valley; Tertiary volcanics and alluvium; low relief.

Discussion:

This elongated high has been interpreted by Joralemon as quartz monzonite capped by volcanics. Since it appears to be an extension of the productive Star Range intrusive caused anomaly to the east it is a likely prospect for similar subsurface geologic relations.

Geology:

Preliminary geological investigation prorated from the Star Range and San Francisco Mountains for this volcanic and alluvium covered area is \$500.00.

Geophysics:

Reconnaissance I.P. coverage over the entire area would cost \$7,000.00. Geology may determine that fewer reconnaissance lines could lead to elimination of this area due to too deep a burial under the volcanics and alluvium.

Drilling:

Assuming a minimum of three 1000 foot holes the cost is \$45,000.00.

Grand total \$52,500.00.

AREA 7

Location: West and east flanks of southern San Francisco Mountains; Paleozoic sedimentary rocks; Tertiary quartz monzonite and volcanics and alluvium; very rugged to very low relief.

Discussion:

The most intense magnetic high on the U.S.G.S. aeromagnetic map occurs over a quartz monzonite mass at the southern end of the San Francisco Mountains. The magnetics indicate the mass extends further to the west and south while abruptly truncated in the north and east. It is truncated in the north by the steepest segment of the East-west striking gradient. An "I.P. high" was mentioned vaguely by Joralemon as existing across the steep northern flank. Mining activity has existed on all the flanks of the aeromagnetic high in the quartz monzonite.

Geology:

Preliminary investigation prorated from the San Francisco Mountains is \$1000.00. Geochemical surveying may prove feasible if desired eventually in this area. Geologic study of the eastern flank may modify subsequent I.P. surveying since the rugged topography may increase I.P. costs considerably.

Geophysics:

The topography in the vicinity of this high limits geophysical exploration to the less rugged slopes. I.P. on the 3 flanks (west, south and east) could cost \$15,600.00.

Drilling:

Assuming a minimum of three 1000 foot holes on the eastern and three holes, on the western flank; the projected cost is \$90,000.00.

Grand total is \$106,600.00.

AREA 8

Location: North of steep East-west striking gradient at 38°30' to Sevier Lake; Paleozoic sedimentary rocks; Tertiary volcanics; alluvium; lake deposits; low relief to very high rugged mountains.

Discussion:

At least three magnetic ridges trending northerly appear in the essentially featureless magnetics of the northern area; Wah Wah Hardpan 8(a), Sevier Lake 8(b), Beaver Bottom 8(c). Anomalies are not well defined due to the wide one mile spacing and 9000' elevation of the flight elevation.

Geology:

Preliminary geological investigation could cost a minimum of \$1000.00.

Geophysics:

An aeromagnetic survey using 500' constant terrain clearance with ½ mile spacing would provide a more detailed picture of the low intensity anomalies. Approximately 1200 line miles would cover the north area for \$11,760.00. If the three magnetic highs appearing on the U.S.G.S. magnetic map were covered individually by ground magnetics the cost would be \$7,000.00. This latter method is not recommended. Aeromagnetics could provide new areas of interest and a proper perspective of the overall magnetic relationships.

Drilling:

Assuming a minimum of three 1000 foot holes at each of the three anomalies, total of \$135,000.00. The main portion of the San Francisco Mountains is in this area and a study would entail a major geologic study. This region may be considered a separate comprehensive exploration program in itself depending on the geophysical results.

Grand total \$147,760.00.



Respectfully submitted,
HEINRICHS GEOEXPLORATION COMPANY

Carlos Aiken

Carlos Aiken
Geophysicist

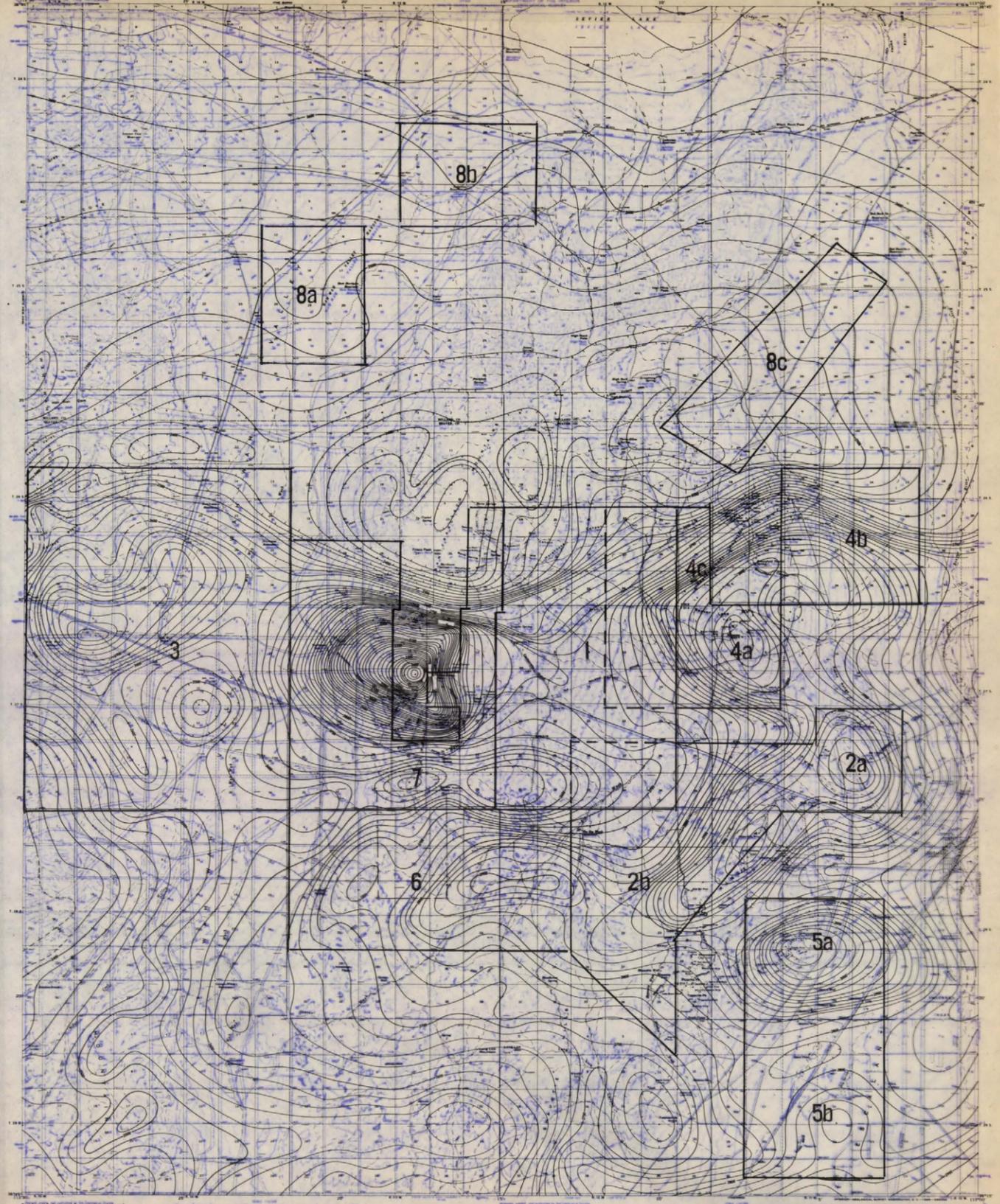
Paul A. Head

Paul A. Head
Geophysicist

APPROVED:

Walter E. Heinrichs, Jr.

Walter E. Heinrichs, Jr.
President and General Manager



AEROMAGNETIC MAP OF THE SAN FRANCISCO MOUNTAINS AND VICINITY
SOUTHWESTERN UTAH

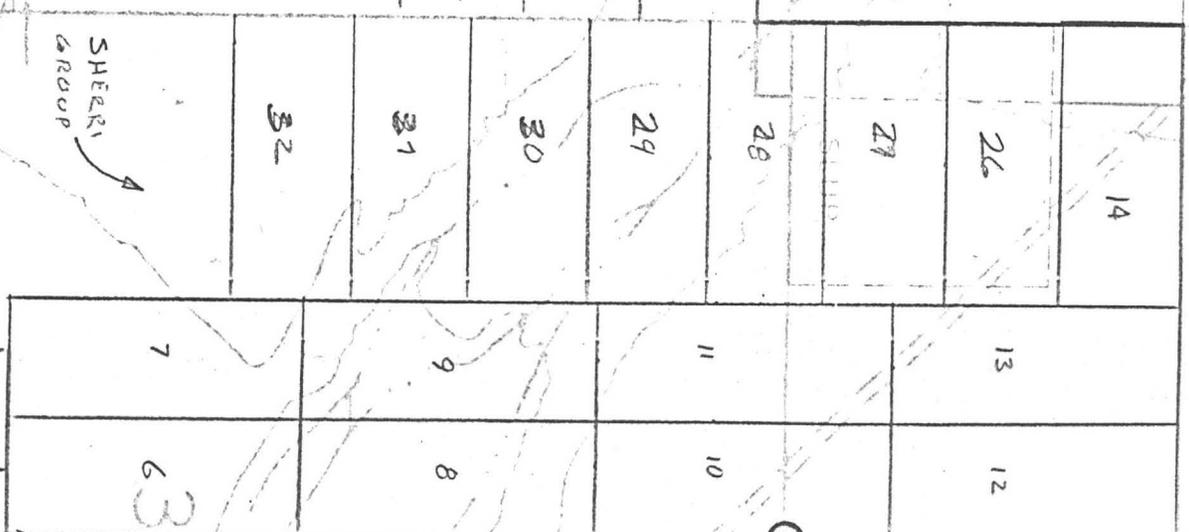
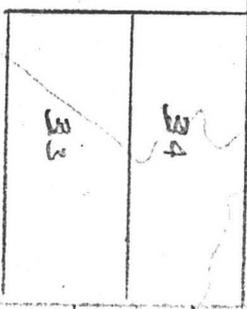
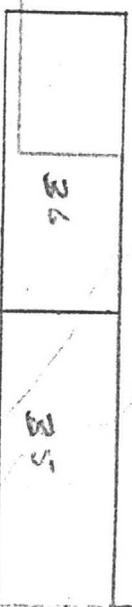


Scale: 1" = 1000'
Rocky Mtn. Dist.
T 37 S, R. 11 W.
Beaver County, Utah

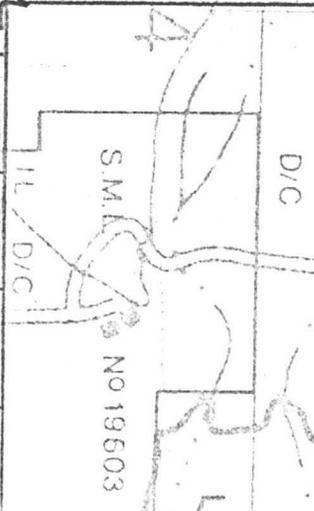
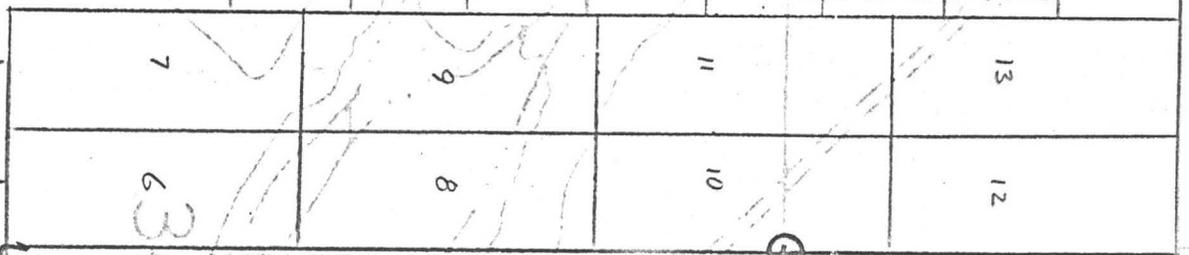
GROUP

ARMSTRONG
LEASE
FEE

GROUP



SHEPHERD GROUP



S.M.L. No 19603

Wdl PS Res

West Point Res

WILDLIFE

RAILROAD

BN

John Wilson Report for
JUNE 1974

MILFORD

DURING THE PAST TWO MONTHS, MINING OPERATIONS WITHIN THE HIDDEN TREASURE MINE HAVE INDICATED THAT POSSIBLY AS MUCH AS 60% OF THE PRE-MINING, PROJECTED ORE RESERVES DID NOT ACTUALLY EXIST WITHIN THE PIT. AS A RESULT OF THIS GREAT VARIANCE AND THE IMPLICATIONS THEREOF, AN INTENSIVE PROGRAM OF GEOLOGICAL MAPPING AND SHALLOW AIR TRACK DRILLING HAS BEEN INITIATED. BECAUSE OF THE RELATIVELY IMMEDIATE NATURE OF THIS PROBLEM AND EQUIPMENT LIMITATIONS, THIS PROGRAM IS BASICALLY DESIGNED TO RE-EVALUATE THE ORE RESERVE PROJECTIONS FOR THE NEXT THREE LEVELS (75') OF MINING OPERATIONS.

INITIAL RESULTS OF THIS PROGRAM ARE INCONCLUSIVE AT THIS TIME.

UPON THE COMPLETION OF THIS PROGRAM AND THE COMPILATION AND INTEGRATION OF ALL OBTAINED DATA, A DECISION WILL BE MADE AS TO WHETHER DEEPER TESTING IS NECESSARY AND AS TO WHETHER IT IS ECONOMICALLY FEASIBLE TO CONTINUE MINING OPERATIONS IN THE HIDDEN TREASURE PIT.

MISC.

DURING THE MONTH, 8 DAYS WERE SPENT IN THE MOAB, UTAH AREA ASSISTING THE TUCSON GEOLOGIC STAFF IN EVALUATING THE CENTENNIAL DEVELOPMENT CO. PROPERTY. DURING THIS PERIOD MOST OF THE TIME WAS SPENT MAPPING AND SAMPLING IN THE VICINITY OF THE CENTENNIAL PIT.

DURING THE MONTH 8 DAYS WERE SPENT FOLLOWING UP SOME OF THE INITIAL WORK ON THE AUSTERLITZ Au-Ag PROSPECT IN SOUTHERN SANTA CRUZ CO., ARIZONA. THIS WORK CONSISTED OF GEOLOGICAL MAPPING AND GEOCHEMICAL SAMPLING AND RESULTED IN THE CONCLUSION THAT THE Au-Ag MINERALIZATION PRESENT IN THE AREA WAS TOO LOW GRADE, SPORADIC AND DISCONTINUOUS TO BE CONSIDERED ECONOMIC AT THIS TIME. /

A FINAL REPORT IS CURRENTLY IN PREPARATION AND IS SCHEDULED FOR COMPLETION JULY 1 1974.

R. 10W. R. 11W.

R. 11W. R. 12W.

T 26 S

T 27 S

T 28 S

LOWER LAKE MINING DISTRICT

UTAH STATE MINERAL LEASE # 171888

64000 ACRES

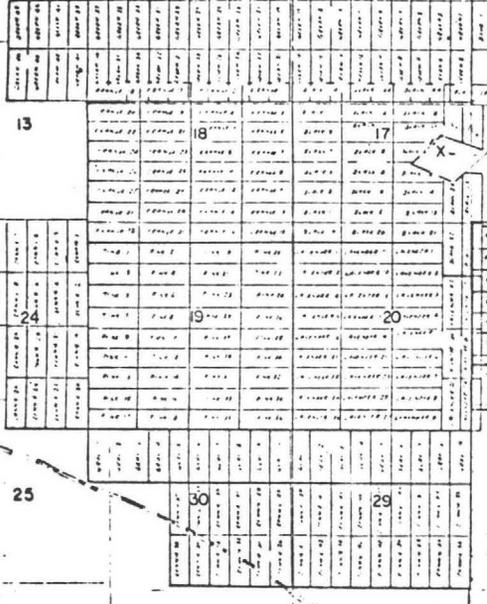
UTAH STATE MINERAL LEASE # 171889

UTAH STATE MINERAL LEASE # 171890

64000 ACRES



O.K. MINE



COPPER RANCH MINE

HIDDEN TREASURE DEPOSIT

BAWANA EXTENSION DEPOSIT

BAWANA PIT

ROCKY MOUNTAIN MINING DISTRICT

MONTREAL MINE

MARIE DEPOSIT

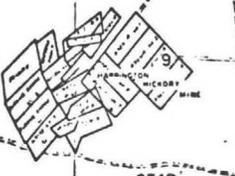
OLD HICKORY MINE

CANDY B DEPOSIT

MILL SITE

MILFORD MUNICIPAL AIRPORT

MILFORD



STAR MINING DISTRICT

MOLLIE'S NIPPLE

RANGE

R

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MONTHLY REPORT - MARCH 1973

SXM

APR 9 - 1973

HIDDEN TREASURE

RECEIVED

DURING THE MONTH A TOTAL OF 765' OF DRILLING WAS COMPLETED. EHT-10 (350E-605) AND EHT-12A (450E-555) WERE COMPLETED TO DEPTHS OF 300' AND 325' RESPECTIVELY AND WERE DRILLED PRIMARILY FOR THE PURPOSE OF OBTAINING METALLURGICAL TEST SAMPLES. EHT-13 (550E-755) IS CURRENTLY AT A DEPTH OF 140' AND IS BEING DRILLED PRIMARILY TO CONFIRM ORE RESERVE ESTIMATES. PRELIMINARY METALLURGICAL TEST RESULTS COMPARE FAVORABLY WITH THE TEST WORK DONE EARLIER. DRILLING IS SCHEDULED FOR COMPLETION 4-4-73.

K.O. AREA

DURING THE MONTH ALL AVAILABLE K.O. CORE WAS RELOGGED. ANOMALOUS Ag-Cu MINERALIZATION (± 0.2 OZ Ag, $\pm 0.1\%$ Cu) WAS FOUND TO OCCUR ALONG A T_{OM}-T_V CONTACT AND ALONG, WHAT APPEAR TO BE, SEVERAL N80W(?) LINEAR ZONES. THE K.O. AREA PROBABLY REPRESENTS THE BURIED EQUIVALENT OF WHAT IS SEEN IN OUTCROP IN THE BEAVER LAKE MOUNTAINS TO THE WEST. NO NEW, HIGH PRIORITY TARGET HAS DEVELOPED.

OK. PIT

FOUR DAYS WERE SPENT MAPPING IN THE O.K. PIT. MAPPING WILL CONTINUE AS NEW BENCHES ARE EXPOSED.

VALLEY "DEPOSIT"

RELOGGING OF THE ANACONDA VALLEY "DEPOSIT" CORE WAS BEGUN DURING THE MONTH. RESULTS ARE INCOMPLETE AT THIS TIME.

MISC.

NORANDEX D.D.H. MP-4, DRILLED EAST OF THE OK PIT ON THE INTERMOUNTAIN GROUND, WAS RELOGGED DURING THE MONTH. COPPER MINERALIZATION AND ALTERATION WAS WEAK AND GENERALLY DISCOURAGING.

NORANDEX D.D.H. MP-1, DRILLED AT THE SOUTH END OF THE ROCKY RANGE ON THE LARGE AIR MAG ANOMALY, WAS ALSO RELOGGED DURING THE MONTH. AN UNALTERED AND UNMINERALIZED Gd-Diorite WAS INTERSECTED. THIS INTRUSIVE CONTAINED ABUNDANT MgT (UP TO 5%) AND IS UNDOUBTEDLY RESPONSIBLE FOR THE LARGE MAG ANOMALY OBSERVED IN THIS AREA.

DRILL HOLE SAMPLES

PROPERTY: HIDDEN TREAS DISTRICT: MILFORD COUNTY: BEAVER STATE: UTAH COUNTRY: U.S.A

HOLE NO.: EHT-10 CONTRACTOR: BOYLES BROS COLLAR COORD.: 60 5 N 360 E COLLAR ELEV.:
 BEARING: - INCLINATION: -90 DEPTH: 325 STARTED: STOPPED:

SAMPLE NUMBER BIT SIZE RECOVERY FEET % DRILL RUN FROM TO INT. % Cu % CuO ASSAYS REMARKS

SAMPLE NUMBER	BIT SIZE	RECOVERY		DRILL RUN		INT.	% Cu		% CuO		ASSAYS		REMARKS
		FEET	%	FROM	TO								
943				95	100		TR						
944				100	105		TR						
945				105	110		TR						
946				110	115		TR						
947				115	120		TR						
948				120	125		TR						
949				125	130		TR						
950				130	135		TR						
951				135	140		TR						
952				140	145		TR						
953				145	150		TR						
954				150	155		TR						
955				155	160		TR						
956				160	165		1.38	1.15					
957				165	170		0.60	0.31					
958				170	175		0.47	0.25					
959				175	180		0.75	0.51					
960				180	185		3.60	3.25					
961				185	190		3.48	3.11					
962				190	195		1.79	1.60					
963				195	200		2.45	1.95					
964				200	205		1.45	1.16					
965				205	210		1.10	0.80					
966				210	215		1.52	1.30					
967				215	220		2.45	2.10					
968				220	225		2.04	1.70					
969				225	230		1.41	0.98					
970				230	235		3.53	3.10					
971				235	240		4.57	4.10					
972				240	245		3.55	3.30					
973				245	250		2.80	2.40					
974				250	255		2.70	2.30					
975				255	260		1.88	1.50					
976				260	265		2.20	1.80					
977				265	270		1.67	1.21					
978				270	275		2.42	2.08					
979				275	280		2.29	2.00					
980				280	285		1.06	0.90					
981				285	290		0.95	0.74					
982				290	295		1.26	1.09					
983				295	300		0.88	0.75					

ACID CONSUMPTION TEST
 180-280'
 # Cu/TON = 27.0
 # Acid/TON = 197.5
 % EXTRN = 63.7

160-180 20' 0.8% - 0.56%

180-280 100' 2.44% - 2.09%

280' Bottom of Proposed Pit

280-300 1.03% 0.87%

MILFORD MINE ORE RESERVE STATUS

September 1972

OK Mine

Mining was again undertaken at the OK Mine in July 1972 with an ore reserve of 300,000 tons at an average grade of 1.41% total copper and 1.04% oxide copper. Approximately 75,000 tons of this reserve have been mined during the past 10 weeks. For exploration and development purposes 22 rotary drill holes from 100 to 400 feet deep were drilled at a cost of approximately \$20,000. The relatively small but high grade center at the OK Mine has some exploration potential at depth and will be tested by one or more drill holes at a later time.

MARIA MINE

In November 1971 when Essex assumed control, an ore reserve of 422,000 tons at 1.88% total copper and 1.60% oxide copper existed above the 5200' elevation. Core drilling by Essex indicated another 400,000 tons at about 1½% copper between the 5200 and 5000 foot elevations. The orebody was found to bottom a short depth below the 5000 foot elevation. An estimated 120,000 tons have been mined since November 1971, and current plans call for an open pit operation to the 5125 foot elevation. In this proposed pit 485,000 tons of ore should be available for future operations. A total of 5439 feet of core drilling was accomplished at the Maria at a cost of about \$82,000.

HIDDEN TREASURE DEPOSIT

Current ore reserve is 700,000 tons at 2.00% total copper, 1.68% oxide copper, but stripping ratio for an open pit operation is very high and no feasible mining plan has been developed. Approximately \$28,000 has been spent drilling 5780 feet of rotary and core hole. Mineralization has not been limited at depth and deeper drilling will have to be undertaken to determine ultimate potential in this area.

BAWANA EXTENSION DEPOSIT

American Mining Company drill hole data indicates a narrow zone or zones containing about 2% total copper and 1 ounce in silver

BAWANA EXTENSION DEPOSIT - continued

extending northwesterly from the Bawana pit. This would be a favorable location to evaluate underground mining methods if sufficient ore and high enough grade were developed. Two core holes have been completed, two more are in progress, and an additional four holes are planned to test this zone. Total cost will be approximately \$90,000.

SUNRISE DEPOSIT

The Sunrise is a new discovery southeast of the Old Hickory Mine. To a depth of 100 feet below the surface 148,000 tons at a grade of 2.81% total copper, 2.29% oxide copper have been developed. It seems likely at this time that the ore and open pit mining could be extended to a depth of 200 feet below the surface thus doubling the ore reserve. Fifty-five drill holes have been completed to depths up to 150 feet at an estimated cost of \$15,000. Exploration potential is uncertain. Preliminary results suggest that ore limits on strike may have been reached although additional drilling will be necessary. No evidence of a limit at depth has been established.

SUMMATION

Probably available at the present time to open pit mining are 1,010,000 tons in the OK, Maria, and Sunrise deposits at a grade estimated at 2.05% total copper and 1.68% oxide copper. At the present production rate of 26,000 tons per month this is 38 months production. At an increased rate of 30,000 tons per month the ore reserve will provide 33 months production. Contained in this ore is 41,410,000 pounds of copper. In addition, a little less than 500,000 tons of tailings contain some recoverable oxide copper.

In the Hidden Treasure and deeper portion of the Maria deposit are 917,000 tons of ore containing between 1.5 and 2.0% copper or about 32 million pounds of copper. Whether any of this material can be mined at a profit will depend on future mining procedure studies.

A good chance exists for discovery of significant quantities of ore at the Bawana Extension and Valley areas, but a considerable amount of additional drilling and probably underground test work will be required to determine if an underground mining method will be feasible.

ANACONDA CORE

MILFORD DISTRICT, UTAH

Core and cuttings from Anaconda's drilling in the Milford District are stored in two old garage buildings in the town of Milford. These buildings are now owned by a Mr. R.G. Price of Las Vegas, telephone number (702) 642-1864. Jim Garmoe has checked Anaconda records and relates that the contract required Anaconda to return all data including core to the claim owners when they dropped their option. Apparently Anaconda simply left the core at its storage area in the garages and probably verbally advised the claim owners of its location. Since abandonment of the core by Anaconda the property on which it is stored was sold to Price (or his wife) and he now claims to own the core.

Bud Temple and I talked to Price and found that he does not want to relinquish the core without being paid whatever the traffic will bear. Howard Lanier attempted to put pressure on Rod Dixon since he was supposed to give all data to us and the core certainly qualifies. Dixon disclaimed any knowledge of the core being returned by Anaconda.

The situation currently is at an impasse, but some responsibility for losing the core must fall on Dixon and whoever the other property owners were at the time. This information will eventually be of some value to us, as the Anaconda core logs available are not very detailed.

J.K. Jones

April 19, 1972

Milford, Utah

May 22, 1972

TO: Paul Eimon

FROM: Dennis C. Temple

SUBJECT: Milford Ore Reserves

The following is a tabulation of ore reserves at the Milford Mine, compiled by J.K. Jones and Dennis C. Temple during the period December 1971 through May, 1972.

Location	Tons	Grade Total Cu	Oxide Cu
OK Mine	302,230	1.41%	1.04%*
Maria Mine	at least 100,000 tons of this already mined		
Above 5200 level	421,953	1.88%	1.60%
5200 level to 5000 level	401,738	1.49%	
Hidden Treasure	646,300	2.00%	1.68%

* The oxide Cu value for the OK reserve is calculated from older reserves, since this reserve contains old data, for which no oxide assays are available.

Below the 5200 level in the Maria Mine, this reserve contains data, for which no oxide assays are available and is in the transition zone, from oxide to sulfide values.

C.C. J.K. Jones

D.C. Beling.

Dennis C. Temple

EIMON

TO: Paul Eimon

FROM: C.K. Chase

SUBJECT: REPORT NO. MET 72-4
Sulfide Flotation Tests on
Maria and Hidden Treasure
Composite Samples

April 20, 1972

Summary and Conclusions:

Based on these two drill sample composites, the flotation tests showed the following results:

<u>Ore Composite</u>	<u>Pounds Copper Floated Per Ton in Final Conct.</u>	<u>Pounds Copper Floated Per Ton in Rougher Conct.</u>	<u>Grade of Conct. % Cu</u>	<u>Au, oz/ton</u>	<u>Ag, oz/ton</u>
Maria	1.6	2.4	26.4	0.54	59.8
Hidden Treasure	1.2	2.2	32.8*	0.87	74.6

These concentrates show a very significant precious metal content.

At a net smelter value for copper of 37.5¢**, and 90% of both \$38 per oz. for gold and \$1.50 per oz. for silver, the net values per ton of these concentrates are:

Net Smelter Values

	<u>Copper Value, \$</u>	<u>Gold Value, \$</u>	<u>Silver Value, \$</u>	<u>Totals, \$</u>
Maria	198.00	18.47	80.70	297.17
Hidden Treasure	246.00	29.75	100.71	376.46

* Two cleaner stages.

** Based on 52¢ wirebar and checked with Kroha of AS&R; total conversion charge = 14.5¢/lb. Cu.

Reactivating the flotation plant for the OK Mine ore alone will pay back the investment and make a good incremental return on the investment, hence its continued use on the other ores will be justified as shown below where the value of the precious metals added to the profit (or loss) from the floatable copper alone results in the following profit figures per lb. of copper recovered:

<u>Ore</u>	<u>Per Pound Copper</u>					<u>Gold & Silver Credit</u>	
	<u>Op. Cost per ton</u>	<u>Pound recov</u>	<u>Cost/lb. Cu recov</u>	<u>Net value per lb.</u>	<u>Net value less cost/lb</u>	<u>Gold & Silver Credit</u>	<u>Total profit per lb. Cu</u>
OK	45.3	7.8	5.8¢	37.5¢	31.7¢	+ 0.7¢	= 32.4¢
Maria	45.3	1.6	28.3¢	37.5¢	9.2¢	+ 18.8¢	= 28.0¢
Hidden Treasure	45.3	1.2	37.8¢	37.5¢	- 0.3¢	+ 19.9¢	= 19.6¢

Procedure:

The head assays on the Maria and Hidden Treasure composites are as follows:

	<u>% total Cu</u>	<u>% insol Cu*</u>	<u>% sol. Cu</u>	<u>Au oz/ton</u>	<u>Ag oz/ton</u>
Maria	1.63	0.26	1.37	0.006	1.00
Hidden Treasure	1.92	0.25	1.67	0.008	1.24

* The sulfide floatable in these tests suggests that half of the "Insol" copper reported may be present as a vitreous, insoluble chrysocolla. Microscopic examination of leach tailings corroborates this.

The flotation tests were conducted at the American Cyanamid Company laboratory in Tucson. Two 2000-gram rougher pulps were floated to gather enough rougher concentrate for a cleaner test. In the case of the Hidden Treasure test, two cleaning steps were performed because the first cleaner concentrate appeared dirty. The flotation tests were run at 37% solids because of flotation cell limitations.

These tests will be repeated with better control of grind and percent solids in flotation and the flotation will be followed by leaching tests on the flotation tailings to corroborate previous isolated tests.

Discussion:

If economically mineable sulfide ore in tactites can be developed, a flotation operation on such ores could return quick dividends at Milford.

CKC:td
attachments

Copies to:
H. Lanier
D. Beling
G. Jackson

AMERICAN CYANAMID COMPANY

GOP-3861 REV. 12/54 8-57

FLOTATION TEST LOG SHEET

TABLE NO.

ESSEX HURLE CRE

TEST NO.

TC 5

CONDITIONS AND REAGENTS

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON								
	TIME MINS	% SOLIDS	PH	AP 412	AF 65							
GRIND	4	66		.10								
COND.	2	38	7.8	.05	.14							
FLOAT	2											
COND.	1			.05	.02							
FLOAT	3											
COND.	1			.05								
1ST CLNR	3											

REMARKS

METALLURGICAL RESULTS

PRODUCT	WEIGHT		ASSAYS					% DISTRIBUTION			
	%	GMS	Gr Cu	Cu	Ag	Au	UNITS Cu		Cu	# Cu/ton	# Cu/ton
1ST CL CON	.30	14.1		26.39	.537	59.75	.08		4.89	2.11	1.6
1ST CL TAIL	.69	32.8		5.41			.04		2.44		
Ro. TAIL	99.01	4710.7		1.54			1.52		92.68		
		4757.6					1.64				

RATIO OF CONCENTRATION

REMARKS

2-Ro - 2000g GALICHER CELL @ 900 RPM @ 37%

AMERICAN CYANAMID COMPANY

GOF-3861 REV. 12/54 8-57

TABLE NO.

TEST NO.

FLOTATION TEST LOG SHEET

HIDDEN
ESSEX TREASURE OR

6

CONDITIONS AND REAGENTS

POINT OF ADDITION	CONDITIONS			REAGENTS POUNDS PER TON								
	TIME MINS	% SOLIDS	PH	HP	AF							
				412	65							
GRIND	6	66		.10								
COND.	2	37	8.1	.05	.20							
FLOAT	2											
COND.	1			.05	.02							
FLOAT	3											
COND.	1			.05								
1 ST CLNR	3											
REMARKS CLNR	2											

METALLURGICAL RESULTS

PRODUCT	WEIGHT		ASSAYS					% DISTRIBUTION		
	%	GMS	Cu	Pb	Ag	LIQUITS		Cu	# Cu / 100	# Cu / 700
2 ND CL CON	17	8.5		32.84	.865	74.60	.06		3.09	1.2
2 ND CL TAIL	24	11.0		4.62			.01		.51	2.2
1 ST CL TAIL	1.02	48.5		3.65			.04		2.04	
Re TAIL	98.56	464.2		1.86			1.83		94.33	
		4732.2					1.94			

RATIO OF CONCENTRATION

REMARKS

PROPOSED EXPLORATION BUDGET AND
PRELIMINARY EVALUATION OF THE
SAN FRANCISCO MOUNTAINS - BEAVER
COUNTY UTAH - FOR ESSEX INT.

JUNE 1970



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AAL-29K-103

AAL-28K-166

AAL-30K-108

AAL-28K-165

AAL-29K-102

AAL-28K-164

AAL-29K-101

AAL-28K-163

AAL-29K-100

AAL-30K-130

AAL-28K-162

AAL-29K-99

AAL-30K-129

AAL-28K-161

AAL-29K-98

AAL-30K-128

AAL-28K-160

AAL-29K-97

AAL-30K-127

AAL-28K-159

AAL-29K-96

AAL-30K-126

AAL-30K-159

AAL-29K-95

AAL-28K-158

AAL-30K-125

AAL-30K-158

AAL-29K-94

AAL-28K-157

AAL-30K-124

AAL-30K-157

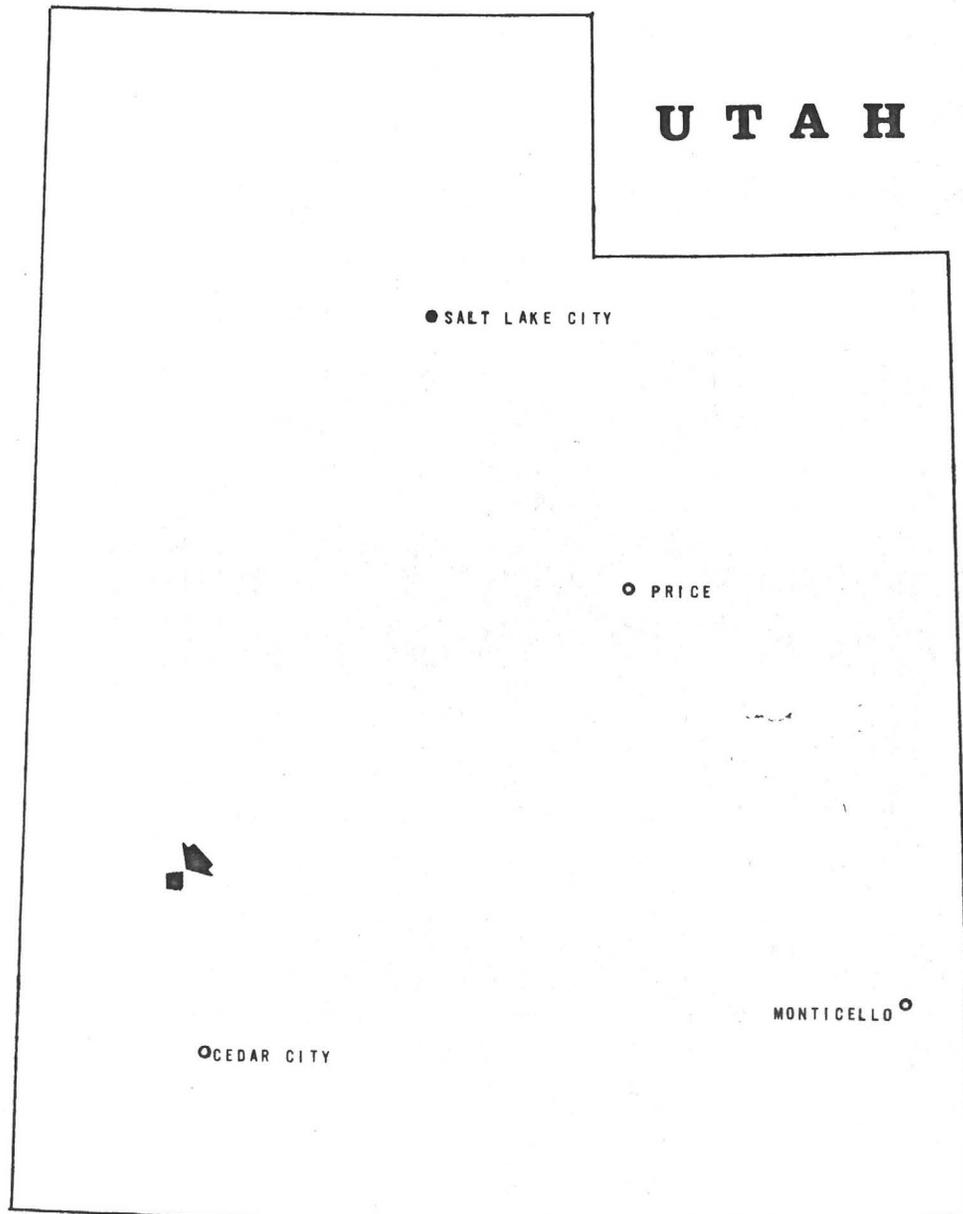
HENRICH'S
GEOEX
GEOPHYSICAL ENGINEERS
TUCSON, ARIZONA



REC'D SEP 4 1970

BOX 5964 TUCSON, ARIZONA 85703
Phone: (AREA 602) 623-0578

GENERAL LOCATION
of
SAN FRANCISCO MOUNTAINS
BEAVER COUNTY, UTAH
for
ESSEX INTERNATIONAL



HEINRICHS GEOEXPLORATION COMPANY		
	AUSTRALIA	U.S.A.
	(SYDNEY)	Post Office Box 5964
	39 Hume Street	Tucson, Arizona 85703
	Crows Nest, NSW	Phone: (602) 623-0578
GEOPHYSICAL ENGINEERS	Phone: 439-1793	Cable: GEOEX, Tucson

PROPOSED EXPLORATION BUDGET AND PRELIMINARY

EVALUATION OF THE SAN FRANCISCO MOUNTAINS

BEAVER COUNTY

UTAH

FOR

ESSEX INTERNATIONAL INC.

JUNE 1970

BY

**HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964 TUCSON, ARIZONA 85703
PHONE: 623-0578 Area Code: 602**

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Fold out maps
Reduced scale aeromagnetics
Reduced scale topography

INTRODUCTION

On behalf of Essex International, Heinrichs GEOEXploration Company evaluated possible areas of future copper exploration in the San Francisco Mountains area, near Milford, Beaver County, Utah. As a result of this evaluation, a tentative exploration budget has been outlined.

This was completed in the time period June 1 - 19, 1970 by the GEOEX staff in Tucson under the direction of Mr. Grover Heinrichs and Mr. Paul A. Head.

The material utilized for this evaluation includes the United States Geological Survey Aeromagnetic Survey Map GP-598, published in 1966; the State of Utah Geological Map (southwest quarter), 1963; Frisco, Milford, Frisco Peak and Beaver Lake Mountains 15 minute U.S.G.S. topographic quadrangles and the report "American Mining Company Mines and Prospects, Beaver and Tooele Counties, Utah", of Joralemon, 1966. The Milford Area is an old and active mining area and considerable additional published data probably exists.

The costs of the projected budget discussed in this report are based on a comprehensive regional exploration program. The program has been arranged by specific areas of interest on a priority basis. The exploration of these areas may be implemented individually with a slight increase in cost per unit area.

CONCLUSIONS

The aeromagnetic anomalies can be separated into three characteristic regions:

(a) The magnetically low and featureless region north of the prominent east striking gradient of $38^{\circ}30'$ exists over Paleozoic sedimentary rocks, Tertiary volcanics, alluvium and lake deposits.

(b) The region bounded on the north by the steep east striking gradient and a prominent parallel low in the south at about $38^{\circ}18'$, is characterized by higher intensity and steeper gradient anomalies of several hundred gammas enclosing most of the known mineralization and intrusive outcrops.

(c) The region south of (b) at the edge of the airmagnetic map appears to have higher intensity anomalies than area (a) and the Escalante Valley could be of interest, but this cannot be well determined with the information at hand.

The east striking gradient seems to represent a regional demarcation between exposed intrusive rocks and "barren" areas. This general area of intrusives is 15 - 20 miles wide. A barren area to the north is 50 miles wide. The barren area to the south is 35 miles wide. This relation seems to persist if these trends are extrapolated to the east beyond the Mineral Mountains. The Tertiary intrusive zone is either delineated by these trends or the intrusives are structurally deeper under the apparent "barren" regions.

North trending lineations parallel the topography and are likely related to recent structure. Prominent northeast and northwest lineations also exist. There are at least four significant lineation intersections.

(1) At least 6 to 8 lineations intersect in the topographically low lying area between the San Francisco Mountains and Beaver Lake Mountains. At least three of them are related to known mineralization in other areas. The west Beaver Lake Mountains may also be included.

(2) South of Rocky Range the Star Range magnetic high, Beaver Lake Mountains magnetic high, northwestern, eastern and northeastern lineaments intersect. Much of this general area is under alluvium though areas to the southwest (Star Range) and north (Rocky Range) have considerable mineralization.

(3) Southwest of the Star Range and north of the Shauntie Hills, east, north and northeast trending lineaments intersect. Much of the area is under volcanics and alluvium.

The most prominent magnetic anomalies indicate shallow depths and are locally closely related to the previous mining activity. The related rocks are identified as Tertiary granitic and porphyritic intrusive rocks on the State Geological Map and called quartz monzonites by Joralemon. In fact, mining activity and intrusive outcrops seem restricted to:

- (a) above the 2800 gamma contour line in the east;
- (b) about the 800 - 1000 gamma high over the San Francisco Mountains in the west.

The conclusions derived from these data are gross, rather striking correlations of aeromagnetic and geologic data. Nearly "textbook" type correlation would be a description of the relationship of the magnetic data to larger geologic structures.

RECOMMENDATIONS

The order of priority given to specific areas of interest within the San Francisco Mountains area is based on known areas and trends of mineralization, extrapolation of apparent intrusive related anomalies, lineament intersections and structural relationships. It should be emphasized that this assigned priority is based on broad scale regional data, and that one of the initial assignments of the field geologist will be to reassess priorities based on fresh and possibly new data derived on site in the field. Also, the availability of open ground, or presently controlled ground will dictate the actual exploration priorities followed. Thus an up to date, complete and accurate land status study and compilation are of primary importance. A detailed aeromagnetic survey as suggested over the northern portion could also alter the general order of exploration priority.

In order to prepare the following proposed budget we have estimated the following rates:

1. Land status compilation - initially - 10 man weeks at \$500.00 to \$1000.00/week estimated.
2. Aerial magnetics: \$7.00 per line mile.
3. Surface magnetics: \$225.00 per field day assuming a two man, independently operating crew, or \$40.00 per field day if the magnetics are done by the I.P. crew at the time the I.P. survey is in process.
4. Induced Polarization charges are \$390.00 per crew day using 5 electrode dipole-dipole spreads.

Items 2, 3 and 4 costs include expenses and report.

5. Geological and geophysical supervision is \$150.00 per man day plus expenses.
6. Geochemical survey costs have not been estimated for the purpose of this budget.
7. Diamond Drill costs are estimated at \$15.00 per foot, including logging and some assaying. The actual number of drill holes and their depths in each area will be individually determined by combined discussions of the geologist and geophysicist. For the present purpose we have arbitrarily assumed three 1000 foot drill holes per area to be the minimum required.

One additional assumption is made, each claim staked, bought, leased, or optioned will cost a minimum of \$100.00 to locate or to acquire control, plus a minimum expenditure of \$100.00 per claim each year to hold. Each area may require on the order of 100 claims, or equivalent expenditure to acquire a firm mineral rights position. Therefore, we recommend that \$250,000.00 be allocated for this purpose, to be drawn upon as the situation demands during the first year or two of the program.

PROPOSED BUDGET ALLOCATION

	<u>Total all methods</u>
Land Acquisition all areas-----	\$ 250,000.00
Area 1-----	52,300.00
Area 2(a)-----	50,200.00
Area 2(b)-----	55,750.00
Area 3-----	61,800.00
Area 4(a)-----	49,280.00
Area 4(b)-----	50,540.00
Area 4(c)-----	48,620.00
Area 5(a)-----	51,980.00
Area 5(b)-----	51,560.00
Area 6-----	52,500.00
Area 7-----	106,600.00
Area 8(a)-----	54,133.00
Area 8(b)-----	55,733.00
Area 8(c)-----	52,560.00
 Total Proposed Budget-----	 <u><u>\$1,043,190.00</u></u>

	<u>Total all areas</u>	
Total Land Acquisition-----	\$250,000.00	= 24%
Total Geology-----	9,000.00	= 1%
Total Geophysics-----	109,190.00	= 10%
Total Drilling-----	675,000.00	= 65%
 Total Proposed Budget-----	 <u>\$1,043,190.00</u>	 = 100%

Approximate area of proposed exploration 325 sq. miles

Cost per sq. mile \$3,200.00

GENERAL CONSIDERATIONS AND METHODS

The U.S.G.S. Aeromagnetic Survey was flown at 9000' constant elevation with one mile line intervals. The topography of the area is generally 4000' - 6000' altitude. This type of survey brings into focus the larger scale and deeper structures. Even though magnetite rich contact skarns, which are commonly associated with massive mineralization, may cause high intensity (up to several thousand gammas) magnetic anomalies, they would not necessarily be differentially detected by such a high altitude widely spaced survey. Aeromagnetic surveys flown at low constant terrain clearance generally resolve a more detailed picture of shallow and small scale structures such as skarns. Even more detailed data can be provided by a surface magnetic survey, and may be more practical over areas of limited size.

In a comprehensive exploration program of this general area, a preliminary geological investigation must be made prior to any additional geophysical program. This includes library research for available published data regarding the area and followup check of this data with on site field observations. In certain instances a small sub-area may warrant a detailed geologic mapping program prior to doing reconnaissance geophysics. However, it is not possible to study the geology of one small area alone without bringing into perspective the surrounding regional geology. Even in areas with alluvial cover, nearby exposed geology must be considered.

For this reason it has been difficult to break down projected geologic costs into small target areas. We have therefore tried to prorate the total estimated geologic program for each small area discussed. The possible costs for two adjacent areas is only slightly greater than the cost for one of the areas. Two adjacent areas would cost less than two widely separated areas.

The usefulness of any newly acquired data will to a large degree depend on the availability of suitable base maps or preparing them from aerial photographs. Usually the U.S.G.S. topographic maps serve quite well for reconnaissance work but may be inadequate for semi-detailed exploration. Acquisition of generally available aerial photographs from government agencies and obtaining detailed new color aerial photographic coverage may be recommended by the geologist in the preliminary investigations as the situation demands.

Drilling targets can be picked on the basis of magnetics and geology in the case of very intense local magnetic anomalies, where magnetite rich skarns may be associated with massive mineralization. However, without a proven magnetite and copper association, disseminated mineralization cannot be traced by means of a magnetic survey only.

Induced Polarization techniques provide a means of direct detection of metallic lustered minerals, either as massive or disseminated deposits. Metallic lustered sulfides include pyrite, chalcopyrite and chalcocite. Some oxide minerals such as magnetite and manganite are also detected by I.P., although more weakly than the sulfides. We strongly recommend that the weak or moderate magnetic anomalies be explored by reconnaissance I.P. prior to starting a drilling program. This would increase overall exploration costs only slightly whereas a non-productive or misplaced drill hole could easily cost \$15,000.00. This could have paid for 35 days or 50 miles of I.P. surveying based on reconnaissance coverage.

The exact line layout and electrode configuration for I.P. should be determined by preliminary geologic and aeromagnetic data for each area considered. Reconnaissance I.P. over alluvial covered areas may be done using 1000' or 1500' dipole-dipole electrode spacings, whereas check profiles over exposed skarns may be with 250' dipole-dipole spreads.

A simultaneous ground magnetometer survey could run at the same time using 200' station spacing at a modest extra expense amounting to about 10% of the I.P. costs per day. This combination would help differentiate disseminated magnetite and sulfide deposits as well as determining depths to bedrock over alluvium and additional structural information with which to base an analysis of economic potential and how best to achieve it.

Geochemical surveying could be one of the first or final phases of the entire exploration program and would be dependent on the preliminary or more detailed findings and recommendations of the on site geologist and geophysicist. Depending on these aspects, geochemistry may or may not be a very expensive phase of an exploration program. Geochemical prospecting methods are not generally productive in areas with thick alluvium, as is the case in most of the areas of interest discussed in this report, and it is therefore not included in the budget at this time.

Testing the interpretation of the geophysical and geologic portions of the program by means of diamond drilling will conclude the preliminary exploration work set forth in the budget.

For the purpose of providing a possible drilling budget, it has been assumed that at least one drill target will be found in each area or major portion of an area. At least three core holes would be necessary to check a target in the most elemental sense.

DISCUSSION OF AREAS OF INTEREST

The following is a brief discussion of specific areas of interest in the San Francisco Mountains and a statement of exploration techniques that can be used to advantage. An estimate of the cost of each technique is also presented.

AREA 1

Location: Valley between Beaver Lake Mountains and San Francisco Mountains; Tertiary volcanics; alluvium; low relief.

Discussion:

This is the site of the intersection of several magnetic lineations which trend through the San Francisco Mountains area. Mineralization has been well documented east, west and south of this area.

Magnetic lineations indicate fracture patterns or zones of weakness and the sites of their intersections are often the location or key to the location of mineralization. Adjacent areas have reported disseminated and massive skarn mineralization. This area actually includes the east flank of the San Francisco Mountains and the west flank of the Beaver Lake Mountains, both primary areas of interest.

Geology:

Since the area is covered by the alluvium, prorated geological investigation of the San Francisco Mountains and Beaver Lake Mountains for this area is \$1,000.00.

Geophysics:

I.P. and ground magnetics would cover the area adequately for \$6,300.00. This area overlaps Areas 2, 4 and Area 6. The cost would depend on whether these overlapping areas were also chosen to be examined.

Drilling:

Assuming a minimum of three 1000' holes; \$45,000.00.

AREA 2

Location: South end of Rocky Range to southwest end of Star Range; Paleozoic sedimentary rocks; Tertiary quartz monzonite and volcanics; alluvium; terrain flat to very rugged hills.

Description:

This area includes much of the previous mining activity in the Star and Rocky Ranges. Two local magnetic highs exist, one over the Star Range and the other south of Rocky Range in "The Big Wash" valley. Known mineralization in contact skarns occurs on the north flank of the Big Wash high whereas the crest of the high is under alluvium to the south. The flanks of the

Star Range anomaly have been mined considerably and deposits have been disseminated, skarns and veins. Much of the anomaly extends below alluvium to the northwest and under volcanics in the southwest. Previous geology, geophysics and drilling indicate that the trends in the structure and mineralization in the north and the southwest intersect at the Big Wash.

Geology:

Preliminary geological investigation prorated from the Rocky Range and the Star Range for this area is \$2,000.00. A geochemical survey in this area is feasible and may be eventually recommended by the geologist. The estimated costs for this area excludes geochemical analysis.

Geophysics:

Reconnaissance I.P. and ground magnetics coverage would cost approximately \$4,200.00 for the Big Wash Area 2(a).

In Area 2(b), over the north and southwest flanks of the Star Range I.P. would cost \$9,750.00. The total for the entire area is \$13,950.00 for 36 square miles.

Drilling:

Assuming a minimum of 3 holes in each of the two portions of the area, 1000 foot deep, \$90,000.00.

Total cost \$110,150.00

AREA 3

Location: Wah Wah Valley; little relief; alluvium and Tertiary volcanics on its western edge.

Description:

This area is south of the East-striking gradient. The magnetic anomalies are similar to those in the vicinities of the Star and Beaver Lake Ranges. The nearest intrusive outcrops are five miles to the east and west. It intersects the East striking gradient, though the latter is not as steep as it is to the east. The area's resemblance to the productive eastern intrusive caused anomalies warrants interest.

Geology:

Preliminary investigations of the Wah Wah Mountains, might lead to eventual geochemical analysis though this must be determined by the geophysical data also.

Probable cost, \$1000.00, excluding geochemical analysis.

Geophysics:

An initial aeromagnetic or ground magnetic survey is necessary to further delineate the subsurface structure in more detail. I.P. coverage over portions of interest would cost approximately \$13,000.00. Detailed magnetic coverage could reduce I.P. costs by indicating more accurately possible target areas perhaps by as much as one half. Aeromagnetic coverage would cost \$2,800.00 for 400 line miles. Maximum total cost; \$15,800.00.

Drilling:

Assuming a minimum of three 1000 foot holes, estimated cost \$45,000.00.

Grand total \$66,800.00.

AREA 4

Location: Beaver Lake Mountains; Paleozoic sedimentary rocks, Tertiary quartz monzonite and volcanics, alluvium; terrain rugged to flat.

Discussion:

This area includes the old mining areas of the Beaver Lake Mountains. It can be divided into 3 sections on a basis of topography and geology. A magnetic high merges with the East-west trend with mineralization in magnetite rich skarns on the flanks and disseminated copper on the crests. The intersection of the anomalies and the east trend is the site of considerable mining activity, some mineralization occurring in breccia pipes.

The anomalies extend under the volcanics and alluvium on the flanks of the Mountains.

Geology:

Preliminary geological investigations prorated for Beaver Lake Mountains: \$1,500.00. Geochemical analysis may be possible in some sections of the mountains. The costs do not include geochemical analysis.

Geophysics:

Sections 4(a) and 4(b) are over alluvium and I.P. and ground magnetics could cover both areas at a cost of \$3,780.00 and \$5,040.00 respectively.

Section 4(c) is over volcanics. I.P. coverage would cost \$3,120.00.

Total for entire area, \$11,940.00.

Drilling:

Assuming a minimum of three 1000 foot holes per section for a total of 9 holes: \$135,000.00.

Grand total \$148,440.00.

AREA 5

Location: Star Range foothills and Escalante Valley; Paleozoic sedimentary rocks; Tertiary quartz monzonite and volcanics; alluvium; low relief.

Discussion:

A magnetic high is centered on a quartz monzonite outcrop. Much mining activity is located on its northern and western flanks. The anomaly indicates the intrusives continue under the alluvium to the south and east. A less intense circular high is offset to the south by a low and may be a faulted continuation of the intrusives in the north.

Geology:

Preliminary geologic investigation prorated from the Star Range to the Star Range Foothills; \$1000.00.

Geophysics:

Detailed aeromagnetic coverage of the whole area would

delineate the southern high's relation to structure in the north as well as finer structure on the intense high to the north; approximate cost \$1,100.00.

I.P. should be run over the northern half, 5(a), in any case; probable cost \$5,880.00. Total coverage of the southern portion, 5(b), would be \$5,460.00. The I.P. costs could be lowered considerably by the results of the aeromagnetics. Maximum total cost; \$12,440.00.

Drilling:

Assuming a minimum of three 1000 foot holes in each half of the area, total cost: \$90,000.00.

Grand total \$103,440.00.

AREA 6

Location: South of San Francisco Mountains, west of Star Range, east of Wah Wah Valley; Tertiary volcanics and alluvium; low relief.

Discussion:

This elongated high has been interpreted by Joralemon as quartz monzonite capped by volcanics. Since it appears to be an extension of the productive Star Range intrusive caused anomaly to the east it is a likely prospect for similar subsurface geologic relations.

Geology:

Preliminary geological investigation prorated from the Star Range and San Francisco Mountains for this volcanic and alluvium covered area is \$500.00.

Geophysics:

Reconnaissance I.P. coverage over the entire area would cost \$7,000.00. Geology may determine that fewer reconnaissances lines could lead to elimination of this area due to too deep a burial under the volcanics and alluvium.

Drilling:

Assuming a minimum of three 1000 foot holes the cost is \$45,000.00.

Grand total \$52,500.00.

AREA 7

Location: West and east flanks of southern San Francisco Mountains; Paleozoic sedimentary rocks; Tertiary quartz monzonite and volcanics and alluvium; very rugged to very low relief.

Discussion:

The most intense magnetic high on the U.S.G.S. aeromagnetic map occurs over a quartz monzonite mass at the southern end of the San Francisco Mountains. The magnetics indicate the mass extends further to the west and south while abruptly truncated in the north and east. It is truncated in the north by the steepest segment of the East-west striking gradient. An "I.P. high" was mentioned vaguely by Joralemon as existing across the steep northern flank. Mining activity has existed on all the flanks of the aeromagnetic high in the quartz monzonite.

Geology:

Preliminary investigation prorated from the San Francisco Mountains is \$1000.00. Geochemical surveying may prove feasible if desired eventually in this area. Geologic study of the eastern flank may modify subsequent I.P. surveying since the rugged topography may increase I.P. costs considerably.

Geophysics:

The topography in the vicinity of this high limits geophysical exploration to the less rugged slopes. I.P. on the 3 flanks (west, south and east) could cost \$15,600.00.

Drilling:

Assuming a minimum of three 1000 foot holes on the eastern and three holes, on the western flank; the projected cost is \$90,000.00.

Grand total is \$106,600.00.

AREA 8

Location: North of steep East-west striking gradient at 38°30' to Sevier Lake; Paleozoic sedimentary rocks; Tertiary volcanics; alluvium; lake deposits; low relief to very high rugged mountains.

Discussion:

At least three magnetic ridges trending northerly appear in the essentially featureless magnetics of the northern area; Wah Wah Hardpan 8(a), Sevier Lake 8(b), Beaver Bottom 8(c). Anomalies are not well defined due to the wide one mile spacing and 9000' elevation of the flight elevation.

Geology:

Preliminary geological investigation could cost a minimum of \$1000.00.

Geophysics:

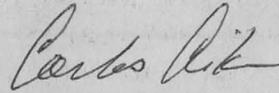
An aeromagnetic survey using 500' constant terrain clearance with ½ mile spacing would provide a more detailed picture of the low intensity anomalies. Approximately 1200 line miles would cover the north area for \$11,760.00. If the three magnetic highs appearing on the U.S.G.S. magnetic map were covered individually by ground magnetics the cost would be \$7,000.00. This latter method is not recommended. Aeromagnetics could provide new areas of interest and a proper perspective of the overall magnetic relationships.

Drilling:

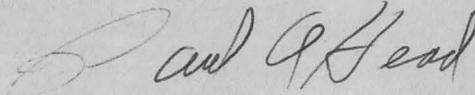
Assuming a minimum of three 1000 foot holes at each of the three anomalies, total of \$135,000.00. The main portion of the San Francisco Mountains is in this area and a study would entail a major geologic study. This region may be considered a separate comprehensive exploration program in itself depending on the geophysical results.

Grand total \$147,760.00.

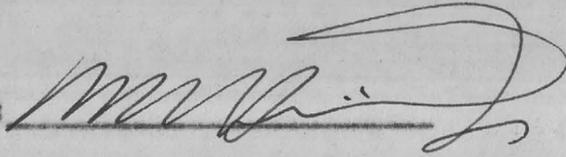
Respectfully submitted,
HEINRICHS GEOEXPLORATION COMPANY



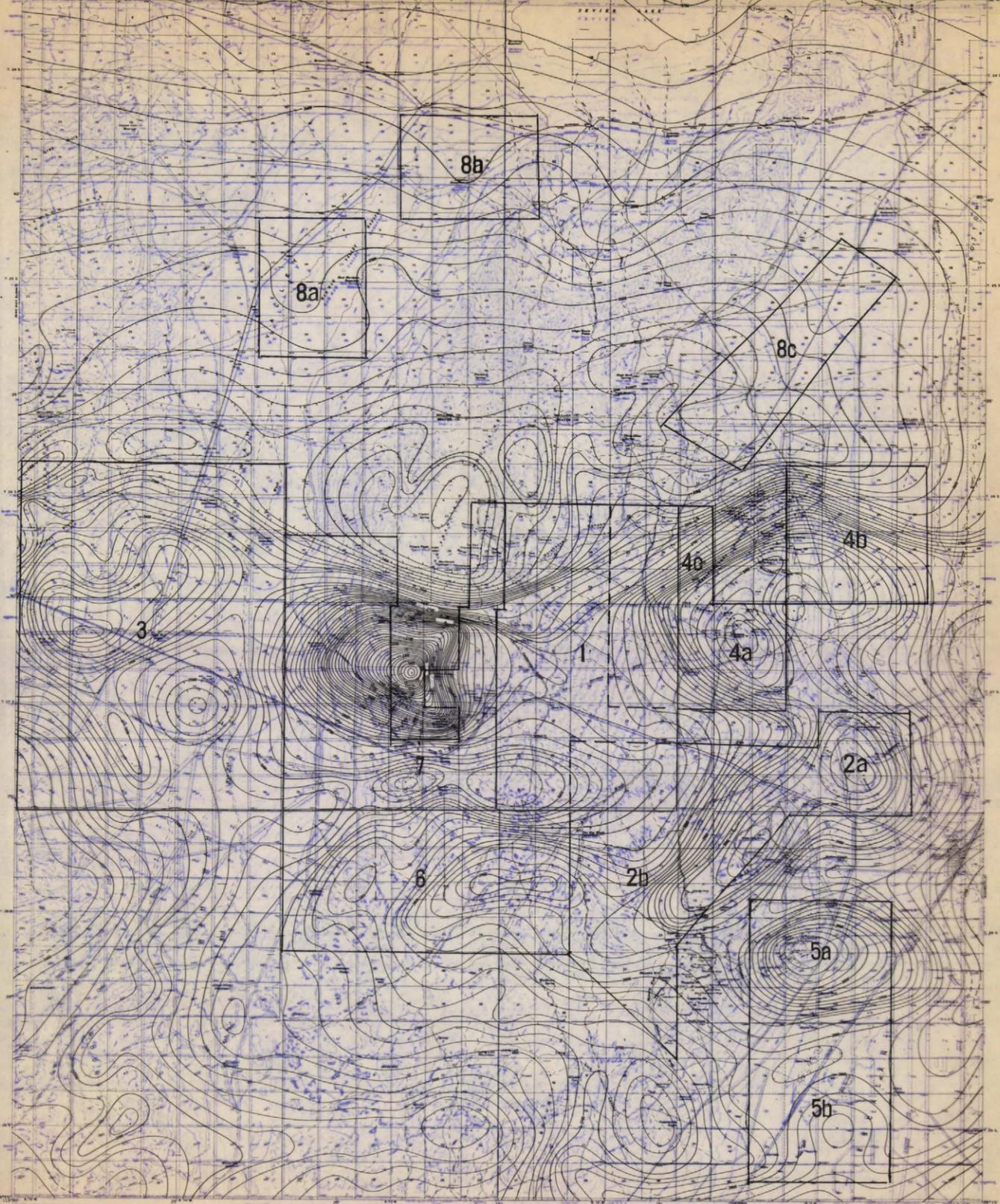
Carlos Aiken
Geophysicist



Paul A. Head
Geophysicist

APPROVED: 

Walter E. Heinrichs, Jr.
President and General Manager



AEROMAGNETIC MAP OF THE SAN FRANCISCO MOUNTAINS AND VICINITY
SOUTHWESTERN UTAH



2256 Canehill Avenue
Long Beach, California
90815

June 19, 1970

HEINRICH
GEOEX

Cable: GEOEX



REC'D JUN 22 1970 REC'D

BOX 5964 TUCSON, ARIZONA 85703

Phone: (AREA 602) 623-0578

Mr. E. Grover Heinrichs
Personnel Department
Heinrichs Geoexploration Co.
P.O. Box 5671
Tucson, Arizona 85703

Dear Sir:

Please inform me if you have an employment opening for someone with my qualifications. I am especially interested in foreign employment.

Enclosed is my resume. If any further information is required please contact me.

Very truly yours,

A handwritten signature in cursive script that reads "John Sims".

John Sims

*I don't know of anything?
but recall send data to Houston.*

No - E.G.H.

Regot No - P.F. responses

RESUME

John Lewis Sims, Jr.
2256 Canehill Avenue
Long Beach, California 90815

PERSONAL

Born; April 24, 1944

Height: 5' 10"

Weight: 175#

Health: Good

U. S. Citizen

Married

Draft Exempt

EDUCATION

St. Anthony's High School
Long Beach, California

September, 1957- June, 1961
High School Diploma

St. Edward's University
Austin, Texas

January, 1962- June, 1962
Liberal Arts G. P. A. 3.7/4.0

California State College
at Long Beach
Long Beach, California

June, 1962- August, 1966
B. S. in Civil Engineering
Engr. G. P. A. 2.5/4.0

Membership

American Society of Civil Engineers

REGISTRATION

California Engineer-in - Training Certificate (E.I.T.) # 25084

Date of Availability

Must give present employer two weeks notice.

EXPERIENCE

California State Highway Division
120 S. Spring St.
Los Angeles, California

June 1969- Present
Salary Now \$998/month
" Start \$905/month

Assistant Highway Engineer- (Highest level not requiring registration) Design Department- design of offsite and onsite drainage systems including culverts, catch basins, etc.

County of Los Angeles Road Department
1540 Alcazar Street
Los Angeles, California

March, 1968-June, 1969
Salary: \$820-\$914

Civil Engr. Asst.- Highway route planning experience

Los Angeles County Engineers
108 W. Second Street
Los Angeles, California

November, 1966-March, 1968
Salary: \$735-\$820

Civil Engr. Asst. on Rotation
14 Months design and plan check sewer systems
2 Months plan check subdivision tract maps

Connolly-Pacific Company
1900 Water Street
Long Beach, California

September, 1966-November, 1966
Salary: \$585/Month

Civil Engineering- Realignment of offshore islands, field engineering, fathometer plotting.

City of Los Angeles
Hollywood District Office
5733 Homewood Avenue
Los Angeles, California

Summer, 1965
Student Engineer
Salary: \$476/ month

City of Fountain Valley
City Hall
Fountain Valley, California

Summer, 1964
Engr. Aide
Salary: \$400/ month

PROJECT NO. EI - 114.8

FOR

ESSEX INTERANTIONAL, INC.

BALL MILL FEED LEACH TESTS

November 29, 1971

METCON RESEARCH, INC.
1796 West Grant Road
Post Office Box 50225
Tucson, Arizona 85703

PROJECT NO. EI - 114.8

TEST SUMMARY

Milford Ball Mill Feed

Leach Time vs. Recovery

Note: Filter and handling time is twenty minutes which should be added to the leach time reported on tests sheets.

<u>Test No.</u>	<u>Leach Time and Handling</u>	<u>T. Cu Recovery</u>	<u>Ox. Cu Recovery</u>	<u>Preg. Soln. Assay gpl</u>
2	2 Hr. & 20 Min.	62.01	85.32	4.25
1	3 Hr. & 20 Min.	64.67	88.99	4.35
5	4 Hr. & 20 Min.	66.12	90.05	4.50
4	5 Hr. & 55 Min.	65.32	89.91	4.55
3	6 Hr. & 40 Min.	68.21	91.97	4.69

Average Calculated Head: 1.4668 % T. Cu; 1.0725 % Ox. Cu

Assay Head: 1.43 % T. Cu; 1.01 % Ox. Cu

Sulphide Copper:	Calculated Head	0.394 %
	Assay Head	0.41 %
	Tailing	0.404 %

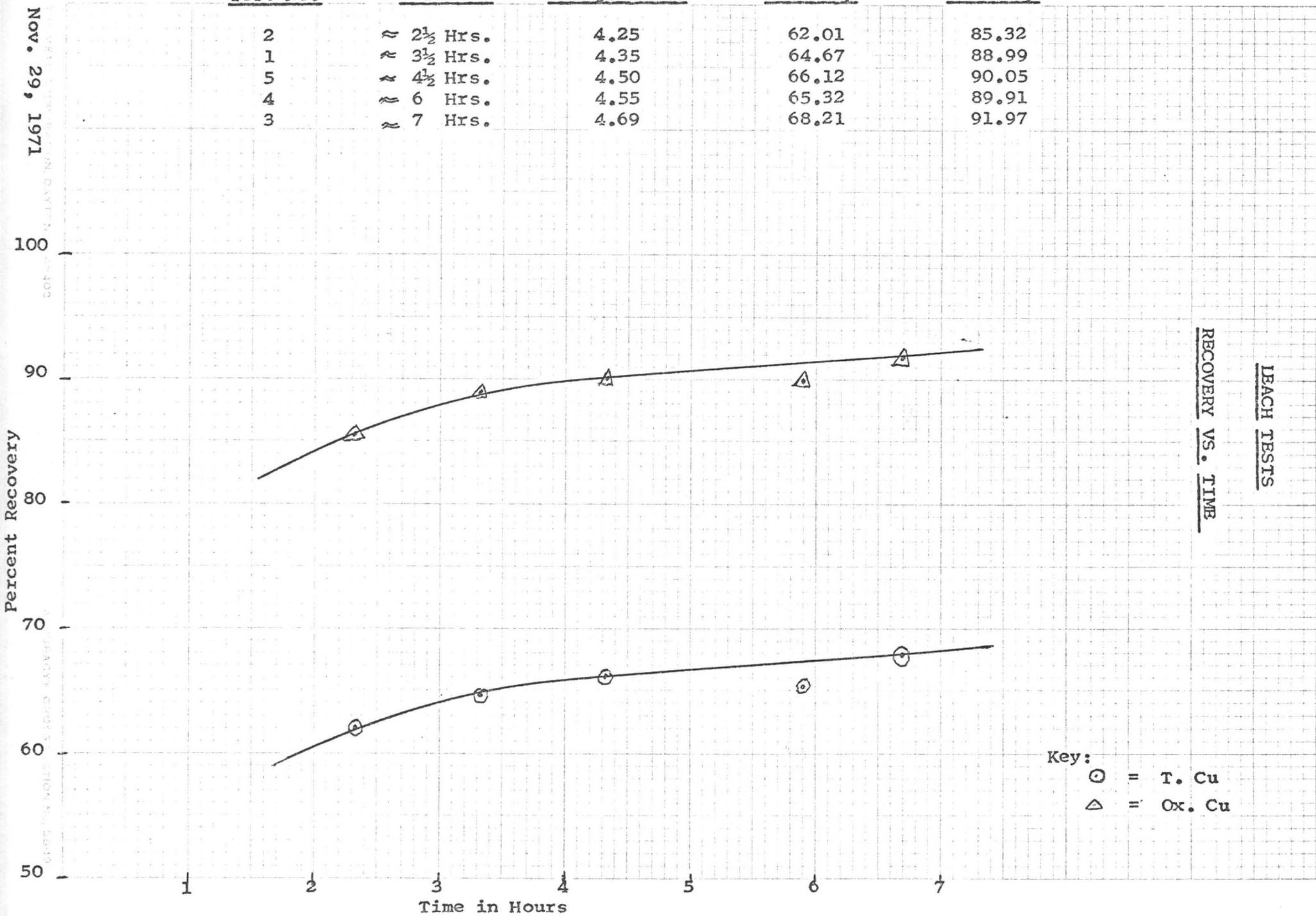
Data Accumulated by:


Rudolph Fisher
Chief Technician

November 29, 1971

Nov. 29, 1971

Test No.	Time	Assay gpl Preg. Soln.	T. Cu Recovery	Ox. Cu Recovery
2	≈ 2½ Hrs.	4.25	62.01	85.32
1	≈ 3½ Hrs.	4.35	64.67	88.99
5	≈ 4½ Hrs.	4.50	66.12	90.05
4	≈ 6 Hrs.	4.55	65.32	89.91
3	≈ 7 Hrs.	4.69	68.21	91.97



Project No. EI - 114.8

B M Reed

METCON

RESEARCH, INC.

BOX 50225
TUCSON, ARIZONA
85703

PROJECT NO. EI - 114.8

TEST NO. 1

3 HOUR LEACH AT pH 1.5

SAMPLE: B M Feed

H₂SO₄:
Purity - 97%
Sp. G. - 1.84

Head Assay: 1.43% T. Cu; 1.01% Ox. Cu; 0.42% S. Cu

Charge: 100g ore + 200ml H₂O

Time	Acid Added (ml)	pH	
		Before	After
1:15	0.95	--	1.4
1:25	0.20	1.7	1.5
1:35	0.10	1.6	1.5
1:45	0.15	1.6	1.5
2:05	0.10	1.6	1.5
3:00	0.15	--	1.4
4:15	--	1.5	1.5

Total H₂SO₄ Added 1.65 ml

Assay No.	Product	Wt./Vol.	Assay		Content		Percent Recovery	
			T. Cu	Ox. Cu	T. Cu	Ox. Cu	T. Cu	Ox. Cu
7663	Preg. Soln.	100 ml	4.35gpl		0.4350		64.67	
7664	Wash Soln.	620 ml	0.83gpl		0.5146			
7673	Leach Tlg.	97.9 g	0.53 %	0.12%	0.5188	0.1175		88.99
					1.4684	1.0670		

Accountability based on average calculated head = 100.1%

$$1.65 \text{ ml H}_2\text{SO}_4 \times 1.84 \times .97 = 2.94 \text{ g H}_2\text{SO}_4$$

3.10 lbs. of acid per pound of copper

58.80 lbs. of acid per ton of ore

November 18, 1971

METCON

RESEARCH, INC.

 BOX 50225
 TUCSON, ARIZONA
 85703

PROJECT NO. EI - 114.8

TEST NO. 2

2 HOUR LEACH AT pH 1.5

SAMPLE: B M Feed

 H_2SO_4 :
 Purity = 97%
 Sp. G. = 1.84

Head Assay: 1.43% T. Cu; 1.01% Ox. Cu; 0.42% S. Cu

Charge: 100 g ore + 200 ml H_2O

Time	Acid Added (ml)	Acid Added	
		Before	After
1:45	0.50	--	1.5
1:50	0.40	1.6	1.4
2:00	0.20	1.6	1.4
2:35	0.30	--	1.4
3:42	0.10	1.6	1.4
3:45	--	--	1.5
Total H_2SO_4 Added		1.50 ml	

Assay No.	Product	Wt./Vol.	Grade		Content		% Recovery	
			T. Cu	Ox. Cu	T. Cu	Ox. Cu	T. Cu	Ox. Cu
7661	Preg. Soln.	100 ml	4.25 gpl		0.4250		62.01	
7662	Wash Soln.	660 ml	0.74 gpl		0.4884			
7674	Leach Tailing	98.2 g	0.57 %	0.16%	0.5597	0.1571		85.32
	Calc. Heads				1.4731	1.0705		

Accountability based on average calculated head = 100.4%

$$1.50 \text{ ml } H_2SO_4 \times 1.84 \times .97 = 2.68 \text{ g } H_2SO_4$$

2.93 lbs. of acid per pound of copper

53.60 lbs. of acid per ton of ore

November 18, 1971

METCON

RESEARCH, INC.

BOX 50225
TUCSON, ARIZONA
85703

PROJECT NO. EI - 114.8

TEST NO. 3

6 HOUR & 20 MINUTE LEACH AT pH 1.5

SAMPLE: B M Feed

H₂SO₄: Purity = 97%
Sp. G. = 1.84

Head Assay: 1.43% T. Cu; 1.01% Ox. Cu; 0.42% S. Cu

Charge: 100g ore + 200 ml H₂O

Time	Acid Added (ml)	pH	
		Before	After
8:20	1.10	--	1.4
8:45	0.10	1.6	1.5
8:55	0.15	1.6	1.5
9:30	0.20	1.6	1.5
11:50	0.85	1.9	1.4
2:40	--	--	1.4

Total H₂SO₄ Added 2.40 ml

Assay No.	Product	Wt./Vol	Assay		Content		% Recovery	
			T. Cu	Ox. Cu	T. Cu	Ox. Cu	T. Cu	Ox. Cu
7668	Preg. Soln.	100 ml	4.69 gpl		0.4690		68.21	
7669	Wash Soln.	620 ml	0.86 gpl		0.5332			
7675	Leach Tailing	97.3 g	0.48 %	0.09 %	0.4670	0.0875		91.97
	Calc. Heads				1.4692	1.0897		

Accountability based on average calculated head = 100.2%

$$2.40 \text{ ml H}_2\text{SO}_4 \times 1.84 \times .97 = 4.28 \text{ g H}_2\text{SO}_4$$

4.27 lbs. of acid per pound of copper

85.60 lbs. of acid per ton of ore

November 18, 1971

METCON

RESEARCH, INC.

 BOX 50225
 TUCSON, ARIZONA
 85703

PROJECT NO. BI - 114.8

TEST NO. 4

5 HOUR & 35 MINUTE LEACH AT pH 1.5

SAMPLE: B M Feed

 H_2SO_4 :
 Purity = 97%
 Sp. G. = 1.84

Head Assay: 1.43% T. Cu; 1.01% Ox. Cu; 0.42% S. Cu

Charge: 100 g ore + 200 ml H₂O

Time	Acid Added (ml)	pH	
		Before	After
8:40	0.70	--	1.5
8:45	0.25	1.6	1.4
8:55	0.40	1.6	1.4
9:55	0.20	1.6	1.4
11:45	0.05	1.6	1.5
1:15	0.80	1.9	1.4
2:15	--	--	1.4
Total H ₂ SO ₄ Added		2.40 ml	

Assay No.	Product	Wt./Vol.	Assay		Content		% Recovery	
			T. Cu	Ox. Cu	T. Cu	Ox. Cu	T. Cu	Ox. Cu
7666	Preg. Soln.	100 ml	4.55 gpl		0.4550		65.32	
7667	Wash Soln.	595 ml	0.84 gpl		0.4998			
7677B	Leach Tailing	97.5 g	0.52 %	0.11 %	0.5070	0.1072		89.91
					1.4618	1.0620		

Accountability based on Average calculated head = 99.7%

$$2.40 \text{ ml } H_2SO_4 \times 1.84 \times .97 = 4.28 \text{ g } H_2SO_4$$

4.48 lbs. of acid per pound of copper

85.60 lbs. of acid per ton of ore

November 18, 1971

METCON

RESEARCH, INC.

BOX 50225
TUCSON, ARIZONA
85703

PROJECT NO. EI - 114.8

TEST NO. 5

4 HOUR LEACH AT pH 1.5

SAMPLE: B M Feed

Head Assay: 1.43% T. Cu; 1.01% Ox. Cu; 0.42% S. Cu

Charge: 100 g ore + 200 ml H₂O

H₂SO₄:
Purity = 97%
Sp. G. = 1.84

Time	Acid Added (ml)	pH	
		Before	After
11:30	0.75	--	1.40
11:45	0.55	2.20	1.40
12:05	1.10	1.60	1.50
1:15	0.35	1.65	1.40
3:30	--	--	1.50
Total H ₂ SO ₄ Added		1.75 ml	

Assay No.	Product	Wt./Vol.	Assay		Content		% Recovery	
			T. Cu	Ox. Cu	T. Cu	Ox. Cu	T. Cu	Ox. Cu
7670	Preg. Soln.	100 ml	4.50 gpl		0.4500		66.12	
7671	Wash Soln.	630 ml	0.82 gpl		0.5166			
7677A	Leach Tailing	97.1 g	0.51 %	0.11 %	0.4952	0.1068		90.05
	Calc. Heads				1.4618	1.0734		

Accountability based on average calculated head = 99.7 %

$$1.75 \text{ ml H}_2\text{SO}_4 \times 1.84 \times .97 = 3.12 \text{ g H}_2\text{SO}_4$$

3.23 lbs. of acid per pound of copper

62.40 lbs. of acid per ton of ore

November 18, 1971

AMERICAN ANALYTICAL and RESEARCH LABORATORIES

Project # EI - 114.5

ASSAYERS - CHEMISTS - METALLURGISTS

TUCSON, ARIZONA 85713

SAMPLE SUBMITTED BY Metcon Research Inc.

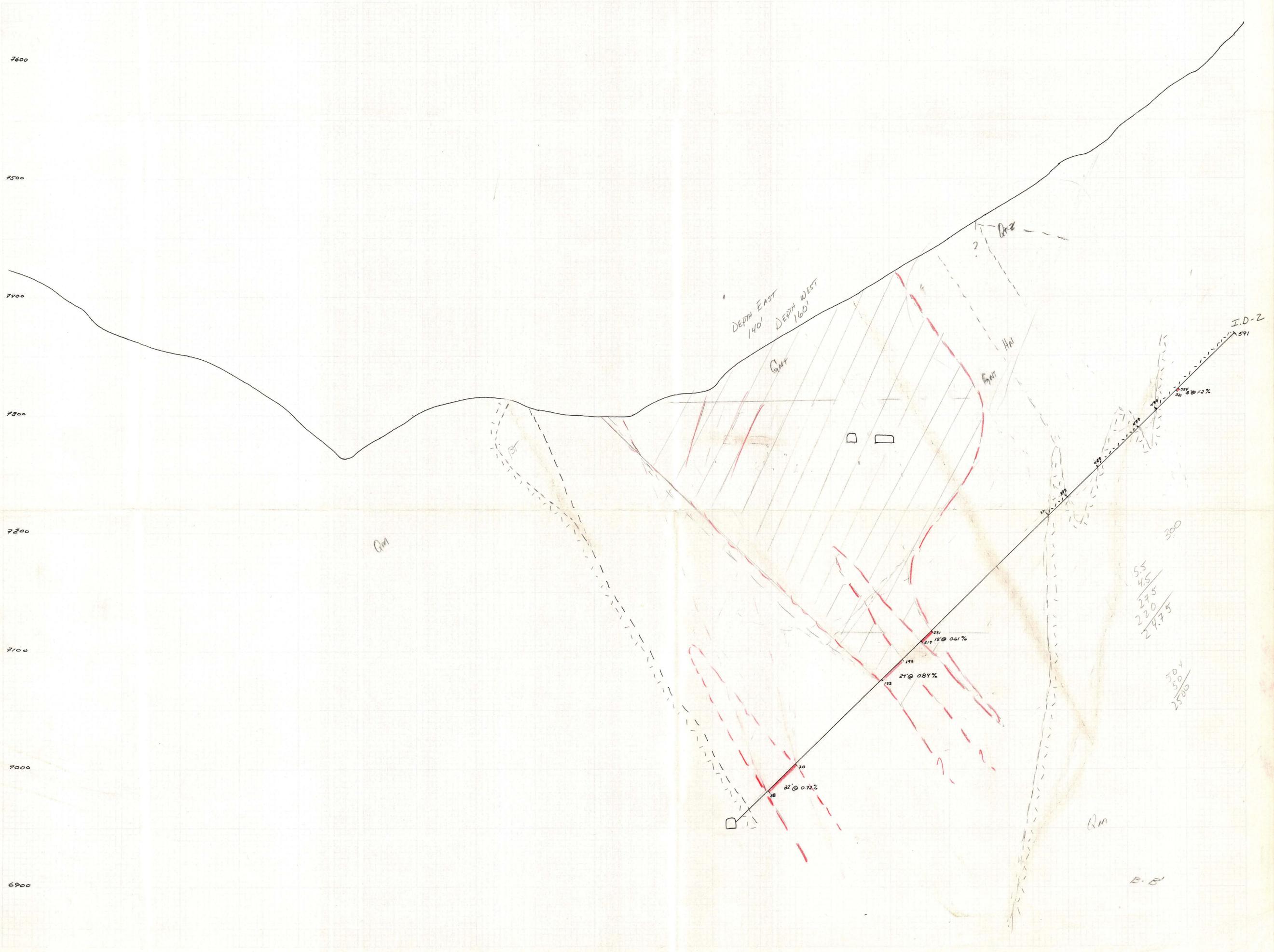
DATE November 26, 1971

SAMPLE MARKED	GOLD OZ / TON	SILVER OZ / TON	PER CENT COPPER	PERCENT LEAD	PERCENT Ox Fe Cu	PERCENT MOLYBDENUM	PERCENT IRON	G/L Cu
Pulps 7665			1.43		1.01			
7673			0.53		0.12			
7674			0.57		0.16			
7675			0.48		0.09			
7677-A			0.51		0.11			
7677-B			0.52		0.11			
Solutions								
7661								4.25
7662								0.74
7663								4.35
7664								0.83
7666								4.55
7667								0.84
7668								4.69
7669								0.86
7670								4.50
7671								0.82

[Handwritten Signature]
11/26/71

Invoice # 7033

CHARGES \$ 36.00



7600
7500
7400
7300
7200
7100
7000
6900

DEPTH EAST
140'
DEPTH WEST
160'

I.D.-2

Am

Bm

Am

300

55
45
275
220
2475

50
50
2500

21 @ 0.61%

24 @ 0.84%

22 @ 0.72%

Rm

Bm