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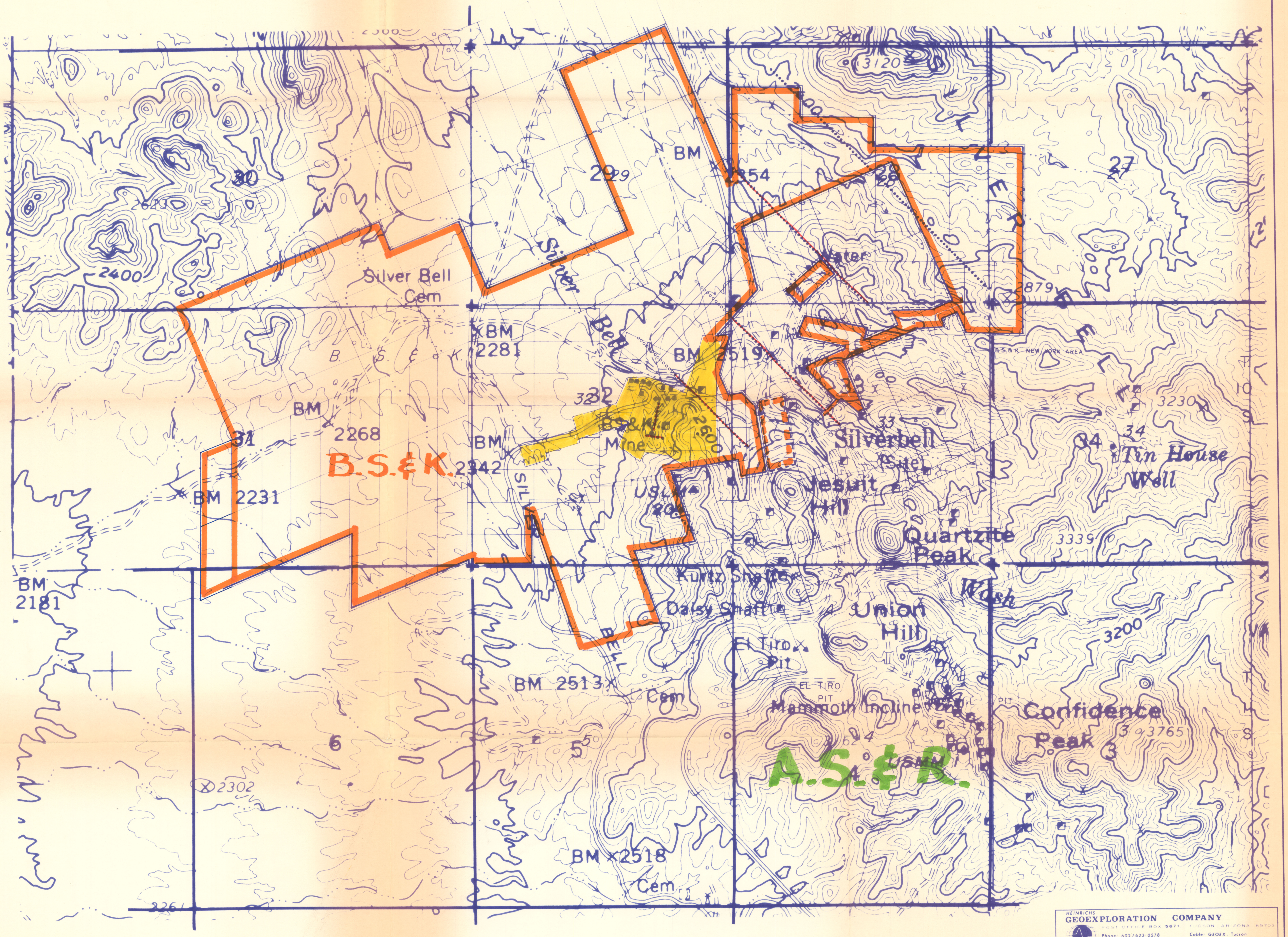


R. 8 E.

WEAK STRONG I. P. ANOMALISM (GEOEX, CANADIAN AERO & MCPHAR)

- B. S. & K. BOUNDARY
- B.S. & K. PATENTED CLAIMS
- B.S. & K. 2/3, STEINFELD 1/3

For Abe Kalaf

HEINRICHS
GEOEXPLORATION COMPANY
POST OFFICE BOX 5671, TUCSON, ARIZONA, 85703
Phone: 602/623-0578 Cable: GEOEX, Tucson
vancouver
sydney
geophysical engineers

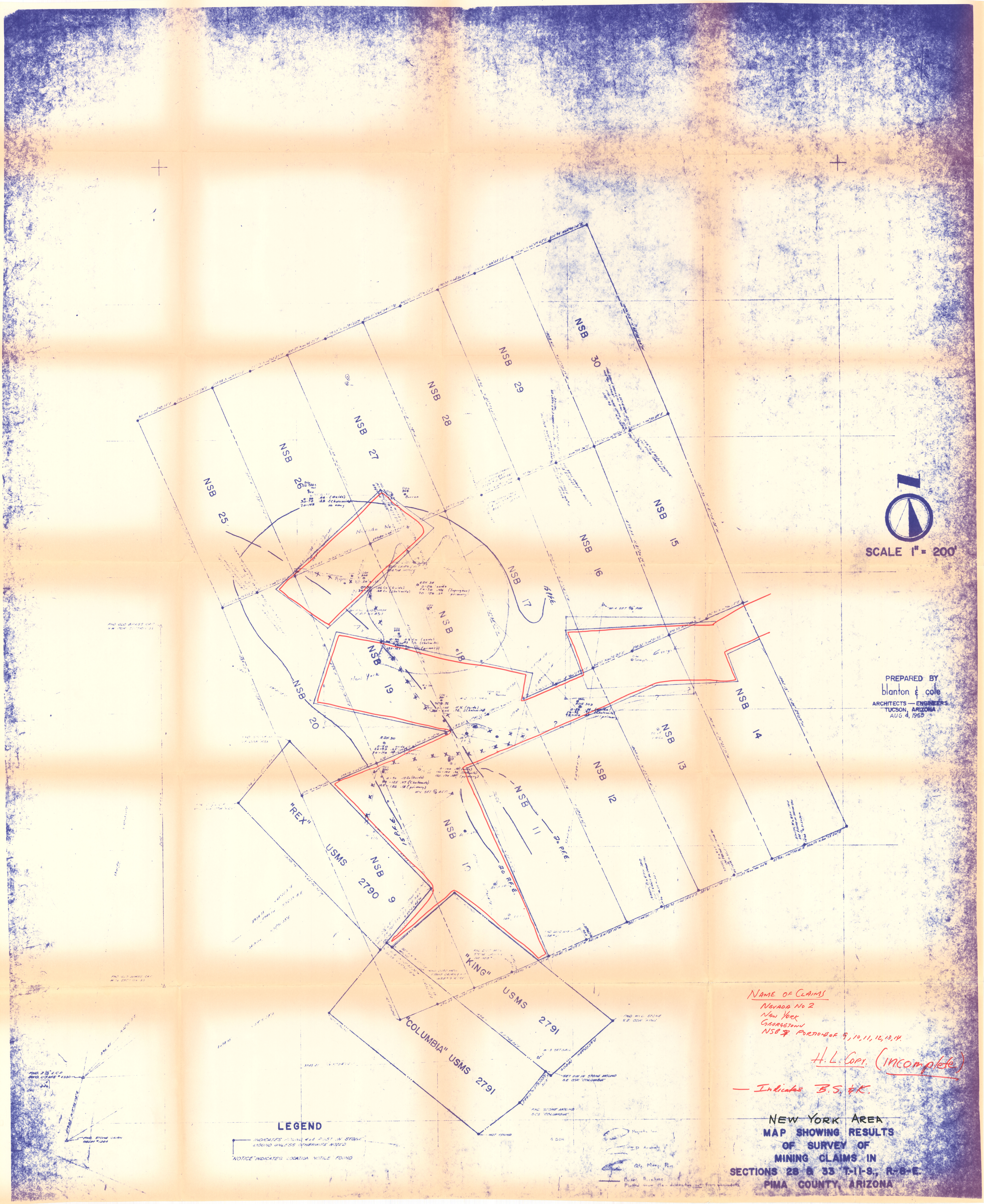
B.S. & K. MINING CO.
ATLAS MINE & VICINITY
PIMA COUNTY, ARIZONA

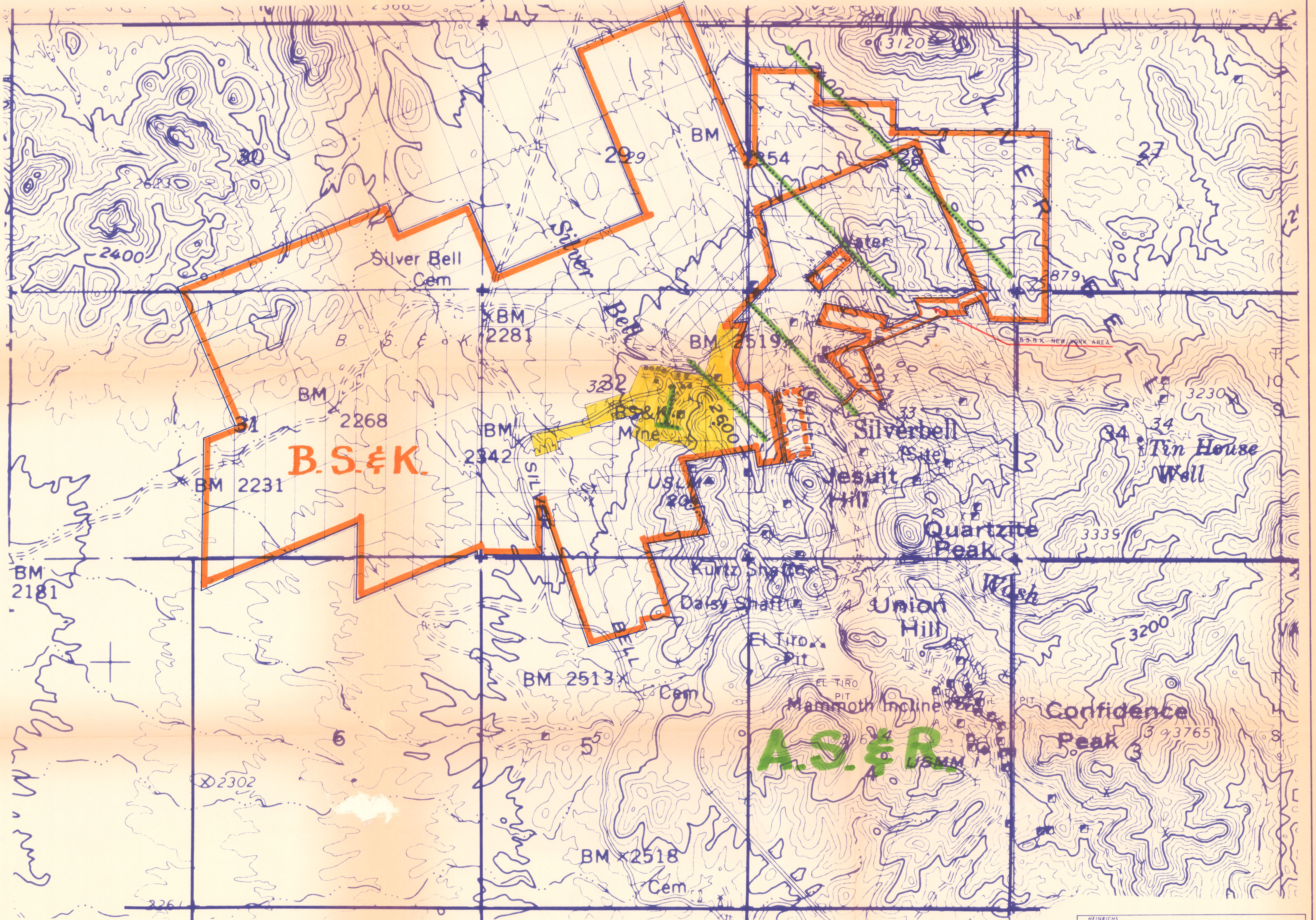
OWNERSHIP

FOR

ESSEX INTERNATIONAL INC.

SCALE 1" = 1000' | DRAWN BY EGH & JCD | DATE MARCH 1970


NSB 30
NSB 29
NSB 28
NSB 27
NSB 26
NSB 25
NSB 17
NSB 16
NSB 15
NSB 18
NSB 19
NSB 20
NSB 14
NSB 13
NSB 12
NSB 11
NSB 10
NSB 9
"REX" USMS 2790
"KING" USMS 2791
"COLUMBIA" USMS 2791
SCALE 1" = 200'
PREPARED BY
blanton & cole
ARCHITECTS — ENGINEERS
TUCSON, ARIZONA
AUG 4, 1969
SET PIN IN STONE MOUND
S.E. COR. "COLUMBIA"
FND STONE MOUND
SCS "COLUMBIA"
NOT FOUND
LEGEND
INDICATES FOUND 4x4 POST IN STONE MOUND UNLESS OTHERWISE NOTED
"NOTICE" INDICATES LOCATION NOTICE FOUND
Magnetic low
I.P. Anomaly
Qtz. Monz. Pors
Baker Purchase
NAME OF CLAIMS
NEVADA NO 2
NEW YORK
GEORGETOWN
NSB PORTIONS OF 9, 10, 11, 12, 13, 14.
H. L. COPY. (incomplete)
— Indicates B.S. & K.
NEW YORK AREA
MAP SHOWING RESULTS
OF SURVEY OF
MINING CLAIMS IN
SECTIONS 28 & 33 T.-11-S., R.-8-E.
PIMA COUNTY, ARIZONA



T. 10 S.

T. 11 S.

R. 8 E.

WEAK STRONG I. P. ANOMALISM (GEOEX, CANADIAN AERO & MCPHAR)

B. S. & K. BOUNDARY

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OWNERSHIP

FOR

ESSEX INTERNATIONAL INC.

SCALE 1" = 1000'	DRAWN BY EGH & JCD	DATE MARCH 1970

Concrete vats 18' deep.

Size same as 80 × 120 × 12

Reduce area by $\frac{11}{17}$ = $9600 \times \frac{11}{17} = 6200$#.

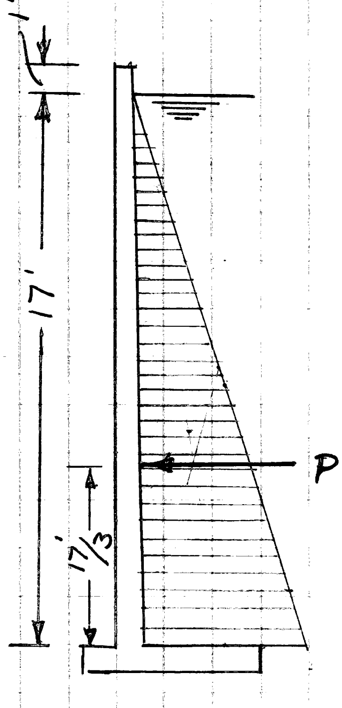
sides same ration x & y where y = 1.5x

$x \times x \times 1.5 = 6200$ $\qquad x^2 = \frac{6200}{1.5} = 4130$

$x = \sqrt{4130} = 64.2'$ $\qquad y = 96.57'$

Use 62' × 100' × 18' deep.

Specific gravity of leaching solution = 1.12



Pressure at bottom of vat

$17 \times 1.12 \times 62.4 = 1188$ #/#.

$P = 1188 \times \frac{17}{2} = 10.098$ #

Moment at bottom of wall for 1' wide strip of wall

$M = 10.098 \times \frac{17}{3} = 57.222$ Ft#.

Try 2'-0" thick wall d = 21"

with 3000 #/sq i. Concrete & fs = 18000

Allowable $f_c = 1350$ $\quad n = 10$ $\quad K = 0.403$

$j = 0.866$

$M_c = \frac{1}{2} f_c \times K \times j \times b \times d^2 = 57222 \times 12$

$f_c = \frac{57.222 \times 12 \times 2}{0.403 \times 0.866 \times 12 \times 21^2} = 753.6$ psi.

File Make file B.S. & K. Prospect

"Please make 2 Xerox copies" J. Jancic

EXHIBIT A

G. A. Girard

V. F. Hollister

November 22, 1965

All Concerned

Bacterial Leaching of B.S. & K. Exploration Composite

H_2SO_4

Abstract

Total copper extraction from the B.S. & K. exploration composite gave a recovery of 77%. Recovery from acid-soluble copper fraction was about 85%; from chalcocite copper was 82%; and about 51% from chalcopyrite.

There is no requirement for purchased acid. An initial acidification would, however, increase the initial copper production.

Microscopic examination of chalcopyrite particles revealed substructures of that mineral species within a network of more soluble chalcocite. The new surface exposure generated by the dissolution of chalcocite is believed to be responsible for the increased extraction from chalcopyrite.

Background

It was requested by the Exploration Department that a bacterial leach test be run on specified drill hole samples from the B.S. & K. location to determine the acid consumption of the ore, the response of the ore to copper recovery by bacteria and to evaluate this response in terms of our laboratory experience with other ores. The test head consisted of specified intervals from drill holes 300, 301, 302, 303 and 305.

Purpose

It was the purpose of this experiment to determine in a bacterial leach process:

1. The total recovery of copper over a four week leach period,
2. The copper recovery from each of the mineral species,
3. The total acid consumed and the purchased acid requirement.

Procedure

The composite sample was crushed to pass 10 mesh, the minus 100 mesh fraction rejected. Four test charges were split out from the minus 10 plus 100 mesh sample fraction. An additional sample was removed for chemical analyses, the results of which appear in Table I.

One hundred grams of sample were charged into each of four percolation columns. One hundred ml of sterile barren leach solution were added to each of the columns. The columns were each inoculated with 25 ml of an 8 day culture of *T. ferrooxidans* having a population of 1×10^8 bacteria per ml. The percolators had an adjusted air flow of 50 to 75 ml per minute. Each week the solutions were drained from the columns and submitted for copper, iron and pH analyses. The copper present in the sterile barren leach solution was deducted from the total copper recovered.

The ore in columns 1 and 2 were controlled at pH 2.0 by daily adjustment with sulfuric acid.

The ore in columns 3 and 4 was initially fed a solution of pH 2.0. The solutions fed the columns the second and subsequent weeks matched the pH of the effluent solutions of the previous week.

Upon termination of the test the columns were drained and rinsed with 20 ml of pH 2.0 distilled water. The combined solutions were submitted for analysis. The columns were then rinsed with two 25 ml portions of barren leach solution followed by a wash with 100 ml of one normal H_2SO_4 for five minutes. The columns were then rinsed with 20 ml of pH 2.0 distilled water. The combined solution, submitted for analysis, represented desorbed and dissolved ferric and cupric ion. The columns were then given a final rinse with 100 ml of pH 2.0 distilled water to determine the quantity of copper and ferric iron remaining after strong acid treatment. This solution was submitted for analysis.

The ore was removed from the columns, dried and submitted for chemical analysis. The test data are presented below.

TABLE I
B.S. & K. LEACH TEST

SAMPLE NO.		1	2	3	4
Assayed Head,	% A-S Cu	———	——— .174	———	———
" "	% cc Cu	———	——— .269	———	———
" "	% cpy Cu	———	——— .091	———	———
" "	% Total Cu	———	——— .535	———	———
Calculated Head,	% Cu	.510	.555	.481	.520
Residue,	% A-S Cu	.022	.026	.023	.028
"	% cc Cu	.048	.048	.045	.050
"	% cpy Cu	.046	.046	.046	.043
"	% Total Cu	.116	.120	.114	.121
Copper Extracted	(#/Ton)	7.90	8.71	7.33	7.92
#H_2SO_4 Consumed Per Ton Feed*	Total	17.0	18.1	-	-
	Cu	12.2	13.4	11.3	12.2
	Gangue	4.8	4.7	-	-
Distribution %Cu	Filtrate	77.5	78.5	76.2	76.1
	Residue	22.5	21.5	23.8	23.9
#H_2SO_4 Consumed Per #Cu	Recovered	2.2	2.1	-	-
	Available	1.7	1.6	-	-
% A-S Cu Recovered		87.5	85.1	86.8	84.0
% cc Cu "		82.2	82.2	83.3	81.5
% cpy Cu "		49.5	49.5	49.5	52.7

60%

* The acid consumed by columns 1 and 2 (duplicate) was based upon actual acid addition to maintain a pH of 2.0.

Data and Results:

extraction 78.35%

Copper Extraction

Slightly more copper was extracted from the columns maintained at pH 2.0 (columns 1 & 2) than from the columns with no pH control (columns 3 & 4). An average of 78% copper was extracted from the columns maintained at pH 2.0 while only 76% was the average copper extracted from the columns with no pH control (see Figure I, Table II). With the exception of the first week's extraction, the weekly extraction is identical and indicates that a benefit could be derived from an initial dump acidification.

Acid Consumption by Columns One and Two

The total acid consumed by the pH controlled columns is given in Table I. Table III representing the average of pH controlled columns gives a breakdown of the acid consumed or produced by the ore and solution each week and cumulatively. Table III and Figures II and III gives specific information or the consumption of acid by oxidized ferrous ion and the net acid consumption by the ore. The total acid consumption is the actual acid necessary to maintain the system at pH 2.0. This acid was consumed by the ore and ferrous ion oxidation in solution:

$$2FeSO_4 + H_2SO_4 + 1/2\ O_2 \xrightarrow{\text{Bacteria}} Fe_2(SO_4)_3 + H_2O$$

The total acid consumption by ore and solution and the acid consumption by oxidized ferrous iron are illustrated in Figure III on a weekly and cumulative basis. The net acid consumption by the ore is shown in Figure IV. It will be noted that, after seventeen days, more acid was being produced by the ore than was being consumed by the ore and solution.

Acid Consumption by Columns Three and Four

The acid consumption data by the columns with no pH control is presented in Table IV and illustrated in Figures IV and V. The acid consumption is based on the actual ferric hydroxide formation:

$$Fe_2(SO_4) + 6H_2O \xrightarrow{pH\ 2.7} 2Fe(OH)_3 + 3H_2SO_4$$

The system is kept below pH 2.7 by the production of acid through ferric precipitation. A rise in the pH of the leach liquor throughout the test represents, also, an acid consumption. These two factors are combined in Table IV and Figure IV under the heading of "total acid consumption from $Fe(OH)_3$ formation." The acid consumption by oxidized ferrous in solution is deducted from Figure IV to give the net acid consumption represented by Figure V.

Comparison of Acid Consumption Data From Each Column Pair

It will be noted from Figure V that the weekly acid consumption approaches zero asymtotically with time. The pH of this system seems to stabilize at 2.35 over the four week test. In Figure III there is a net acid production. It follows, then, that gangue consumption must be greater in the pH controlled system since acid producing constituents in the ore have been released.

The pH-controlled columns give a true picture of the acid consumption necessary to maintain a pH of 2.0. The columns with no pH control were designed to indicate any need for purchased acid. Other than the benefit to be derived from initial dump acidification, it is concluded that no additional acid need be purchased.

The Structural Nature of Chalcopyrite Used in This Test

It was noted from the results of chemical analysis of the chalcopyrite mineral species that the recovery was 12 to 25 times greater than most reported results both in our laboratory tests and in the literature. Previous work with Battle Mountain ore yielded, in certain cases, results similar to those in this test with chalcopyrite. These prior results were regarded with suspicion and attributed to inconsistancies in the analytical procedure. Since a recovery of about 51% occurred with this mineral species, it was decided to resubmit the samples for analysis. The samples were leached for seven minutes and twenty minutes with cyanide in two separate tests to determine whether all the chalcocite had been removed prior to the analysis for chalcopyrite. These test results were in agreement with each other and those first reported.

It was then thought that this chalcopyrite must be structurally different from other specimens of the same mineral species. A polished section was made of the sink fraction of a heavy media separation. A microscopic examination of the chalcopyrite particles at 450 power revealed intimate intergrowths of chalcocite replacing chalcopyrite.

A 48 mesh particle of chalcopyrite, for example, exhibited a subparticle size of 400 mesh in many cases. Since chalcocite is readily leached in a bacterial system the surface exposure of chalcopyrite is greatly increased as leaching proceeds.

Based on our laboratory experience with unaltered chalcopyrite from the bottom of the Esperanza pit the recovery from E.S. & K. chalcopyrite is 1040% greater.

A microprojection of a typical chalcopyrite particle, illustrated in Figure VI, was traced on thin translucent paper.

Conclusions

1. Copper extraction over the four week test period gave a total recovery of about 77%. Recovery of copper from chalcopyrite about 51% and was 10.4 times greater than expected. Microscopic examination revealed the special nature of this mineral species.

2. The data indicate that purchased acid is not necessary except for the benefit to be derived from initial dump acidification.

Respectfully submitted,

George A. Girard

George A. Girard
Process Chemist

GAG:jfg

cc: R. W. Livingston (2)
R. W. Flagg
C. H. Curtis
G. E. Atwood
J. E. Frost
E. K. Drechsel
R. R. Nelson
D. J. Bourne

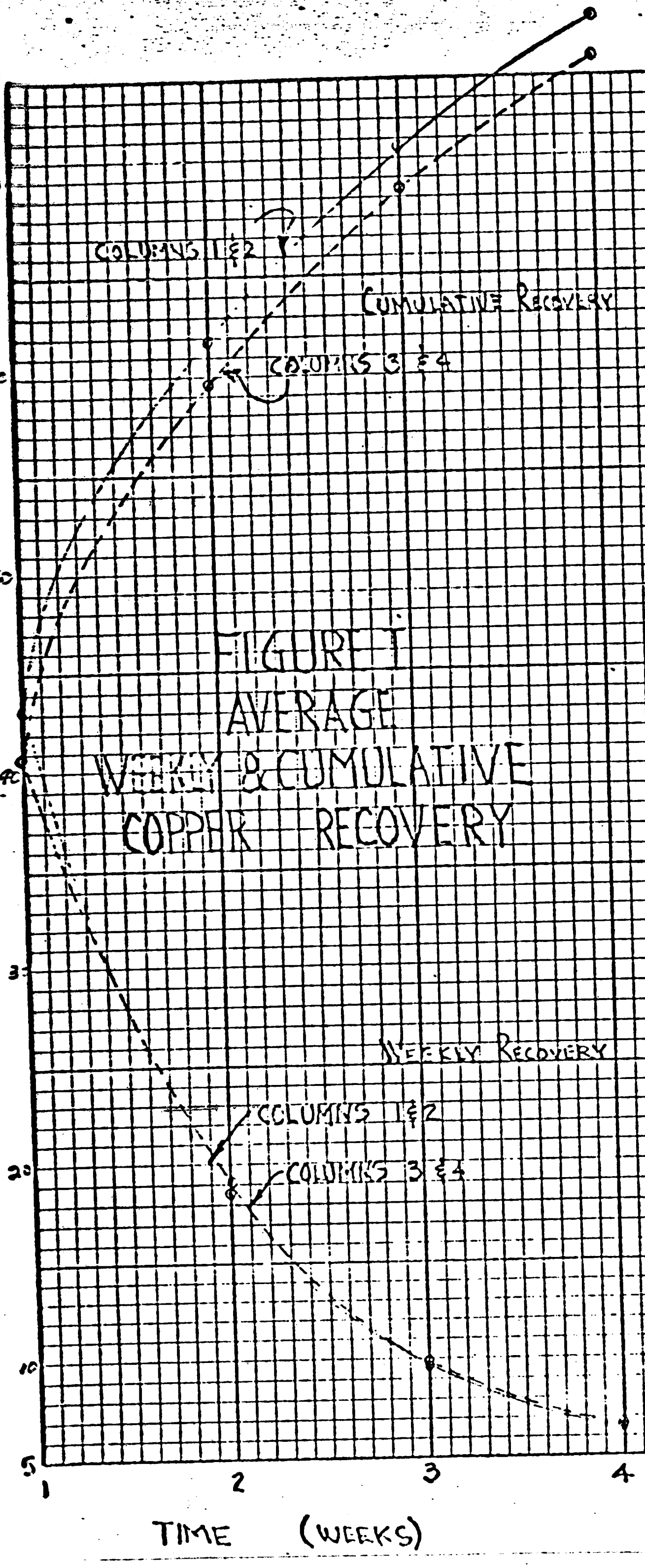


FIGURE I
AVERAGE
WEEKLY & CUMULATIVE
COPPER RECOVERY

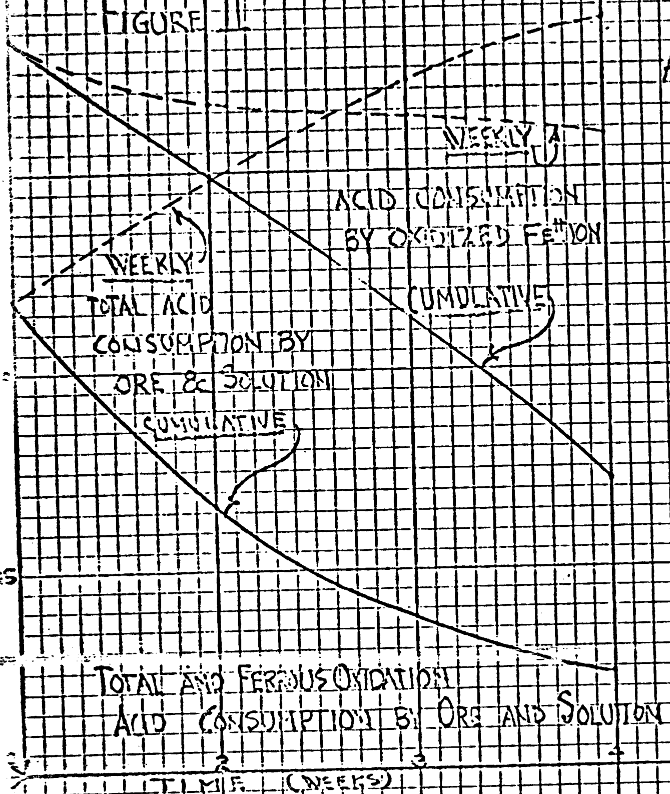
TABLE II

% RECOVERY

WEEK No	COLUMN 1 WEEKLY	COLUMN 1 CUMUL.	COLUMN 2 WEEKLY	COLUMN 2 CUMUL.	AVERAGE CUMULAT. RECOVERY COLS. 1 & 2	COLUMN 3 WEEKLY	COLUMN 3 CUMUL.	COLUMN 4 WEEKLY	COLUMN 4 CUMUL.	AVERAGE CUMULAT. RECOVERY [illegible]
1	47.4	47.4	44.0	44.0	43.7	41.2	41.2	40.2	[illegible]	40.7
2	19.0	61.5	17.9	62.0	61.8	18.6	59.8	19.8	[illegible]	59.7
3	9.6	[illegible]	10.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	6.4	77.5	6.5	78.5	78.0	6.6	76.2	6.7	76.1	76.2

AVERAGE ACID CONSUMPTION OF COLUMNS 1 & 2

FIGURE II



TOTAL AND FERROUS OXIDATION ACID CONSUMPTION BY ORE AND SOLUTION

FIGURE III

NET ACID CONSUMPTION AND PRODUCTION BY ORE

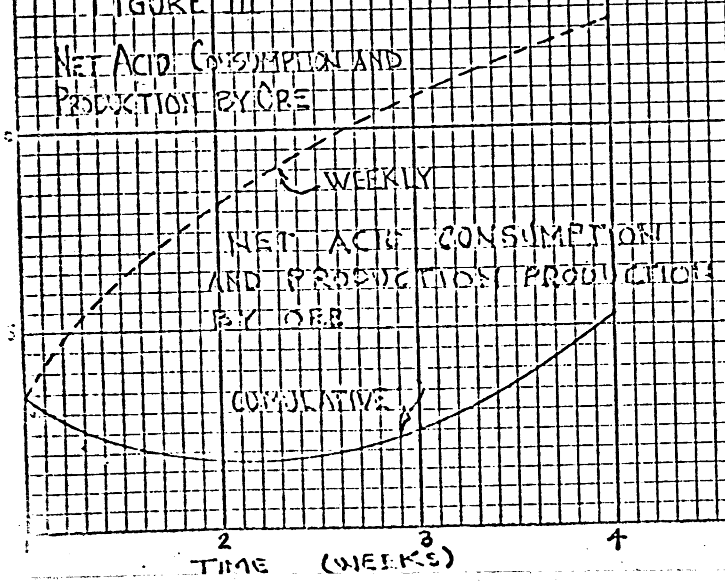
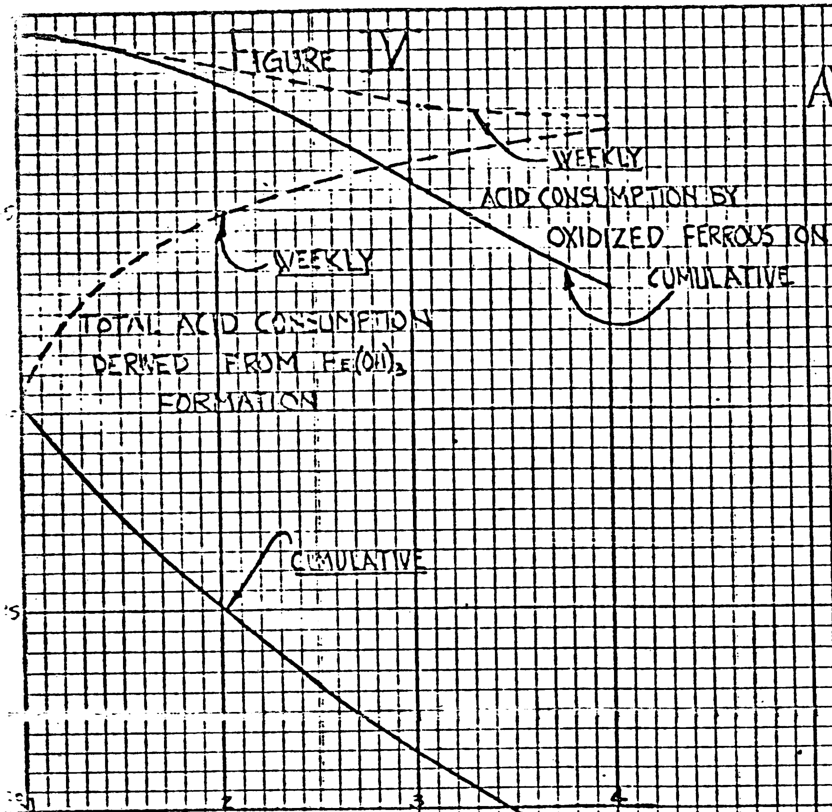


TABLE III

WEEK NO.	TOTAL ACID CONSUMPTION BY ORE & SOLUT. (#/TON)		ACID CONSUMPTION BY OXIDIZED Fe++ ION (#/TON)		NET ACID CONSUM. AND PRODUCTION BY ORE (#/TON)	
	WEEKLY	CUMUL.	WEEKLY	CUMUL.	WEEKLY	CUMUL.
1	-8.17	-8.17	-1.66	-1.66	-6.51	-6.51
2	-5.71	-13.38	-3.12	-5.08	-1.79	-8.30
3	-2.78	-16.16	-3.61	-8.69	.83	-7.47
4	-1.40	-17.56	-4.17	-12.29	2.77	-4.70

NOTE:
THE TOTAL ACID CONSUMPTION IS THE ACTUAL ACID ADDED TO MAINTAIN A pH OF 2.0.

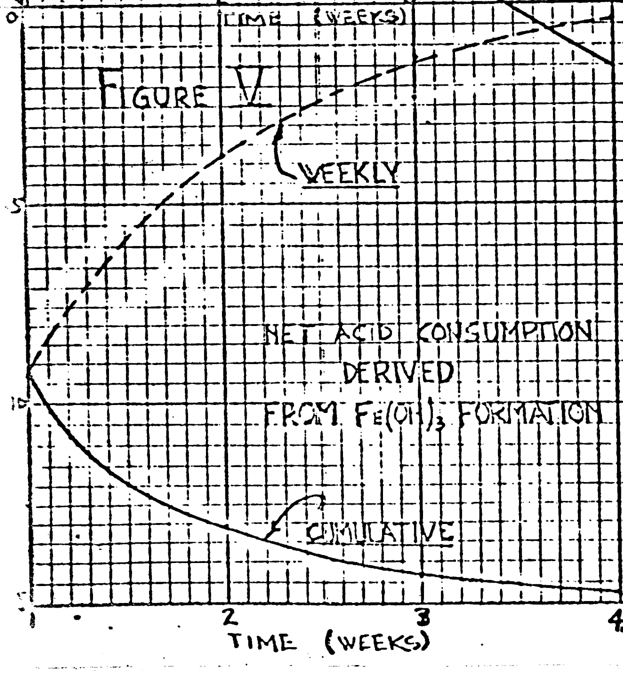


AVERAGE ACID CONSUMPTION DERIVED FROM FERRIC HYDROXIDE FORMATION IN COLUMNS 3 & 4

TABLE IV

WEEK NO.	TOTAL ACID CONSUMPTION FROM $Fe(OH)_3$ FORMATION (#/TON)		ACID CONSUMPTION BY OXIDIZED FERROUS ION (#/TON)		NET ACID CONSUMPTION FROM $Fe(OH)_3$ FORMATION (#/TON)	
	WEEKLY	CUMUL.	WEEKLY	CUMUL.	WEEKLY	CUMUL.
1	-9.70	-9.70	-0.53	-0.53	-9.23	-9.23
2	-5.06	-14.76	-1.28	-1.81	-3.78	-13.01
3	-3.74	-18.50	-2.43	-4.24	-1.31	-14.32
4	-3.09	-21.59	-2.70	-6.94	-0.39	-14.71

NOTE: THE TOTAL ACID CONSUMPTION DERIVED FROM $Fe(OH)_3$ FORMATION ALSO INCLUDES ACID CONSUMED THRU A SYSTEMIC pH RISE.



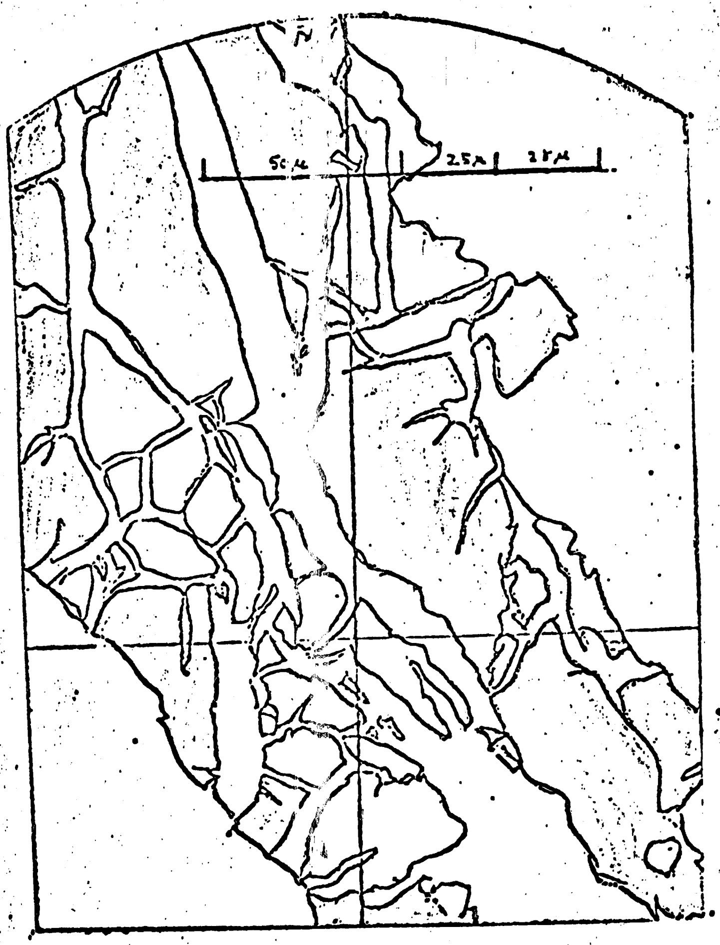
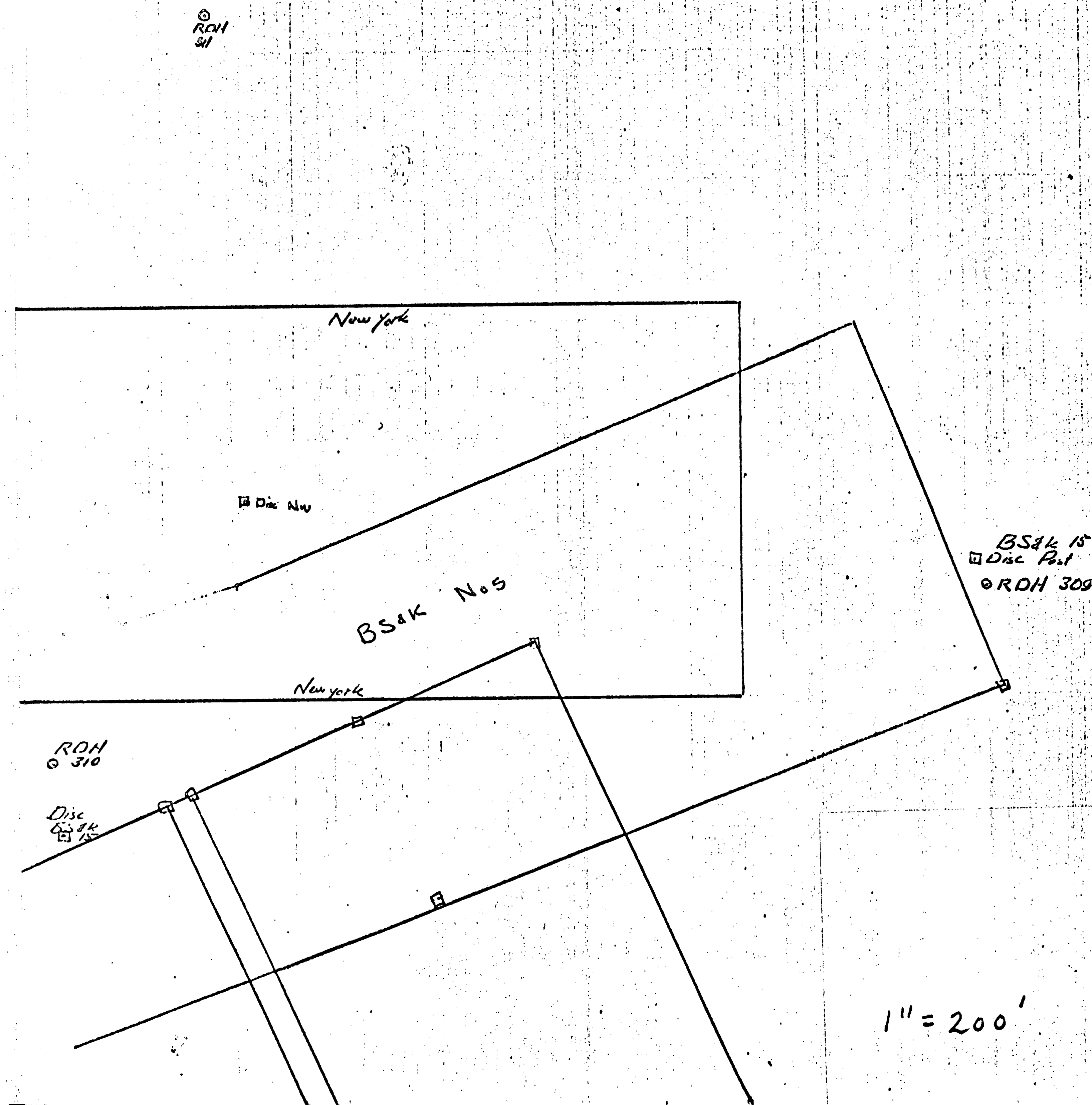
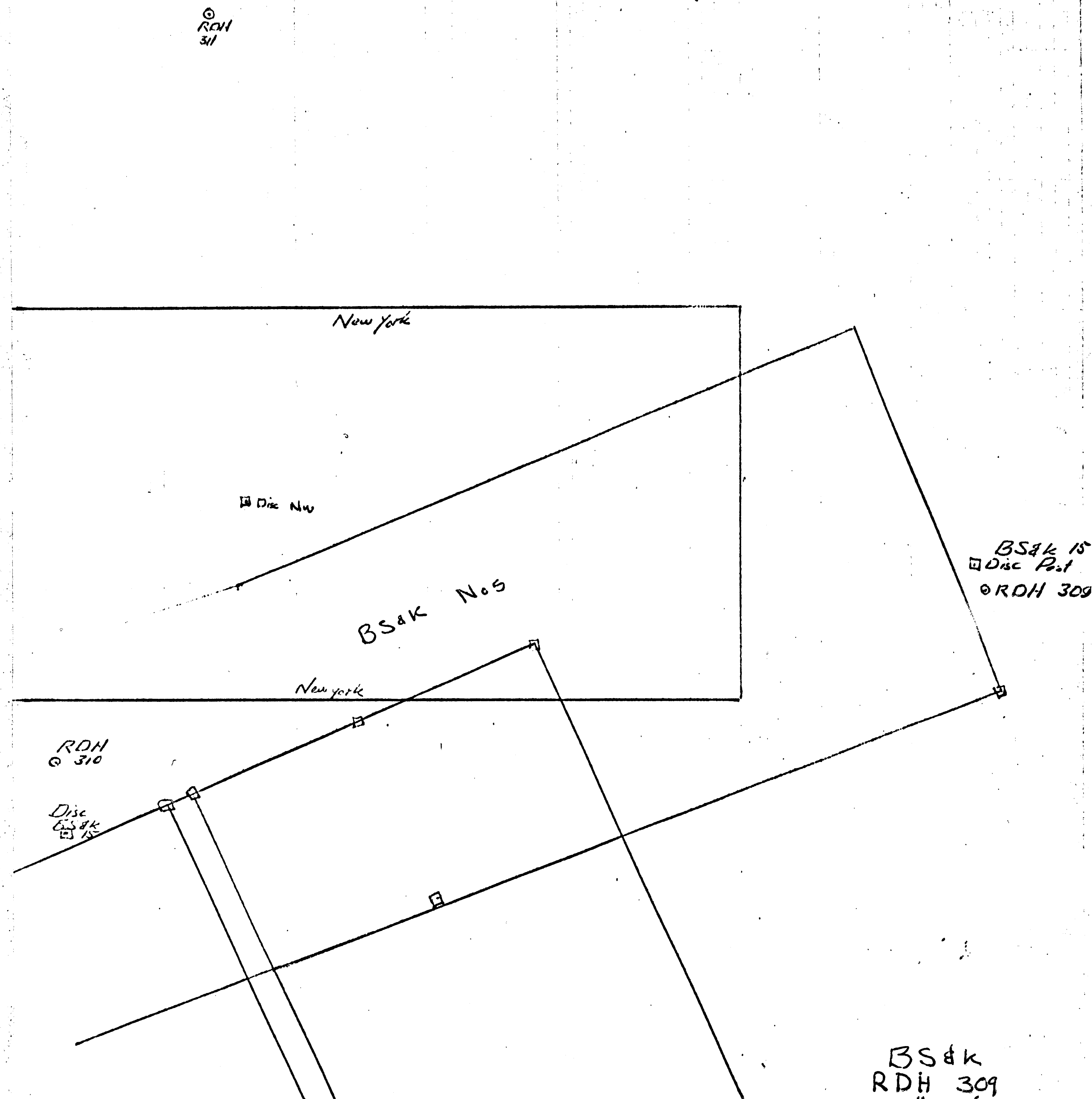


FIGURE VI

MICROPROJECTION TRACING (530X)


PROPOSED DUMP & LEACH AREA
ROUTE 2
ROUTE 1
NEW YORK CLAIM GROUP
ATLAS MINE
2/3 B.S.&K.
1/3 Steinfeld
EL TIRO PIT
IMPERIAL PIT
HEINRICHS
GEOEXPLORATION COMPANY
POST OFFICE BOX 5671, TUCSON, ARIZONA, 85703
Phone: 602/623-0578
Cable: GEOEX, Tucson
vancouver
sydney
geophysical engineers
AERIAL PHOTO MOSAIC
of
B. S. & K. MINING CO. PROPERTIES
T 10 & 11 S, R 8 E
PIMA COUNTY, ARIZONA
for
ESSEX INTERNATIONAL INC.
Scale: 1" = 1000' 13 March 1970


RDH 311
New York
Disc NW
BS&K 15
Disc Post
RDH 309
BS&K No 5
New york
RDH 310
Disc BS&K 15
1" = 200'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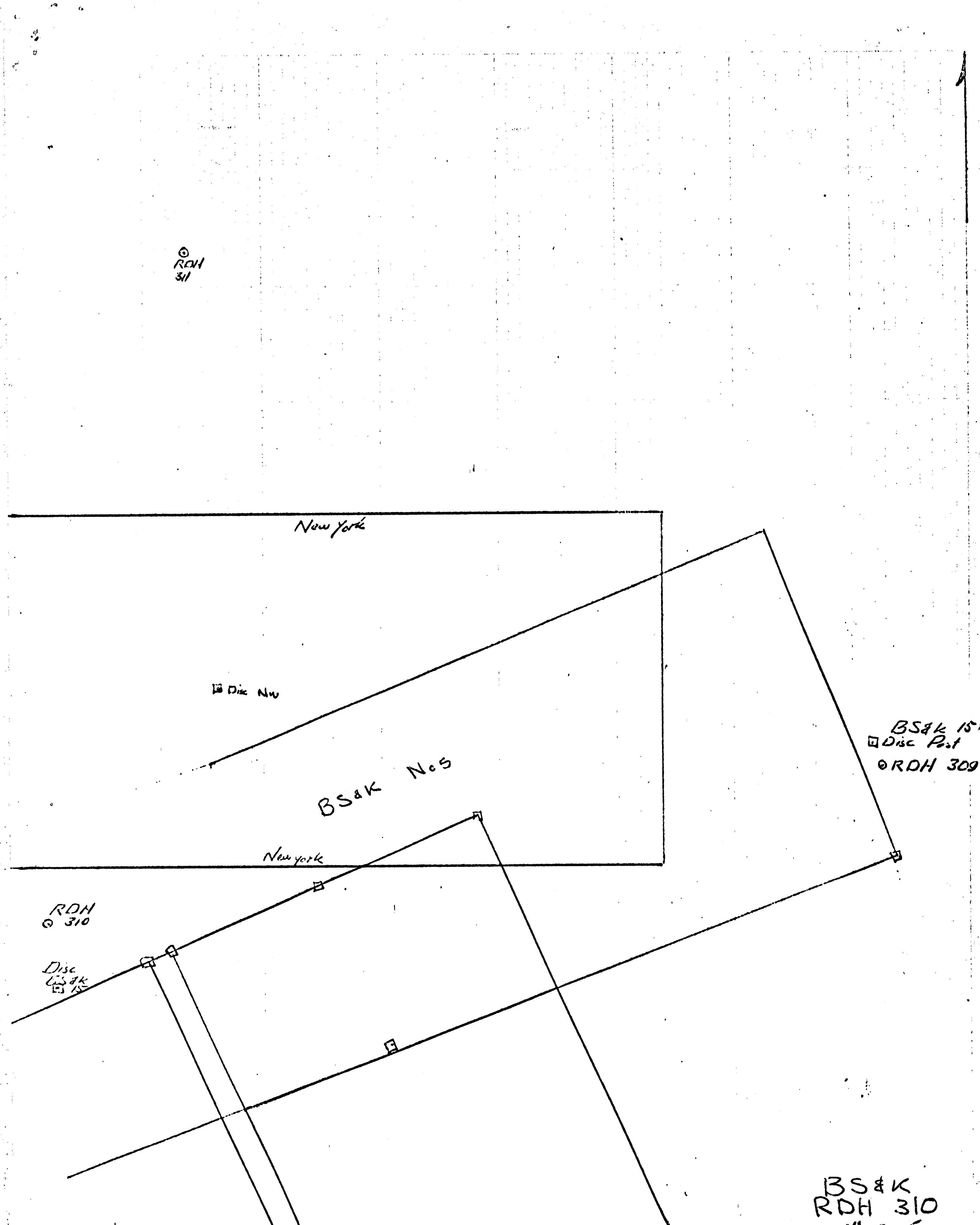
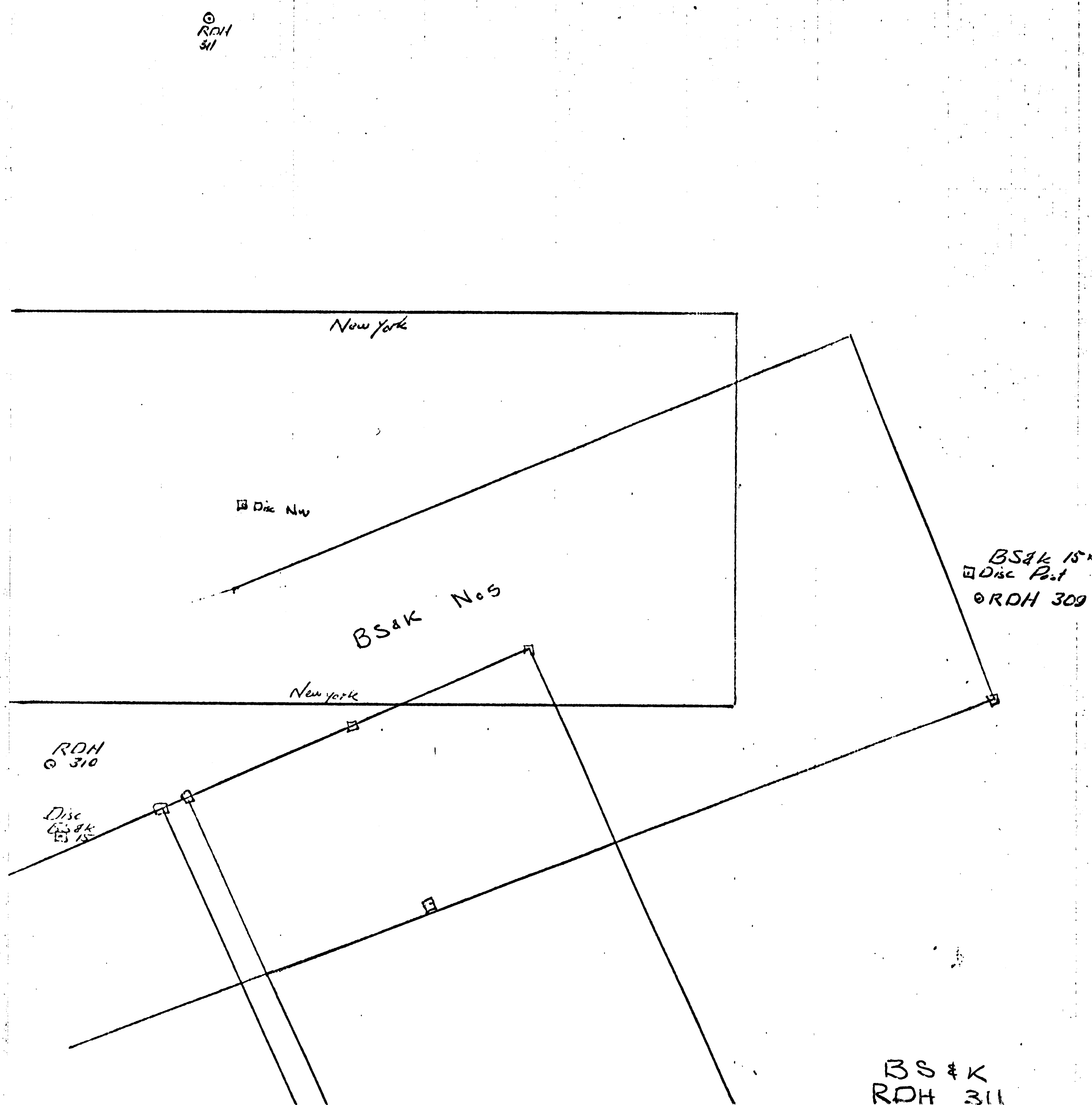
New York
Disc NW
BS&K No 5
New york
RDH 310
Disc BS&K 15
BS&K 15
Disc Post
RDH 309

BS&K
RDH 309


RDH 311
New York
Disc NW
BS&K No 5
New york
RDH 310
Disc
Disc Post
RDH 309
BS&K
RDH 310


RDH 311
New York
Disc NW
BS&K No 5
BS&K 15
Disc Post
RDH 309
New york
RDH 310
Disc BS&K 15
BS & K
RDH 311

INDUCED POLARIZATION AND
RESISTIVITY SURVEY
BS AND K PROJECT
SILVER BELL DISTRICT
PIMA COUNTY, ARIZONA
FOR
THE HANNA MINING COMPANY

PROJECT 9618

INDUCED POLARIZATION AND RESISTIVITY SURVEY

BS AND K PROJECT
SILVER BELL DISTRICT
PIMA COUNTY, ARIZONA

FOR

THE HANNA MINING COMPANY

PROJECT 9618

CANADIAN AERO *Mineral Surveys*

TABLE OF CONTENTS

Accompanying This Report:

9 IP and Resistivity Profiles (Quasi Sections)

1 Plan Map

1 IP Contour Map

1 Resistivity Contour Map

ABSTRACT

A strong IP response representing likely greater than 4% sulfides by volume has been outlined along the southeast side of the survey area. The response is most pronounced on line 52 where the zone has apparent characteristics of a flat-lying trend at a depth of 150'. Response decreases below 800' indicating an apparent thickness of 650'.

The anomaly lies parallel to the profile lines hence its lateral boundaries and depth extent cannot be accurately described by the present data. A suggested profile across the strike of the anomaly is considered a prudent step prior to locating a drill site.

Anomalous response characteristics along the south-east end of lines 48, 50, and 54 indicate that a broad area of response occurs to the south and east of the present survey area, and may extend easterly.

In the west half of the area a response layer occurs at an average depth of 1800' under the Tertiary-Cretaceous vol-canics. The response of 15 units could represent 1% sulfides by volume or a background varation due to change in rock type at that depth.

INDUCED POLARIZATION AND
RESISTIVITY SURVEY
BS AND K PROJECT
SILVER BELL DISTRICT
PIMA COUNTY, ARIZONA
FOR
THE HANNA MINING COMPANY

Part I

INTRODUCTION

At the request of Messrs Victor Mejia and Jackie Stephen of The Hanna Mining Company, personnel of Canadian Aero Mineral Surveys Limited were engaged in an induced polarization and resistivity survey in the Silver Bell District, Pima County, Arizona. The project was underway during the period from March 17 to April 10, 1969 and included 9 dipole-dipole profiles covering a total of 77,500 feet of surveyed line.

The survey was under the field direction of Avinash V. Hardas, Engineer for CAMS.

The major rock types that occur in the area include alaskite, granite, monzonite, Gila Conglomerate and the Tertiary-Cretaceous volcanics.

According to Victor Mejia, Gila Conglomerate occupies areas in sections 29, west 1/2 of 32, and southeast 1/4 of 31; flanked by intrusives (granite, monzonite, alaskite) to the east and Tertiary-Cretaceous volcanics to the west. Small patches of limestone occur as irregular isolated outcrops near the BS and K mine. A contact between granite and dacite porphyry is noted to occur between lines 52 and 54.

PURPOSE OF THE SURVEY

The purpose of the survey was to locate areas of mineralization near the BS and K mine and to describe the extent of related anomalies as being additional occurrences of sulphide mineralization. Also to determine if possible the thickness of overlying Tertiary-Cretaceous volcanic rocks in the western half of the project area; and the occurrence of IP response at depth below the volcanics.

SURVEY PROCEDURES

The induced polarization and resistivity measurements were made in the time-domain made of operation. A conventional system of measurements which uses a time cycle of 2.0 seconds "on" and 2.0 seconds "off", a 2.0 seconds "on" and 2.0 seconds "off" (current reversed), was employed.

The commencement of the measurement of the secondary voltage is delayed by 0.45 seconds to avoid coupling and other transient effects. The integration is preformed during the period from 0.45 seconds to 1.10 seconds after the cessation of current.

To conform to a standard presentation, the integral time constant is adjusted to give induced polarization readings equivalent to those obtained with transmitter cycles of 3.0 seconds "on" and 3.0 seconds "off" with integration of the secondary voltage during the first second of the "off" period.

Throughout the survey except line 44 and 46 a conventional inline dipole-dipole array of seven electrodes was used. For additional data coverage on lines 44 and 46, two additional electrodes were employed, there by obtaining additional coverage to the southeast. A dipole length of 1000' was used for the survey. This dipole length was recommended for greater penetration and greater lateral coverage.

Measurements were made for dipole separation factors (n) 1 to 6. Potential dipole setups occupied positions on both sides of the current-electrode setup. This resulted in obtaining a total line coverage approximately nine times the dipole length where 7 electrodes were used.

Apparent polarization responses is in units of millivolts-seconds per volt, or milliseconds, and apparent resistivity is in units of ohm-meters.

Part II

DISCUSSION OF RESULTS

Line 38: This line clearly indicates a change in rock type at about 500 feet southeast of the center; To the southeast the resistivity is of the order of 40-70 ohm-meters as against 130 to 400 ohm-meters to the northwest. The data is indicative of southeast dipping contact.

Pulse response is of the order of 4.0 to 8.0 milliseconds and does not vary across the resistivity contact. The data is distorted due to fence-power line effects and therefore does not yield an intelligent interpretation.

Line 40: Low resistivity (35-70 ohm-meter) is noticed on south side of the line. Resistivity to northwest ranges from 100-500 ohm-meters. The point at which a change in rock type occurs is noted at 500-700 feet southeast of the center.

Changeability is of the order of 4.0 to 13.0 milliseconds with a slight increase in response at depth. However, it is believed the values are too low to indicate presence of sulphides in economic quantities.

Line 42: Again on this line low resistivity rock occurs to the southeast and high resistivity rock to northwest. This change in physical characteristics of the rocks occurs at 600' southeast from center. To the southeast the resistivity is of the order of 40-60 ohm-meters and to the northwest 100-400 ohm-meters.

Pulse response ranges from 4.8 to 10.2 milliseconds increasing with depth, but again likely represents a high background response or at least minor (less than 1.5% by volume) sulfides at depth.

Line 44: Resistivity contact is noted 500' northwest from the center with high resistivity to northwest and low resistivity to southeast.

Average pulse response of 2.8 to 5.0 is present with a slight increase in response to 10.0 at depth. This increase could be due to a normal background response at depth with no indication of the presence of substantial amounts of sulphides.

Line 46: A reverse situation occurs on this line where high resistivity occurs to the southeast and low resistivity to the northwest. The high resistivity is related to the granite that outcrop to the southeast. The resistivity of the volcanics and sediments to the northwest is low, varying from 7 to 40 ohm-meters.

Due to the very low resistivity of the rocks, signal could not be obtained at "n's" greater than 3. thus the depth penetration is limited. Background response varies from 2.0 to as much as 15.4 milliseconds.

Line 48: A resistivity contact occurs at the center of the line. Rocks of high resistivity (100-700 ohm-meters) extend southwards from the center and the low-resistivity rocks extend nortwards from the center. Rocks to the northwest have resistivity of 16 to 90 ohm-meters.

Average chargeability background response is 6.0 milliseconds with sharp increase in response up to 27.0 milliseconds to the southeast. (Fence interference may cause the few high readings to the south).

The high pulse response is related to the high resistivity indicative of sulfides in granites.

Another gradual increase in response at depth is also noted in the low resistivity rocks to the northwest. Due to the very low resistivity of the rocks full line coverage at depth could not be obtained.

Line 50: A very clear indiaction of a lithologic contact is noted on this line at 1000' northwest from the center.

Resistivity of rocks to the southeast range from 184 to 550 ohm-meters and to the northwest from 14 to 150 ohm-meters. The high resistivity zone is associated with high pulse response of 20 to 67 milliseconds and is indicative of 2-3 percent sulphides by volume at a depth less than 400 feet from surface.

Surface pulse response to the northwest is of the order 2.6 to 6.4 milliseconds but increases slightly to more than 15.0 milliseconds at depth. This response zone may be in part due to the power line or fence that tranverse the line.

The low resistivity relates to a broad near-vertical north-south striking of alluvium or Gila Conglomerate zone and is devoid of any substantial amounts of sulphides.

Line 52: Interpretation of resistivity data of this line is a little complex as surface resistivity variation appear related to complex geology. However, in general, rocks of less than 50 ohm-meters resistivity extend northwards from C_3 and are characterized by low pulse response.

Rocks that crop out on the southeast side of the line have resistivity of 90 to 650 ohm-meters and are associated with 10.0 to 80.0 milliseconds response. The anomalous response is related to a broad zone of moderately high resistivity and

and is indicative of 3-4 percent sulphides by volume at a depth less than 200' from the surface. Line 52 does not extend far enough to cover the southern boundary of the zone.

Line 54: Resistivity varies from 190 ohm-meters to as much as 600 ohm-meters with no apparent indication of a lithologic contact.

Background pulse response of 3.0 to 10.0 is observed on the northside of the lines but increases at depth to more than 40.0 milliseconds to the southeast. This relates to a zone of anomalous responses that extends southward from C_7. This line runs parallel to the main zone of response and hence the actual true response obtained from the anomalous zone is not clear. However, there is a slight indication from the resistivity pattern that the response zone may extend to the east at depth. We feel that in order to actually define the anomaly a line at right angles to the strike of the zone should be surveyed.

Part III

INTERPRETATION

The accompanying contour maps of chargeability and resistivity provide a good picture of distribution and extent of response material, i.e. possible sulphide mineralization, and the related rock types in the area.

First look at the resistivity contour map indicates that 3 major rock types occur in the area which govern the resistivity pattern. They are granites, volcanics, and alluvium (Gila Conglomerate?).

In sections 30 and 31 the relatively high resistivity of 100 to 200 ohm-meters is related to the Tertiary-Cretaceous volcanics. The resistivity data indicates increased resistivities at a depth of 1000' plus. The resistivity of the lower layer is as much as 1000 ohm-meters-atypical of volcanic rocks.

A high resistivity anomaly of approximately 1000 ohm-meters occurs in the east 1/2 of section 32, closely associated with the BS and K mine. This anomaly is related to granite which crops out in the area. We suspect silicification (alteration) of the granite has resulted in this abnormal granite resisitivity.

Resistivities in the vicinity of the high IP response on line 52 are locally lower (100 to 200 ohm-meters) than the adjacent resistivities (200-400 ohm-meters) on line 50 and 54.

The alteration and mineralization of the granite is believed the cause of the lower resistivity here.

Extremely low resistivity of less than 100 ohm-meters in a north-south trend through sections 29, east half 31, and 32 is related to alluvium and/or Gila Conglomerate.

Effective penetration has been drastically reduced in the area of low resistivity due to loss of signal at the larger electrode spacings. This condition is most severe on line 46 where our ability to see below 1000' is nil.

The chargeability contour map provides a good picture of the distribution of the response material in the area.

High response material of 80 milliseconds occurs in section 28 and 33. The anomaly is controlled to the west by a strong north-south contact (fault). This contact feature is common to both the IP and resistivity data and represents the boundary between the mineralized intrusives on the east and the alluvium (Gila?) on the west.

The BS and K mine occurs along this contact or fault zone. The alluvium or Gila Conglomerate is marked by the area of response of less than 2.0 milliseconds on the IP contour map.

The Tertiary-Cretaceous volcanics to the west have response values of 4 to 8 milliseconds near surface. An increase in response to 15 milliseconds at depths greater than 1800' is associated with higher resistivities and could be related to rocks other than volcanics. This increase in response at depth could be due to high background response or at best minor sulfides of less than 1.5 percent by volume.

CONCLUSIONS

A zone of substantial IP response occurs on the southeast half of line 52. A calculated response of 80 to 100 milliseconds in the rock at depths from 150' to 800' is related to greater than 4 percent sulfides by volume. The zone lies parallel to our present profiles and a line across the strike of the zone is recommended to locate the northeast and southeast contacts.

Substantial response occurs off the southerly ends of lines 46, 48, 50, 52 and 54 indicating a reasonably large zone of response adjacent to the southeast of the property.

A moderately weak response of 15 milliseconds occurs at depths of about 1800' in the area of the Tertiary-Cretaceous volcanic to the west. An increase in resistivity occurs at depths greater than 1000' in this area. We suspect these interfaces indicate a bottom depth to the volcanics, and a high resistivity rock at depth that may have very minor sulfide mineralization.

RECOMMENDATIONS

A drill hole is proposed to test the response zone outlined on line 52. A minimum depth of 1000' is suggested to test the response characteristics. We strongly recommend a profile be run across the zone to better define the boundaries of the anomaly prior to locating a drill site.

Locally the anomalous response appears to be closing out to the northeast. However, further reconnaissance in the area to the north and east should be considered where geologic conditions appear more favorable.

Some consideration might be given to testing the high resistivity, moderate IP response that occurs below the Tertiary-Cretaceous volcanics in sections 30 and 31. However, there is little reason to expect more than 1 percent sulfides (related to 15 milliseconds response at depth) where a hole to 2000' would be necessary to test the physical property characteristic.

Respectfully Submitted

Avinash V. Hardas, M.S.
Geologist-Geophysical Engineer

W. Gordon Wieduwilt
Geophysicist

May 2, 1969
Tucson, Arizona

Part IV

APPENDIX I

The following personnel of CANADIAN AERO MINERAL SURVEYS LIMITED were engaged in an induced polarization - resistivity survey conducted on behalf of THE HANNA MINING COMPANY on their property in the Silver Bell District, Pima County, Arizona.

		No. of Man Days
Avinash V. Hardas Engineer, CAMS Tucson	Field Office	20 6
Gary Carpenter Helper-Tucson	Field	20
Shantikumer Toprani Helper-Tucson	Field	16
David Hunter Helper-Tucson	Field	9
Christian Dahlberg Helper-Tucson	Field	3
Robert Sigafus Helper-Tucson	Field	1
Total number of man hours		75

APPENDIX II

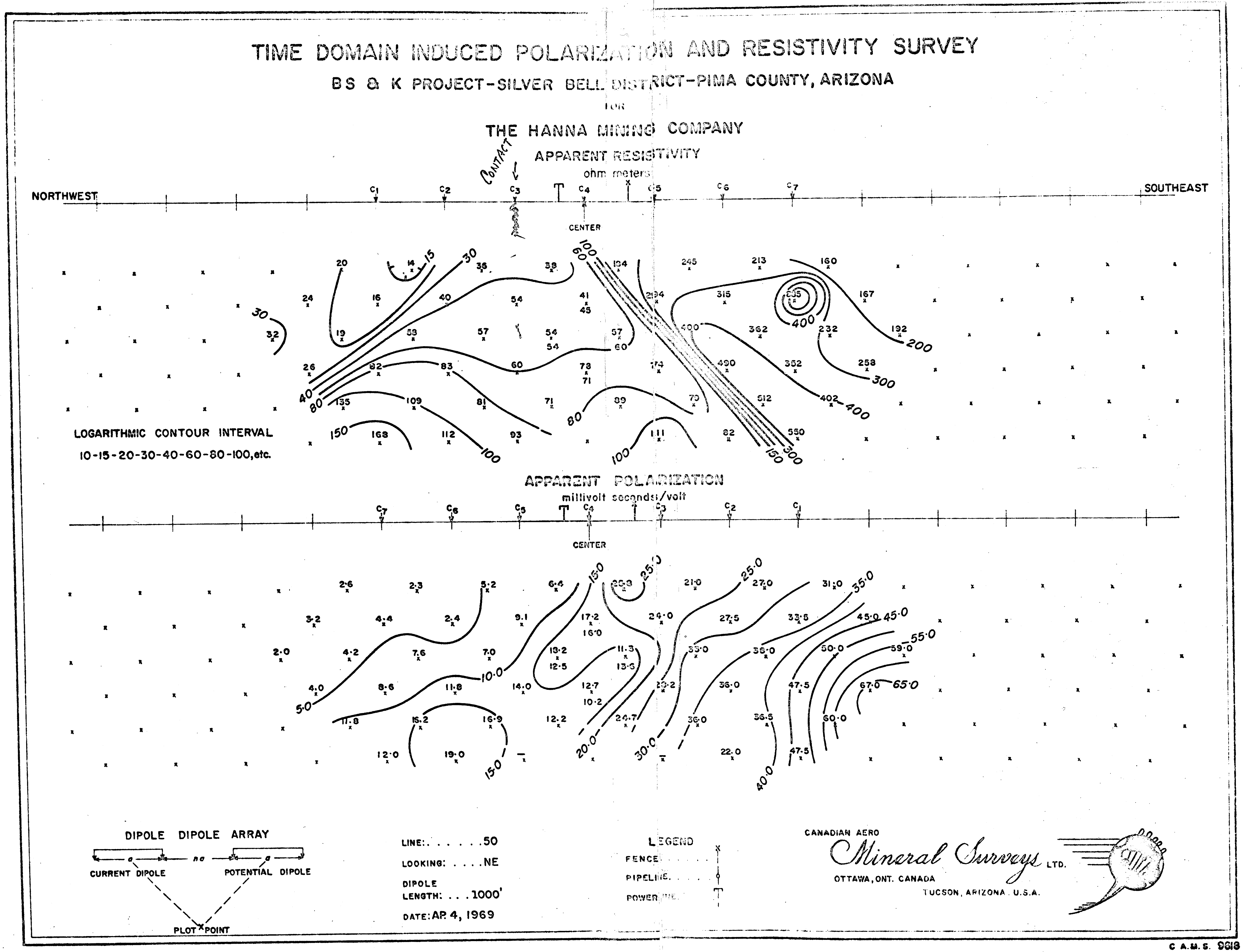
APPLICATION OF INDUCED POLARIZATION METHOD

The induced polarization method is basically a volume detecting technique. Effective penetration is governed by the size of target where normally a large volume of polarizable material at depth is required to give measureable response at surface. This method is relatively sensitive and is capable of detecting as little as 1% by volume of metallic sulfides. Because polarization is essentially a "particle surface" phenomenon, the induced polarization effects from a given percentage of metallic sulfides generally increases as particle size is decreased. This characteristic makes this technique especially suitable to exploration for disseminated sulfide occurrences.

Sulfides of metallic lustre produce IP effects i.e., bornite, chalcopyrite, chalcocite, pyrite, pyrrhotite, arsenopyrite, molybdenite, etc., but not sphalerite. Besides sulfides, some metallic oxides like magnetite and pyrolusite also give rise to IP effects.

Apart from sulfides and oxides, certain minerals with unsatisfied basal charged lattice, when current is applied to the ground, develope a charged double layer which acts as a leaky condenser and gives rise to IP effects. Certain of the clay mica minerals are active in this sense with montmorillonite and vermiculite exhibiting by far the greatest response. Bentonitic tuff is exceptionally active to IP, while kaolines, chlorites, muscovites, and biotites are not generally active.

Although considerable study has taken place, this method has not yet been improved to differentiate the IP effects arising from metallic sulfides, oxides, graphite, or clay occurrences.


TIME DOMAIN INDUCED POLARIZATION AND RESISTIVITY SURVEY
BS & K PROJECT-SILVER BELL DISTRICT-PIMA COUNTY, ARIZONA
FOR
THE HANNA MINING COMPANY
APPARENT RESISTIVITY
ohm meters
CONTACT
NORTHWEST
SOUTHEAST
CENTER
LOGARITHMIC CONTOUR INTERVAL
10-15-20-30-40-60-80-100, etc.
APPARENT POLARIZATION
millivolt seconds/volt
CENTER
DIPOLE DIPOLE ARRAY
CURRENT DIPOLE
POTENTIAL DIPOLE
PLOT POINT
LINE: 50
LOOKING: . . . . NE
DIPOLE LENGTH: . . . 1000'
DATE: AP 4, 1969
LEGEND
FENCE
PIPELINE
POWER LINE
CANADIAN AERO
Mineral Surveys LTD.
OTTAWA, ONT. CANADA
TUCSON, ARIZONA, U.S.A.
C.A.M.S. 9618

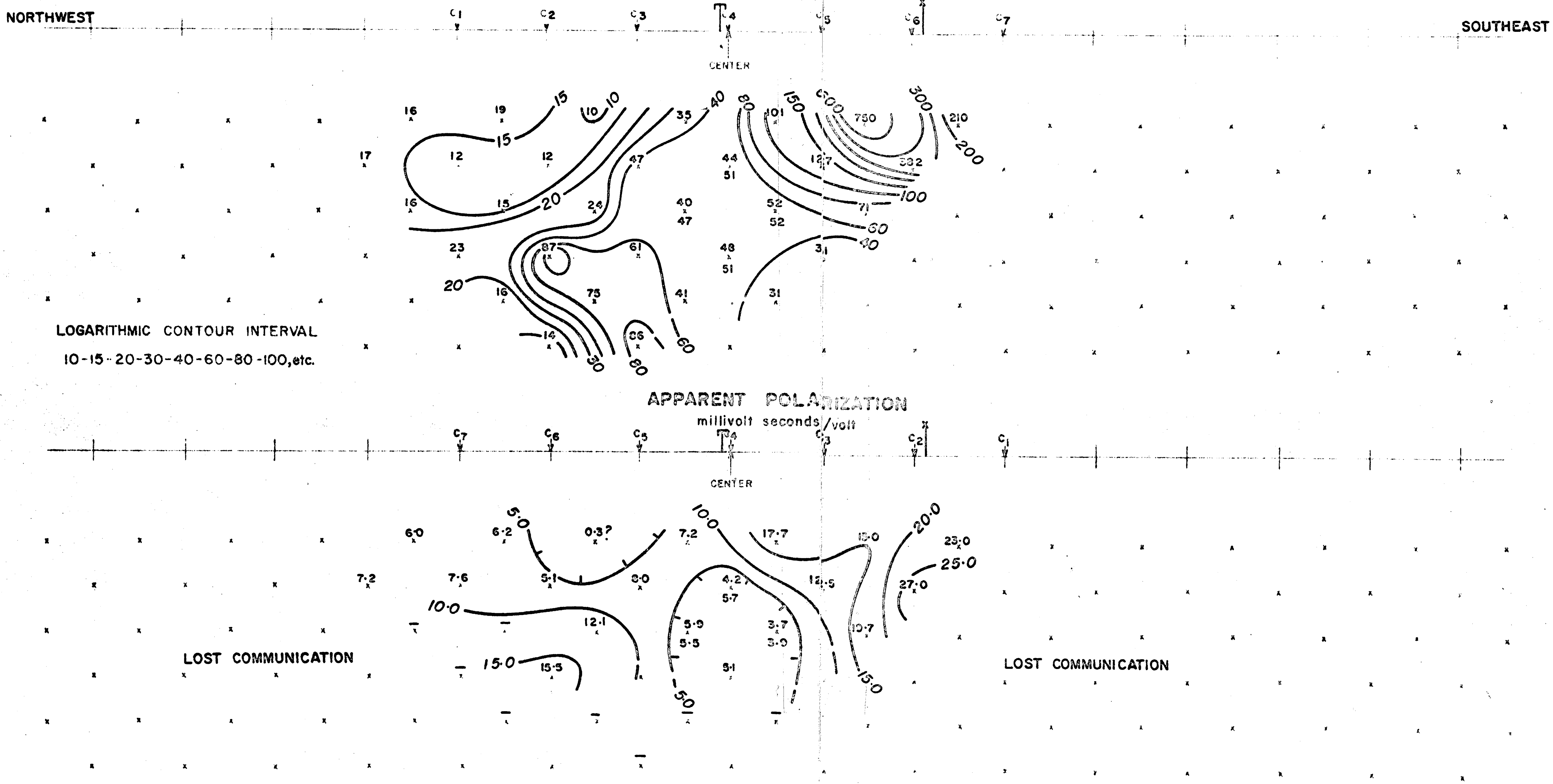
TIME DOMAIN INDUCED POLARIZATION AND RESISTIVITY SURVEY

BS & K PROJECT-SILVER BELL DISTRICT-PIMA COUNTY, ARIZONA

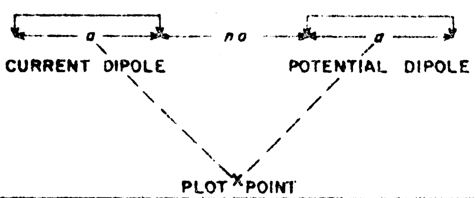
FOR

THE HANNA MINING COMPANY

APPARENT RESISTIVITY
ohm meters



DIPOLE DIPOLE ARRAY



LINE: 48
LOOKING: . . . . NE
DIPOLE LENGTH: 1000
DATE: AP.,3, 1969

LEGEND
FENCE
PIPELINE
POWERLINE

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TIME DOMAIN INDUCED POLARIZATION AND RESISTIVITY SURVEY

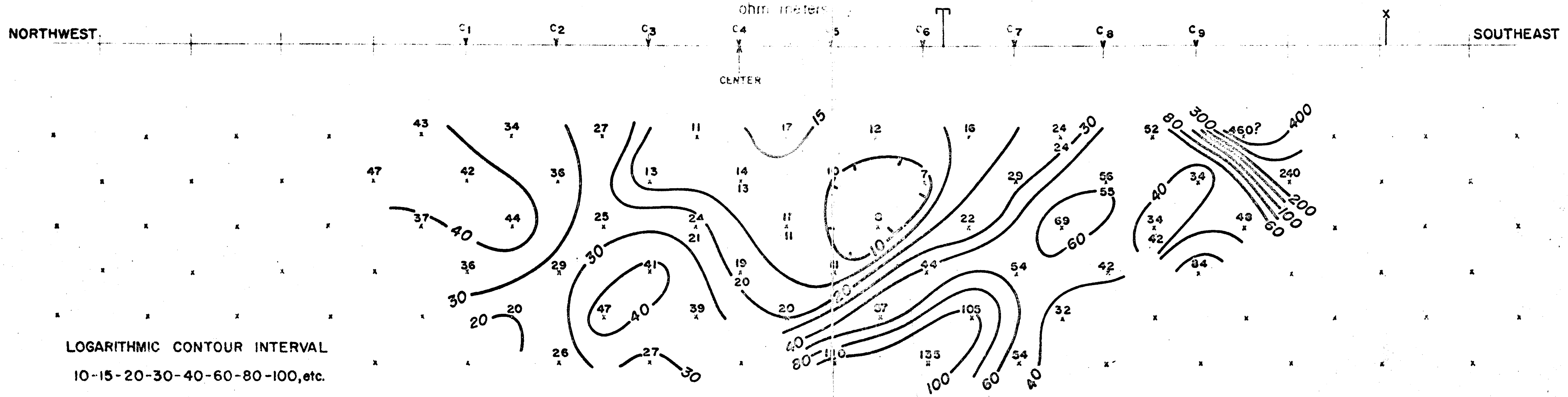
BS & K PROJECT-SILVER BELL DISTRICT-PIMA COUNTY, ARIZONA

FOR

THE HANNA MINING COMPANY

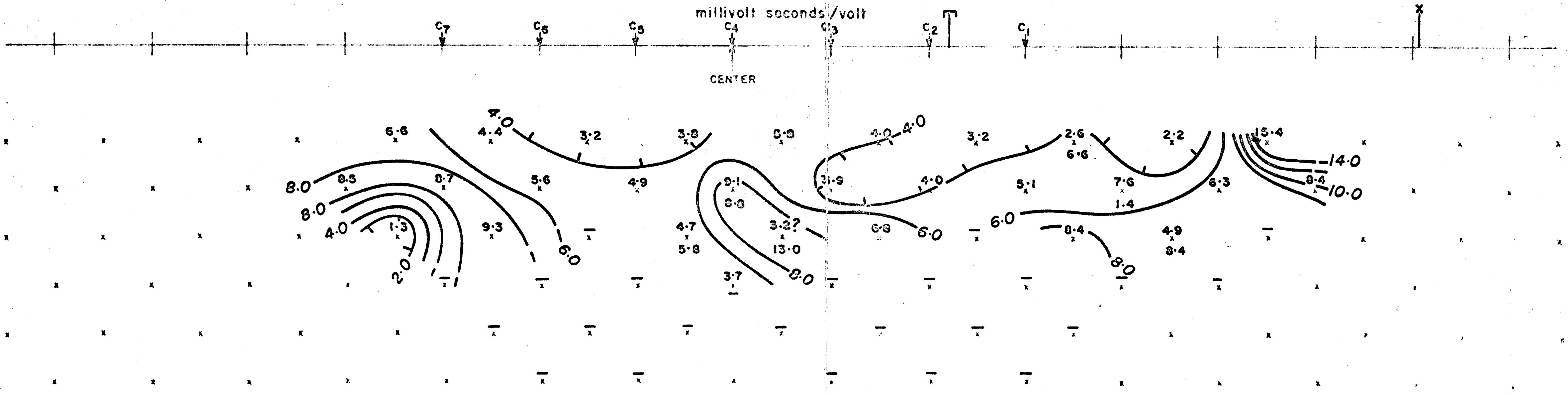
APPARENT RESISTIVITY

ohm meters

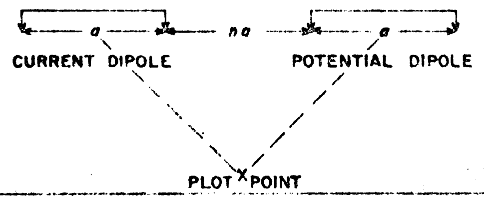


APPARENT POLARIZATION

millivolt seconds/volt



DIPOLE DIPOLE ARRAY



LINE: 46

LOOKING: . . . . . NE

DIPOLE LENGTH: . . . 1000

DATE: MAR. 31, 1969

LEGEND

FENCE

PIPELINE

POWERLINE

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TUCSON, ARIZONA. U.S.A

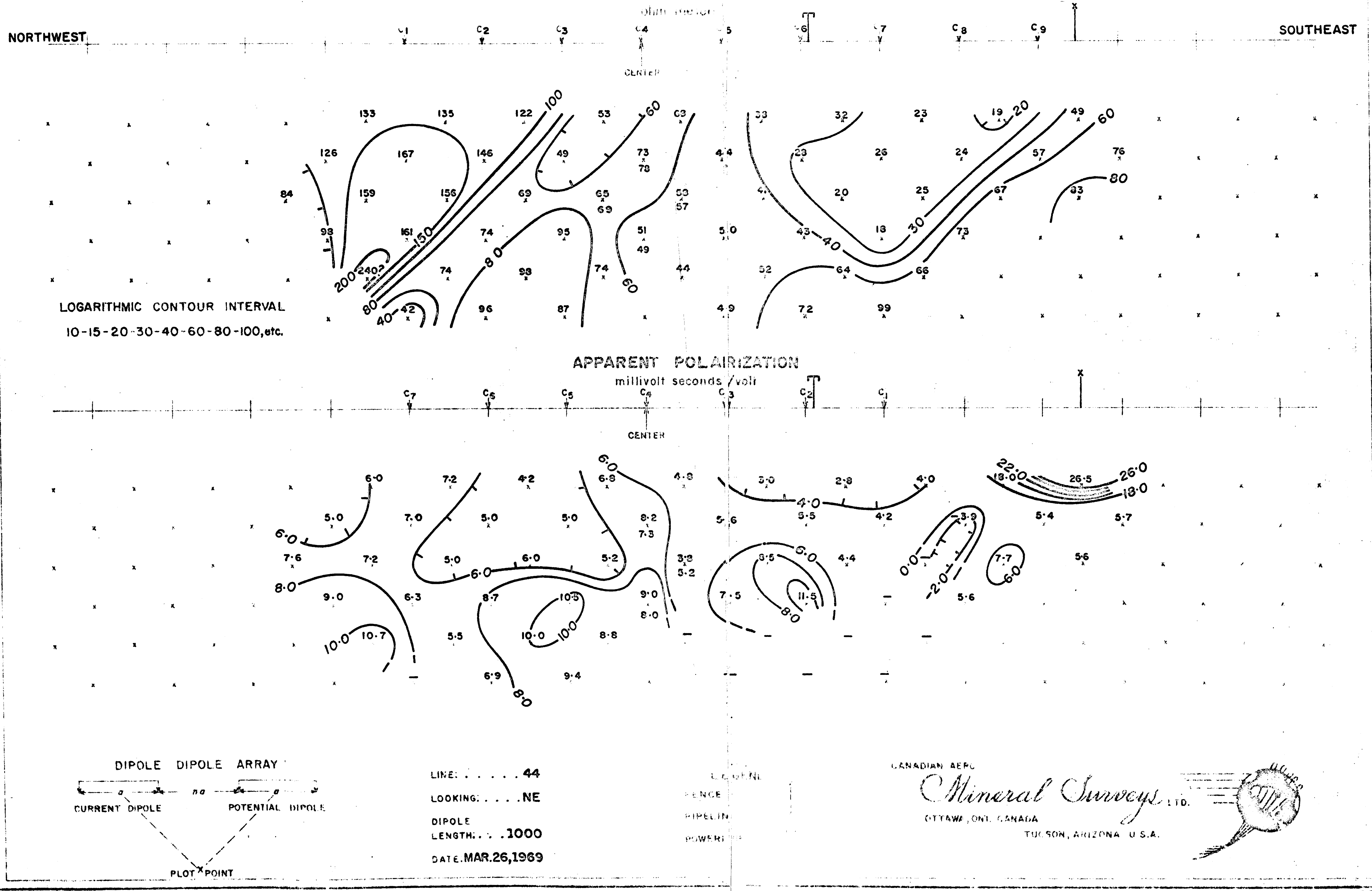
CAMS 9618

TIME DOMAIN INDUCED POLARIZATION AND RESISTIVITY SURVEY

BS & K PROJECT-SILVER BELL DISTRICT-PIMA COUNTY, ARIZONA

FOR

THE HANNA MINING COMPANY



LINE: 44

LOOKING: . . . . NE

DIPOLE LENGTH: . . .1000

DATE. MAR.26,1969

LEGEND

FENCE

PIPELINE

POWERLINE

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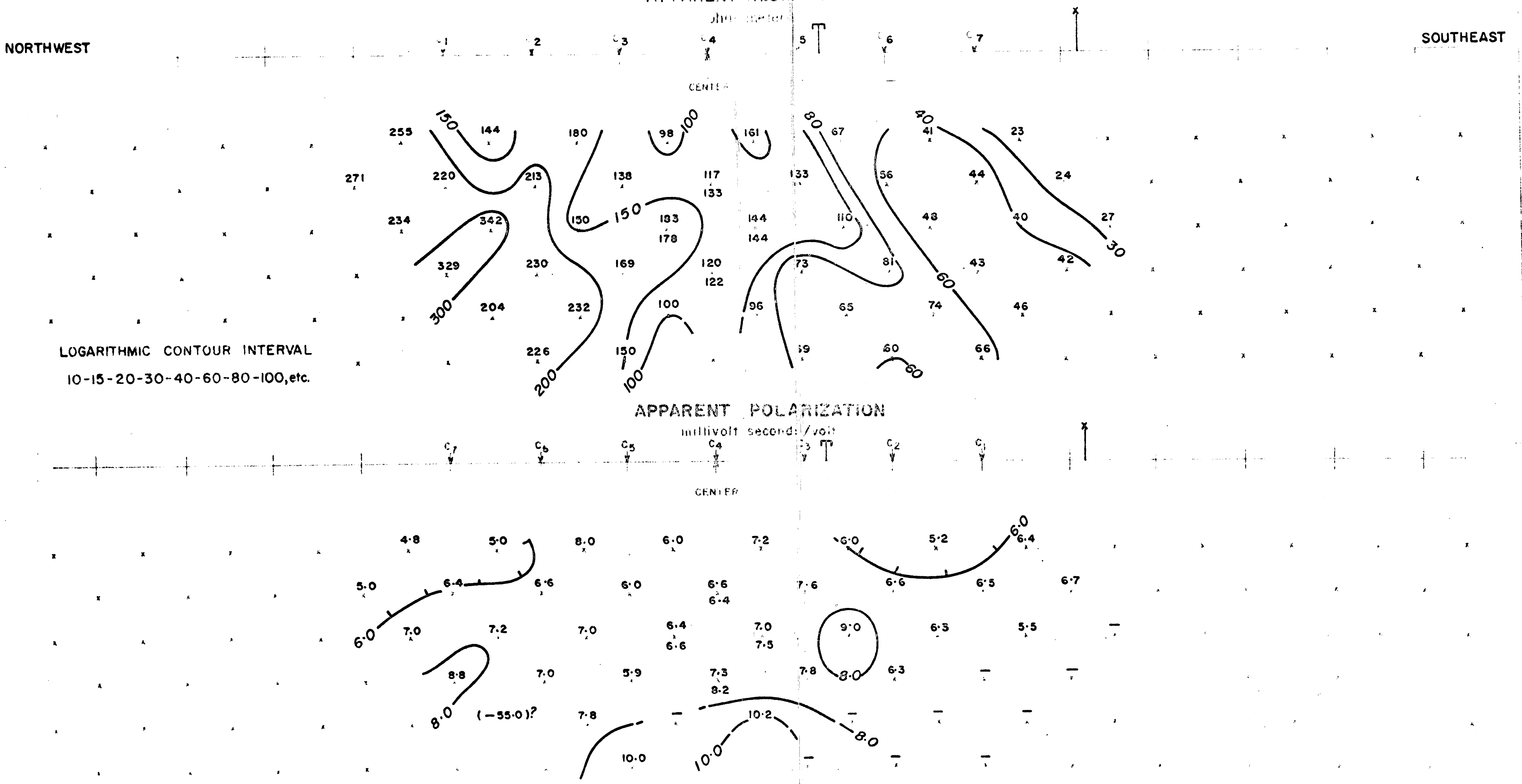
TIME DOMAIN INDUCED POLARIZATION AND RESISTIVITY SURVEY

B S & K PROJECT-SILVER BELL DISTRICT-PIMA COUNTY, ARIZONA

FOR

THE HANNA MINING COMPANY



DIPOLE DIPOLE ARRAY

CURRENT DIPOLE — na — POTENTIAL DIPOLE

PLOT POINT

LINE 42

LOOKING. . . . . NE

DIPOLE LENGTH. . . .1000'

DATE. MAR.24,1969

LEGEND

FENCE

PIPELINE

POWER

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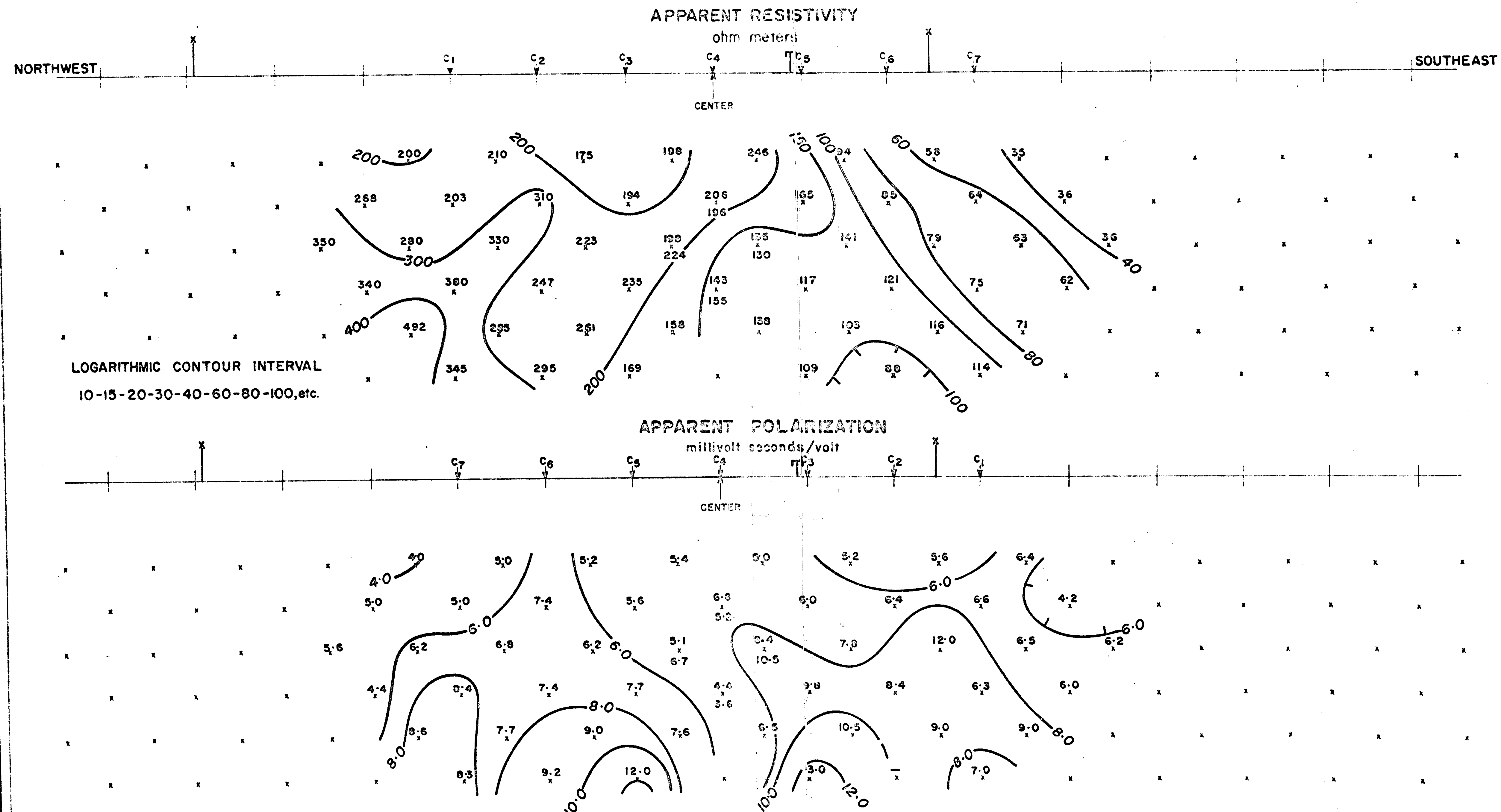
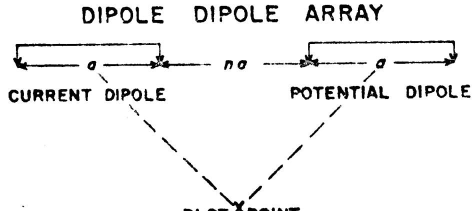
TIME DOMAIN INDUCED POLARIZATION AND RESISTIVITY SURVEY

B S & K PROJECT-SILVER BELL DISTRICT-PIMA COUNTY, ARIZONA

FOR

THE HANNA MINING COMPANY





LINE: 40

LOOKING: . . . . . NE

DIPOLE LENGTH: . . . .1000'

DATE: MAR.20,1969

LEGEND

FENCE x

PIPELINE . . . .

POWERLINE . . .

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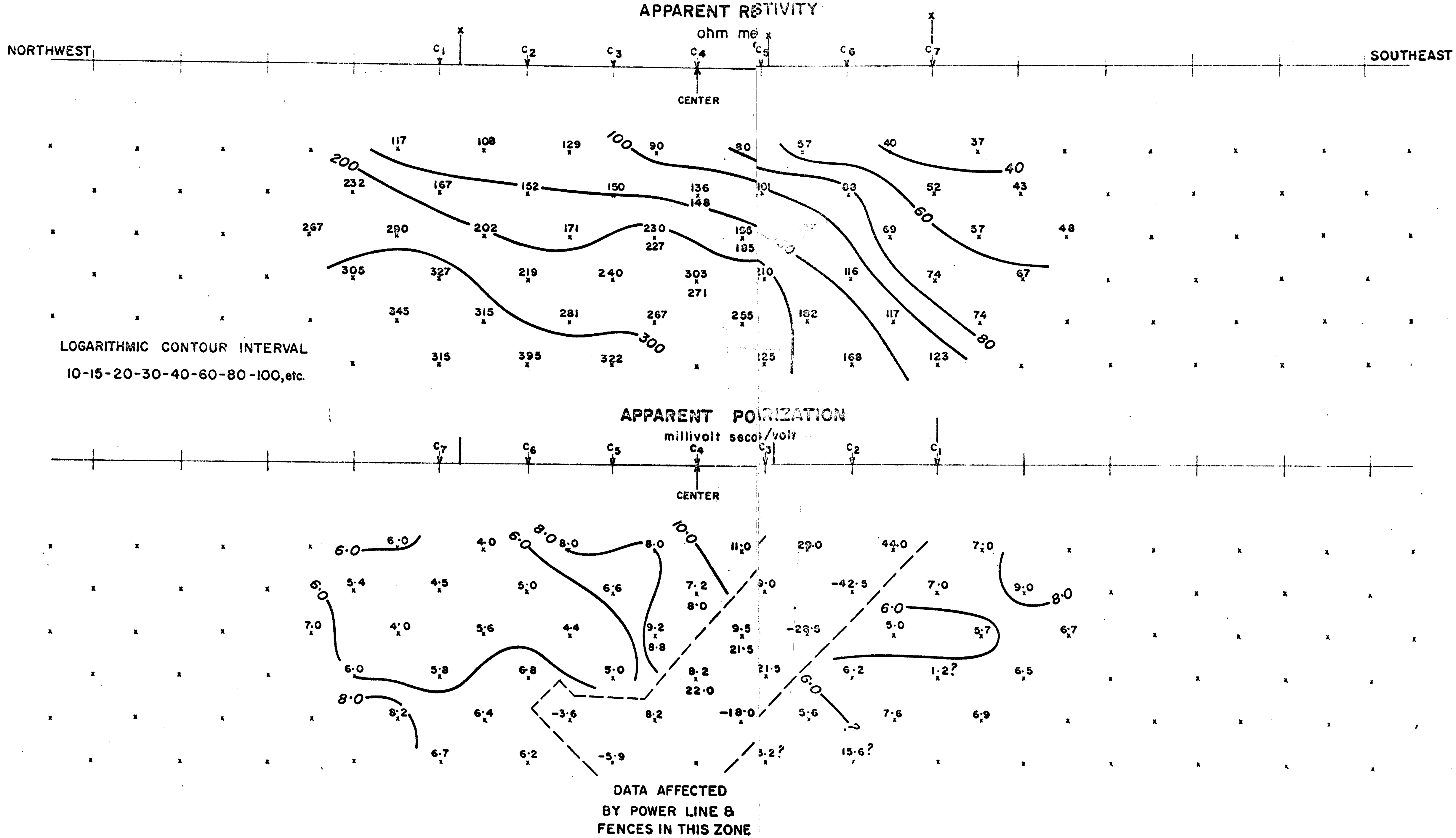
TIME DOMAIN INDUCED POLARIZAON AND RESISTIVITY SURVEY

BS & K PROJECT—SILVER BELL DIRICT—PIMA COUNTY, ARIZONA

FOR

THE HANNA MING COMPANY



DIPOLE DIPOLE ARRAY

CURRENT DIPOLE — na — POTENTIAL DIPOLE

PLOT POINT

LINE: 38

LOOKING: . . . .NE

DIPOLE LENGTH: . . . .1000'

DATE: MAR.18,1969

EGEND

FEI

PIP

POV

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TIME DOMAIN INDUCED POLARIZATION AND RESISTIVITY SURVEY

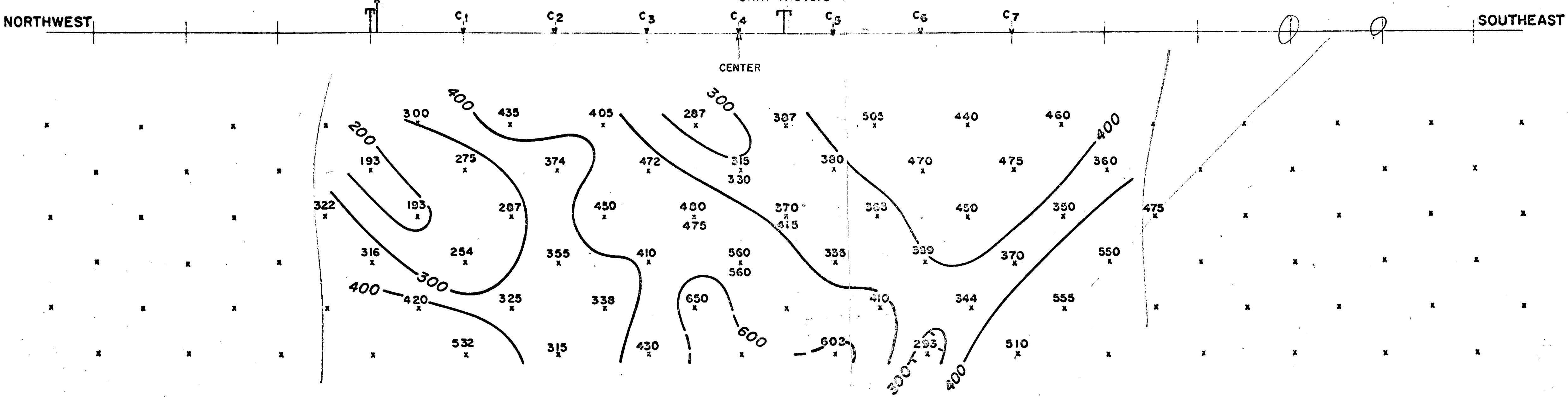
BS & K PROJECT–SILVER BELL DISTRICT–PIMA COUNTY, ARIZONA

FOR

THE HANNA MINING COMPANY

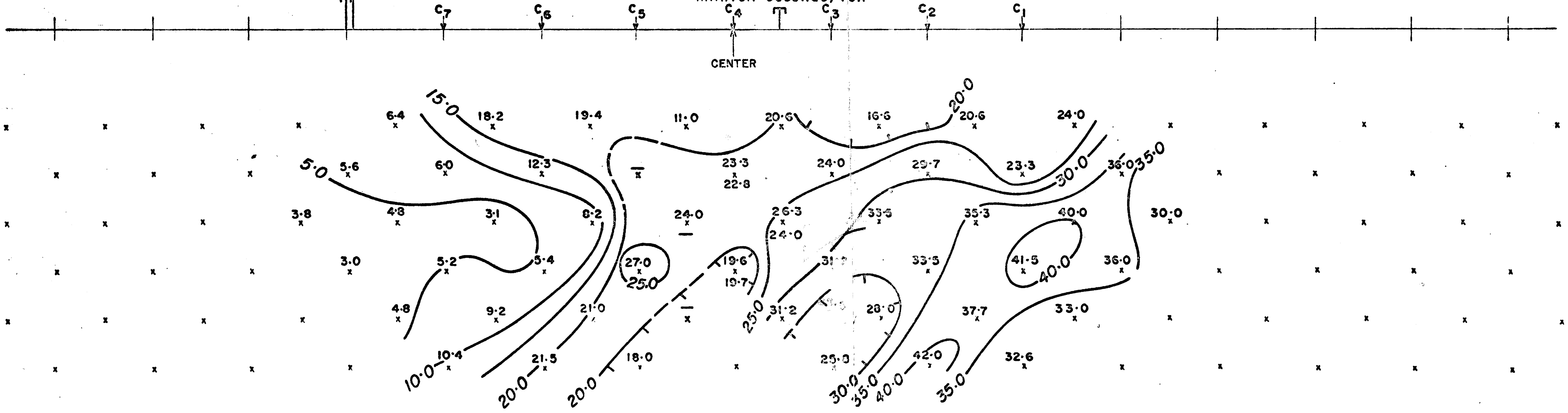
APPARENT RESISTIVITY

ohm meters

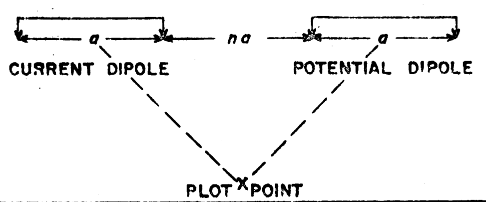


APPARENT POLARIZATION

millivolt seconds/volt



DIPOLE DIPOLE ARRAY



LINE: 54

LOOKING: . . . . NE

DIPOLE LENGTH: . . . 1000'

DATE: AP., 9, 1969

LEGEND

FENCE . . . . . .

PIPELINE . . . . .

POWERLINE

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TIME DOMAIN INDUCED POLARIZATION AND RESISTIVITY SURVEY

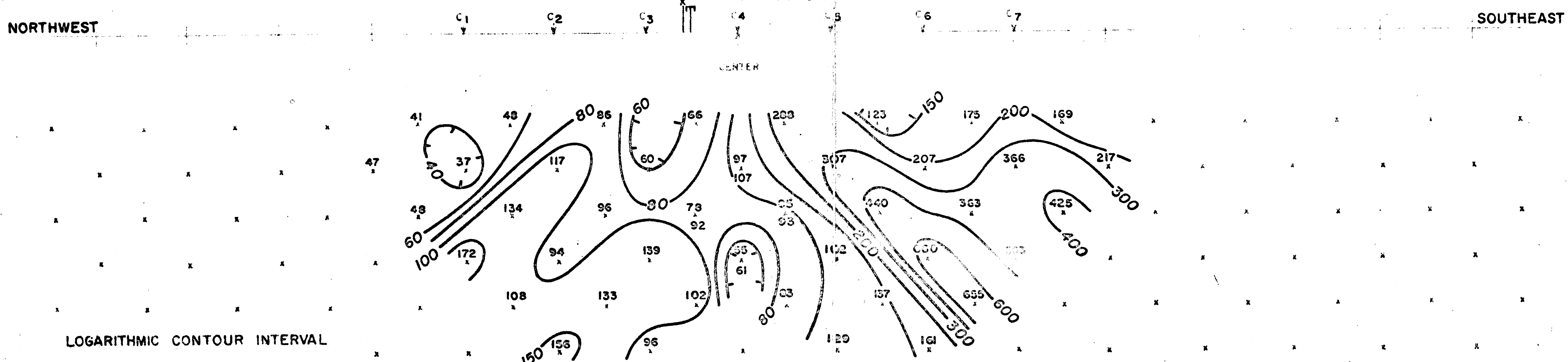
BS & K PROJECT-SILVER BELL DISTRICT-PIMA COUNTY, ARIZONA

for

THE HANNA MINING COMPANY

APPARENT RESISTIVITY

ohm meters

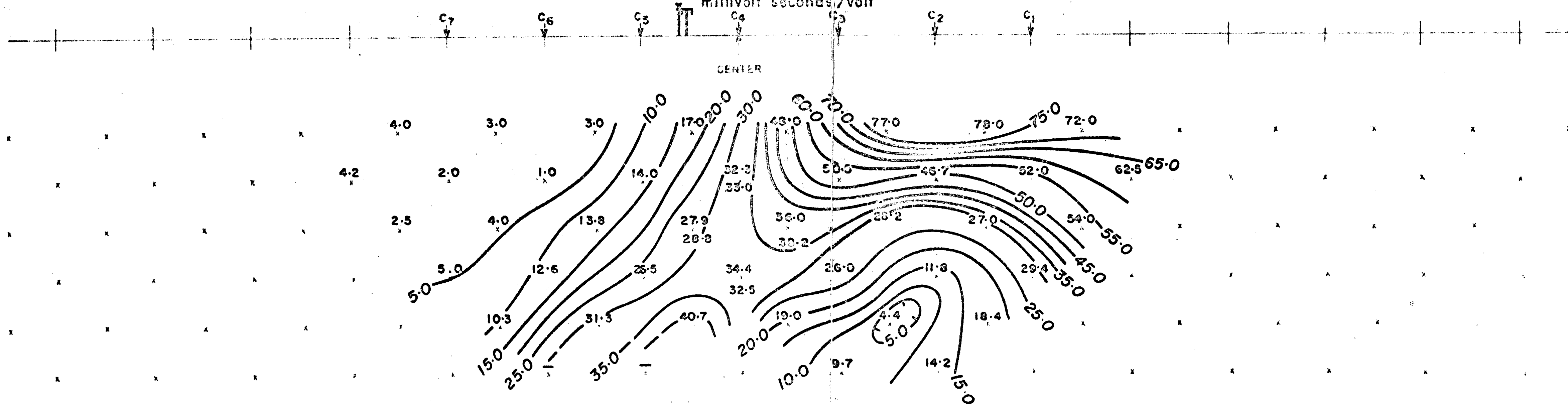


LOGARITHMIC CONTOUR INTERVAL

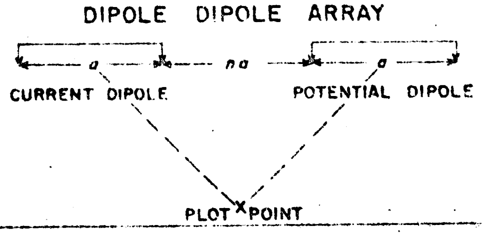
10-15-20-30-40-60-80-100, etc.

APPARENT POLARIZATION

millivolt seconds/volt



DIPOLE DIPOLE ARRAY



LINE: 52

LOOKING: . . . . NE

DIPOLE LENGTH: . . . 1000'

DATE: AP. 7, 1969

LEGEND

FENCE

PIPELINE

POWER

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REPORT ON THE
INDUCED POLARIZATION SURVEY
FOR
B. S. & K. MINING COMPANY, ARIZONA
PART II

Dwg Misc 3298
not included

McPHAR GEOPHYSICS LIMITED

NOTES ON THE THEORY OF INDUCED POLARIZATION AND THE METHOD OF FIELD OPERATION

Induced Polarization as a geophysical measurement refers to the blocking action or polarization or metallic or electronic conductors in a medium of ionic solution conduction.

This electro-chemical phenomenon occurs wherever electrical current is passed through an area which contains metallic minerals such as base metal sulphides. Normally, when current is passed through the ground, as in resistivity measurements, all of the conduction takes place through ions present in the water content of the rock, or soil, i.e. by ionic conduction. This is because almost all minerals have a much higher specific resistivity than ground water. The group of minerals commonly described as "metallic", however, have specific resistivities much lower than ground waters. The induced polarization effect takes place at those interfaces where the mode of conduction changes from ionic in the solutions filling the interstices of the rock to electronic in the metallic minerals present in the rock.

The blocking action or induced polarization mentioned above, which depends upon the chemical energies necessary to allow the ions to give up or receive electrons from the metallic surface, increases with the time that a d.c. current is allowed to flow through the rock, i.e. as ions pile up against the metallic interface the resistance to current flow increases. Eventually, there is enough polarization in the form of excess ions at the interfaces to effectively stop all current flow through the metallic particle. This polarization takes place at each of the infinite number of solution-metal interfaces in a mineralized rock.

When the d. c. voltage used to create this d. c. current flow is cut off, the Coulomb forces between the charged ions forming the polarization cause them to return to their normal position. This movement of charge creates a small current flow which can be measured on the surface of the ground as a decaying potential difference.

From an alternate viewpoint it can be seen that if the direction of the current through the system is reversed repeatedly before the polarization occurs, the effective resistivity of the system as a whole will change as the frequency of the switching is changed. This is a consequence of the fact that the amount of current flowing through each metallic interface depends upon the length of time that current has been passing through it in one direction.

The values of the "metal factor" or "M. F." are a measure of the amount of polarization present in the rock mass being surveyed. This parameter has been found to be very successful in mapping areas of sulphide mineralization, even those in which all other geophysical methods have been unsuccessful. The induced polarization measurement is more sensitive to sulphide content than other electrical measurements because it is much more dependent upon the sulphide content. As the sulphide content of a rock is increased, the "metal factor" of the rock increases much more rapidly than the resistivity decreases.

For example, in one of the large porphyry copper pits, the resistivity contrast between the protore and the enriched zone was found to be only 180/18 or 10/1. The contrast in metal factor in the same pit was found to be 20/10,000. There was less than 1% sulphides in the protore and 5-9% sulphides in the enriched zones. As the sulphide content is increased the metal factor increases until for massive sulphides the values apparently are measured in hundreds of thousands.

Because of this increased sensitivity it is possible to locate and outline zones of less than 10% sulphides that can't be located by E. M. Methods. The method has been successful in locating the disseminated "porphyry copper" type mineralization in the Southwestern United States.

Measurements and experiments also indicate that it should be possible to locate most massive sulphide bodies at a greater depth with induced polarization than with E. M.

Since there is no I. P. effect from any conductor unless it is metallic, the method is useful in checking E. M. anomalies that are suspected of being due to water filled shear zones or other ionic conductors. There is also no effect from conductive overburden, which frequently confuses E. M. results. It would appear from scale model experiments and calculations that the apparent metal factors measured over a mineralized zone are larger if the material overlying the zone is of low resistivity.

Apropos of this, it should be stated that the induced polarization measurements indicate the total amount of metallic constituents in the rock. Thus all of the metallic minerals in the rock, such as pyrite, as well as the ore minerals chalcopyrite, chalcocite, galena, etc. are responsible for the induced polarization effect. Some oxides such as magnetite, pyrolusite, chromite and some forms of hematite also conduct by electrons and are metallic. All of the metallic minerals in the rock will contribute to the induced polarization effect measured on the surface.

In the field procedure, measurements on the surface are made in a way that allows the effects of lateral changes in the properties of the rocks to be separated from the effects of vertical changes in the properties. Current is applied to the ground at one point, the sender location, and voltage difference measurements are made at several other spots, the receiver locations. The sender location is then changed and the procedure is repeated. The value of apparent resistivity and apparent metal factor for any given pair of sender and receiver locations is plotted on the map at the intersection of grid lines, one from the sender location and one from the receiver location. The resistivity values are plotted above the line and the metal factor values below the line. The lateral displacement of a given value is determined by the location along the survey line of the centre point between the sender and receiver locations. The distance of the value from the line is determined by the separation between the sender and receiver that gave that particular value.

The separation between sender and receiver is only one factor which determines the depth to which the ground is being sampled in any particular measurement. These plots then, when contoured, are not section maps of the electrical properties of the ground under the survey line.

The interpretation of the results from any given survey must be carried out using the combined experience gained from field, model and theoretical investigations.

In the field procedure, the interval over which the potential differences are measured is the same as the interval over which the sender is moved after a series of readings has been made. One of the advantages of the induced polarization method is that the same equipment can be used for both detailed and reconnaissance surveys merely by changing the interval over which the transmitter is moved each time. In the past, intervals have been used ranging from 100 feet to 1000 feet for the basic distance. In each case, the decision as to spread distance is largely determined by the expected size of the mineral deposit being sought, the size of the expected anomaly and the speed with which it is desired to progress.

The speed at which measurements can be made along a line is directly related to the length of spread used. In some detailed surveys in which the area of interest had been outlined by previous drilling and/or geology, spreads of 200 feet have been used. In these cases, distances ranging from 2500 feet to 3500 feet may be covered in a normal day's operation by one crew. In reconnaissance work using a 1000 foot spread distances of 5000 to 8000 feet may be surveyed in one day.

McPHAR GEOPHYSICS LIMITED

REPORT ON THE
INDUCED POLARIZATION SURVEY
FOR
B. S. & K. MINING COMPANY, ARIZONA
PART II

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1. INTRODUCTION

During June 1960, an Induced Polarization survey was carried out over a portion of the B. S. & K. Mining Company property in the Silver Bell area of southern Arizona. The investigation revealed the presence of an interesting anomaly to the west of the mine workings and in our report of June 28, 1960, additional surveying was recommended.

This report describes the results obtained from the subsequent investigations carried out in October of this year.

2. PRESENTATION OF RESULTS

The Induced Polarization and Resistivity data are plotted in the manner described in the notes accompanying this report and are shown on the data plots as follows.

Line 2 + 00S	300 foot spreads	Dwg. IP 2771-1
Line A	300 foot spreads	Dwg. IP 2771-2
Line A	200 foot spreads	Dwg. IP 2771-3
Line 2 + 00N	300 foot spreads	Dwg. IP 2771-4
Line 10 + 00W	300 foot spreads	Dwg. IP 2771-5

A sketch of the grid is shown on drawing Misc. 3298 at a scale of 1" = 200'. This is approximate only, being based on pace-and-compass traverses. The definite and possible induced polarization anomalies are indicated by solid and broken bars respectively on this plan map as well as the data plots. These bars represent the surface projection of the anomalous zones as interpreted from the location of the transmitter and receiver electrodes when the anomalous values were measured.

Since the induced polarization measurement is essentially an averaging process, as are all potential methods, it is frequently difficult to exactly pinpoint the source of an anomaly. Certainly, no anomaly can be located with more accuracy than the spread length; i.e. when using 200' spreads the position of a narrow sulphide body can only be determined to lie between two stations 200' apart. In order to locate sources at some depth, larger spreads must be used, with a corresponding increase in the uncertainties of location. Therefore, while the center of the indicated anomaly probably corresponds fairly well with source, the length of the indicated anomaly along the line should not be taken to represent the exact edges of the anomalous material.

Unfortunately the station numbers on the two surveys do not agree. Although the lines coincide in location, the zero point on the present survey is 400' east of the zero point on the original survey. A numbered picket has been placed at each station to avoid any possible confusion in the future.

3. DISCUSSION OF RESULTS

The June survey indicated an interesting anomaly on Line A between stations 4 + 00W and 8 + 00W (i.e. 8 + 00W - 12 + 00W on the new grid). The source appeared to be a sub-vertical tabular body at shallow depth relative to the spread (i.e. less than 400 feet). Line A was re-surveyed in October using 300 foot spreads to confirm the anomaly. Parallel lines were then run 200 feet to the north and south to trace the zone and a fourth line was run along the strike of the anomaly. The results from each line are described below.

Line 2 + 00S

There is an anomaly of moderate strength and intermediate depth at about 9 + 00W on this line. The apparent Metal Factors are smaller than on Line A suggesting that the source is becoming smaller or deeper, or that the line is near the south end of the zone. The results on Line 10 + 00W indicate that this latter interpretation is correct.

Anomalous Metal Factors were also encountered at the west end of the line. These values are based on very low voltages and small frequency effects (1/4 - 3/4%) and hence cannot be considered to be reliable. The associated resistivity low may represent the boundary fault assumed to occur along the west side of the hills.

Line A

The 300 foot data show a moderate anomaly centered at 9 + 00W, corresponding with the feature outlined during the June survey. Several anomalous values were repeated using a greater frequency spread (D. C. - 2-1/2 cps) with a resultant large increase in the apparent Metal Factor indicative of a metallic source.

In addition, there is a small shallow anomaly centered at about station 0 + 00. The east part of the line was re-surveyed using 200 foot spreads in order to obtain greater detail. This work confirmed the location of the anomaly and indicated a depth of the order of 100 - 150 feet to the source.

Line 2 + 00N

Considerable difficulty was encountered on this line because of interference from the numerous surface features. Even with the power turned off at the mill, it was not possible to obtain reliable data on part of the line. However, the resistivity data indicate the presence of the anomaly on this line and such I. P. values as were obtained seem to confirm that the zone extends this far north.

Line 10 + 00W

A line was run along the axis of the anomaly to determine the length of the zone. The results indicate that the south end occurs near station O or between O and 3S. Reliable data could not be obtained to the north because of excessive electrical noise from the power lines. The source appears to be shallower on this line, but there may be complicating factors present, especially the tailings dump.

4. SUMMARY & RECOMMENDATIONS

The October survey has confirmed the I. P. anomaly on Line A and has traced the zone farther to the north and south. A second smaller anomaly has been indicated on the eastern part of Line A.

While there are several surface features (mill, tailings dump, water pipe, etc.) which may be expected to interfere with the measurements or give rise to spurious local effects, it is felt that the main anomaly is primarily due to a sub-surface metallic source. Consequently it is recommended that a drill test be carried out to determine the cause of the anomaly. It is suggested that either a 400 foot vertical hole be drilled at 9 + 00W on Line A, or an inclined hole at 12 + 00W, Line A, drilling east at 45° for 450 - 500 feet.

From discussions with Mr. A. Kalaf, it would seem that the anomaly at 0 + 00, Line A is not related to any known ore lenses, but some interesting mineralization is known to occur in this area from previous underground work. If this is the case, then this anomaly should also be drilled. A hole is recommended at 2 + 00W, drilling east at 45°.

On completion of this test programme, the geophysical results should be reviewed in order to plan additional drilling if warranted and to plan a more extensive survey of the remainder of the property.

McPHAR GEOPHYSICS LIMITED

Robert A. Bell.

Robert A. Bell,
Geologist.

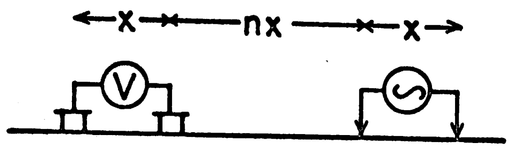
Philip G. Hallof

Philip G. Hallof,
Geophysicist.

Dated : November 8, 1960.

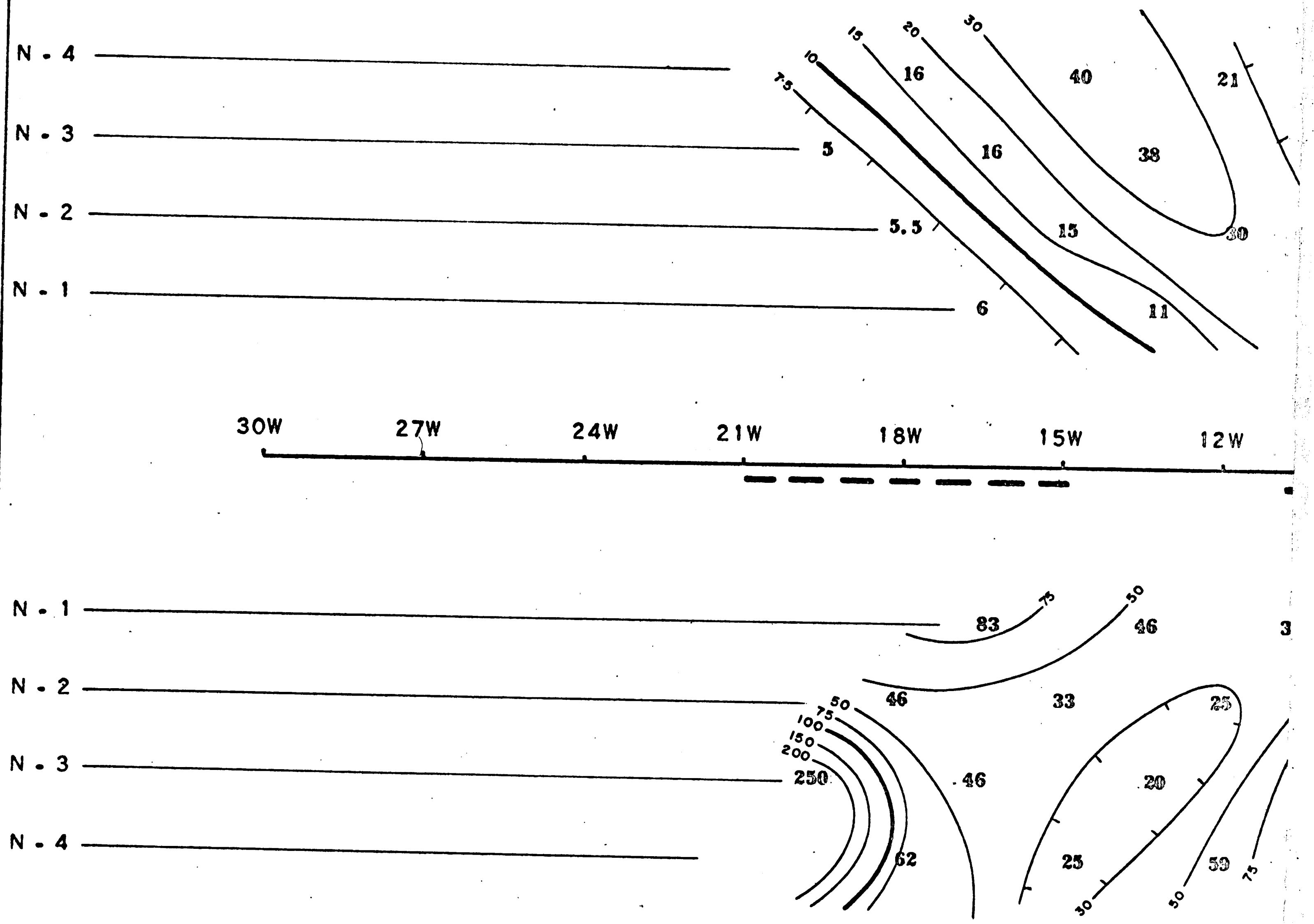
McPHAR GEOPHY

INDUCED POLARIZATION AND



ELECTRODE CONFIGURATION

X - 300



(10) DOUBTFUL READING

N SIGNAL/NOISE TOO LOW

ANOMALOUS ZONE

POSSIBLE ANOMALOUS ZONE

NOTE

LOGARITHMIC CONTOUR INTERVAL

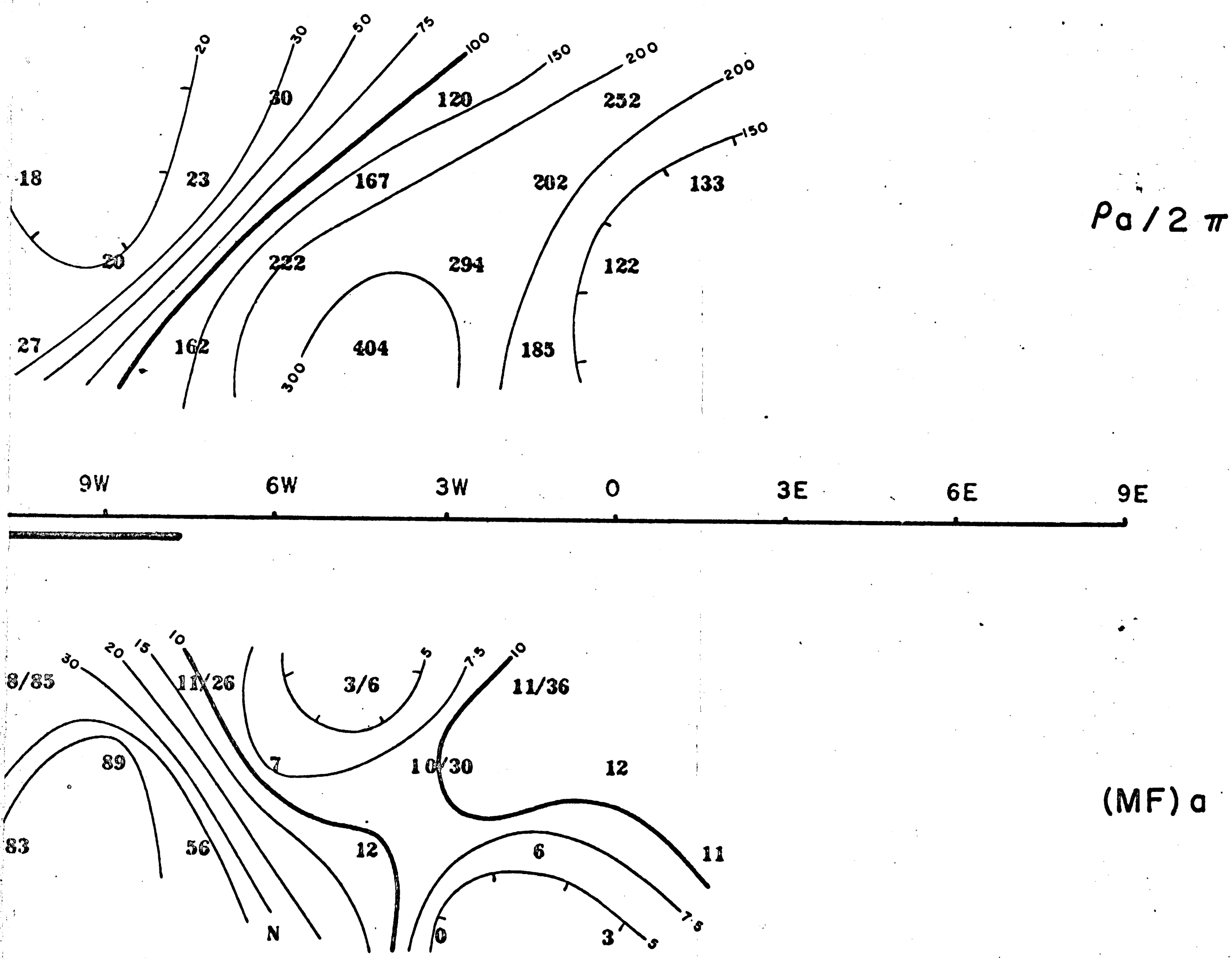
B.S.& K. MININ

PIMA COUNTY

Scale - One inch

SICS LIMITED

) RESISTIVITY SURVEY



LINE NO. 2 S

FREQUENCY 25 -2.5 C.P.S.

DATE SURVEYED JUNE/60

APPROVED R.A.B.

DATE Nov. 2/60

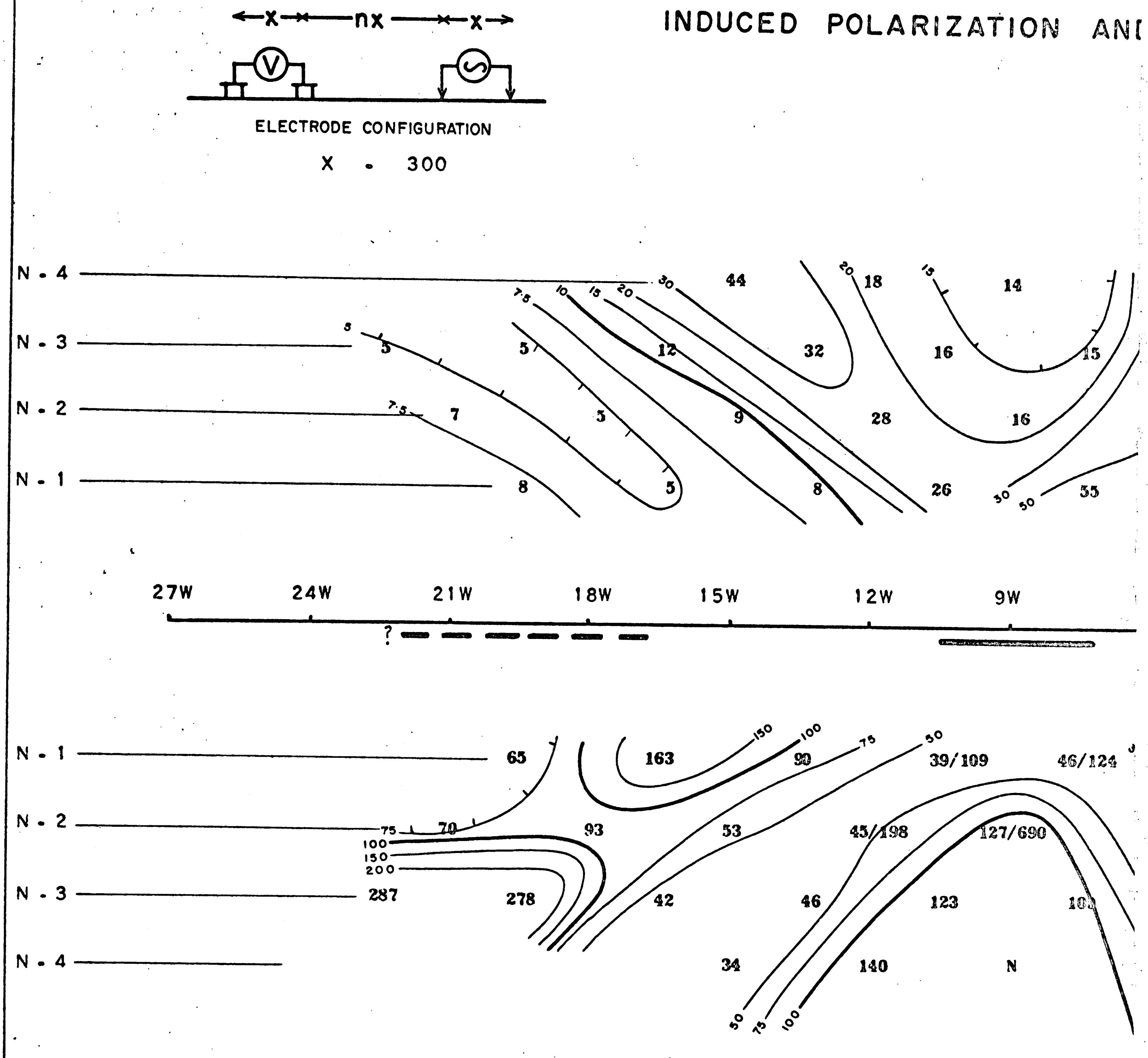
IG COMPANY

—ARIZONA.

=300 Feet

McPHAR GEOPHY

INDUCED POLARIZATION ANI



34/106 —— .25-2.5/D.C.-2.5 CPS

(10) DOUBTFUL READING

N SIGNAL/NOISE TOO LOW

ANOMALOUS ZONE

POSSIBLE ANOMALOUS ZONE

NOTE
LOGARITHMIC CONTOUR INTERVAL

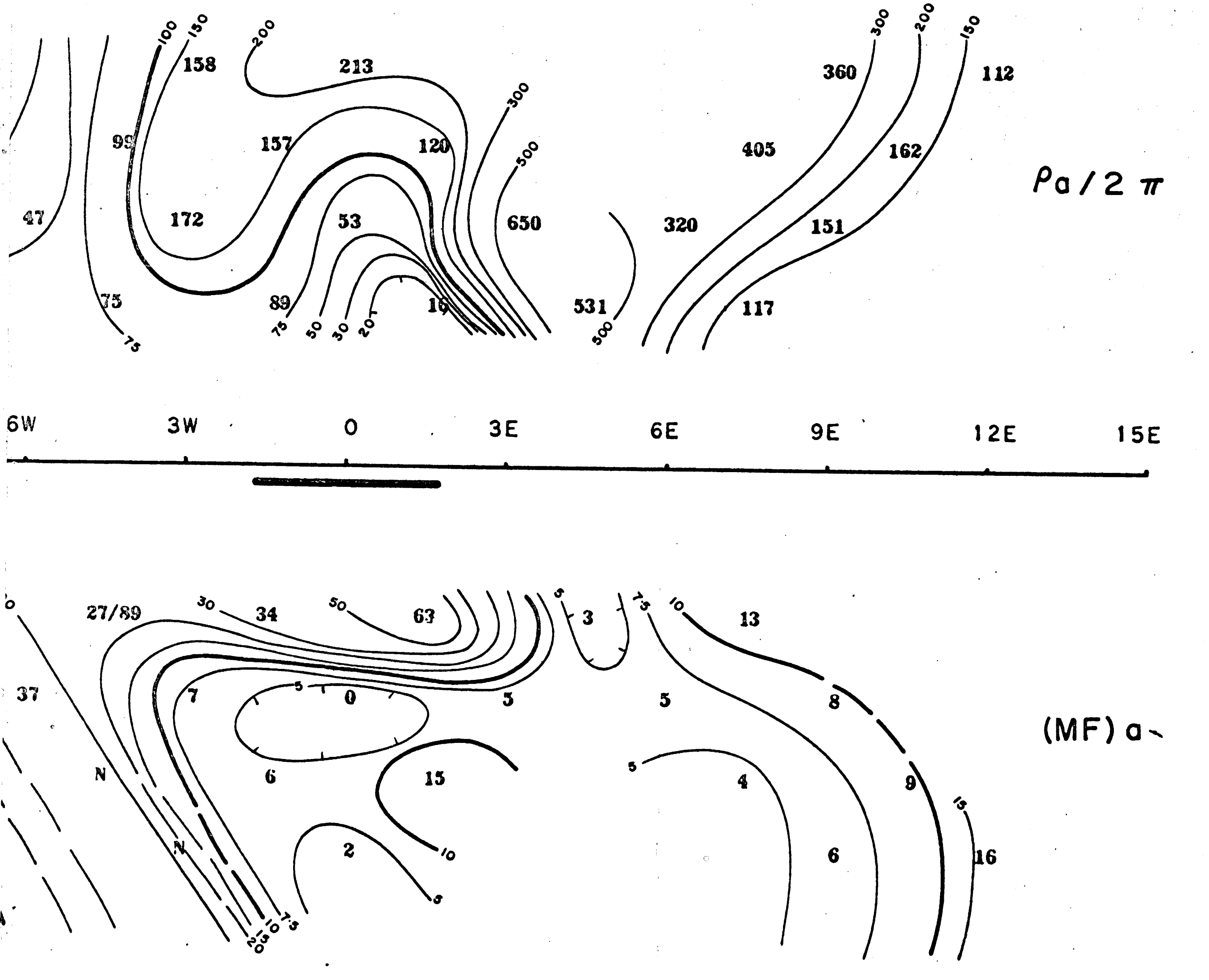
B.S.& K. MININ

PIMA COUNTY

Scale– One inch

SICS LIMITED

) RESISTIVITY SURVEY



LINE NO. "A"

FREQUENCY · 2.5 - 2.5 C.P.S.

DATE SURVEYED JUNE/60

APPROVED R.B.

DATE Nov 2/60

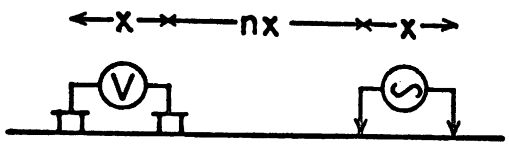
JG COMPANY

' — ARIZONA.

= 300 Feet

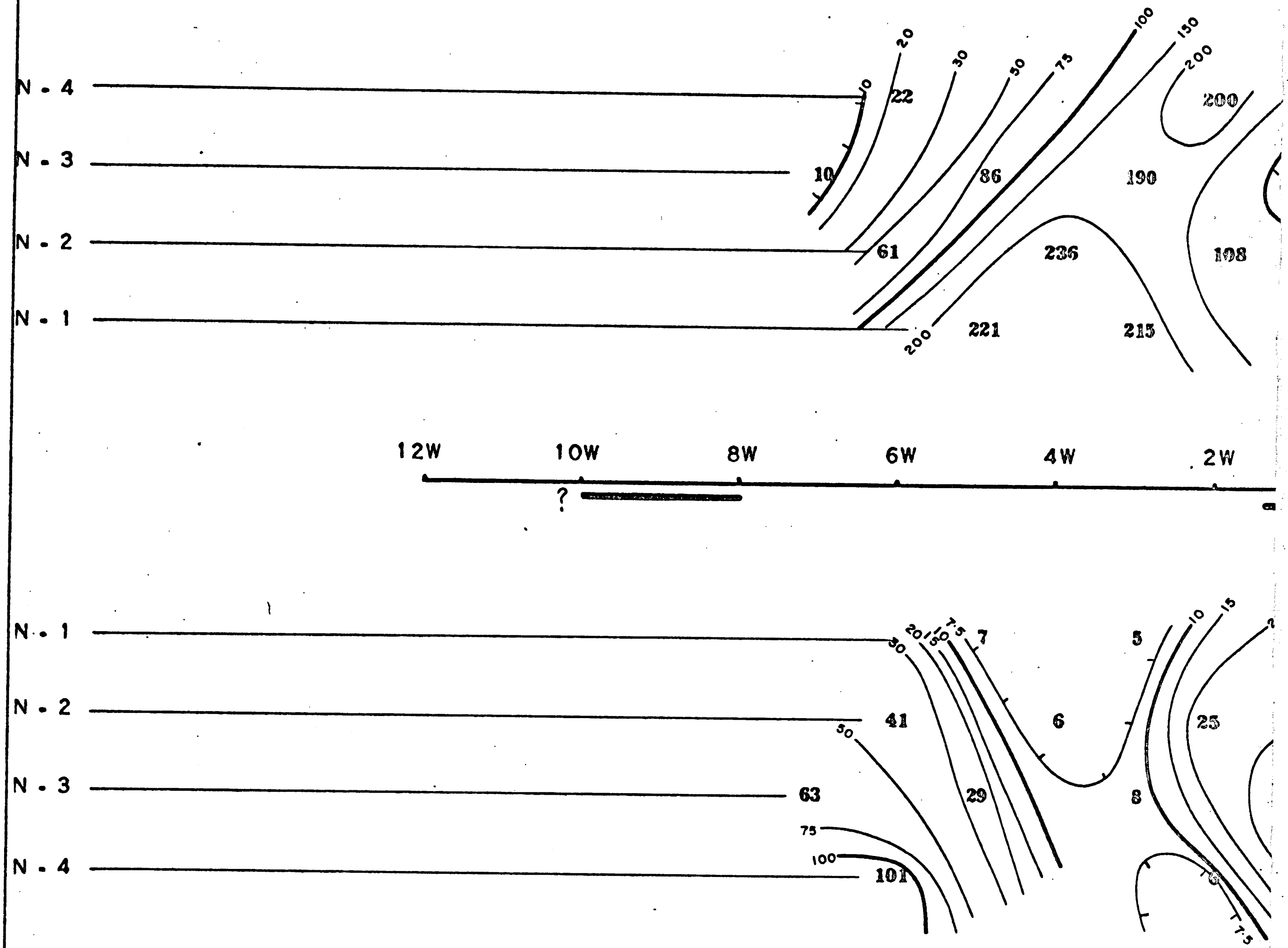
McPHAR GEOPHY

INDUCED POLARIZATION AN



ELECTRODE CONFIGURATION

X - 200



(10) DOUBTFUL READING

N SIGNAL/NOISE TOO LOW

ANOMALOUS ZONE

POSSIBLE ANOMALOUS ZONE

NOTE

LOGARITHMIC CONTOUR INTERVAL

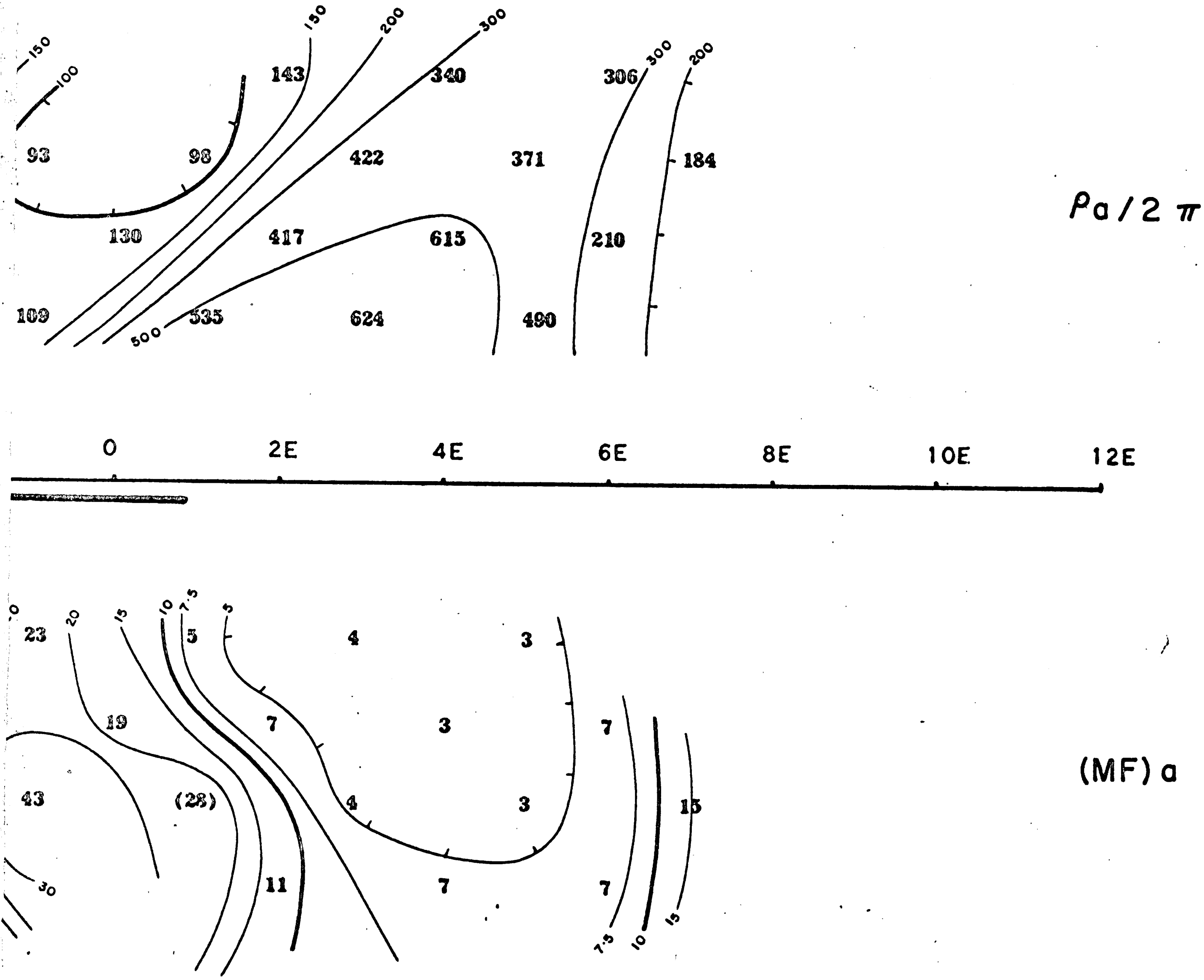
B.S.& K. MINI

PIMA COUNT

Scale-One inch

'SICS LIMITED

D RESISTIVITY SURVEY



LINE NO. "A"

NG COMPANY

Y—ARIZONA.

= 200 Feet

FREQUENCY 25 -2.5 C.P.S.

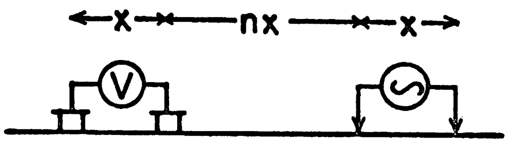
DATE SURVEYED JUNE/60

APPROVED RAB.

DATE Nov 2/60

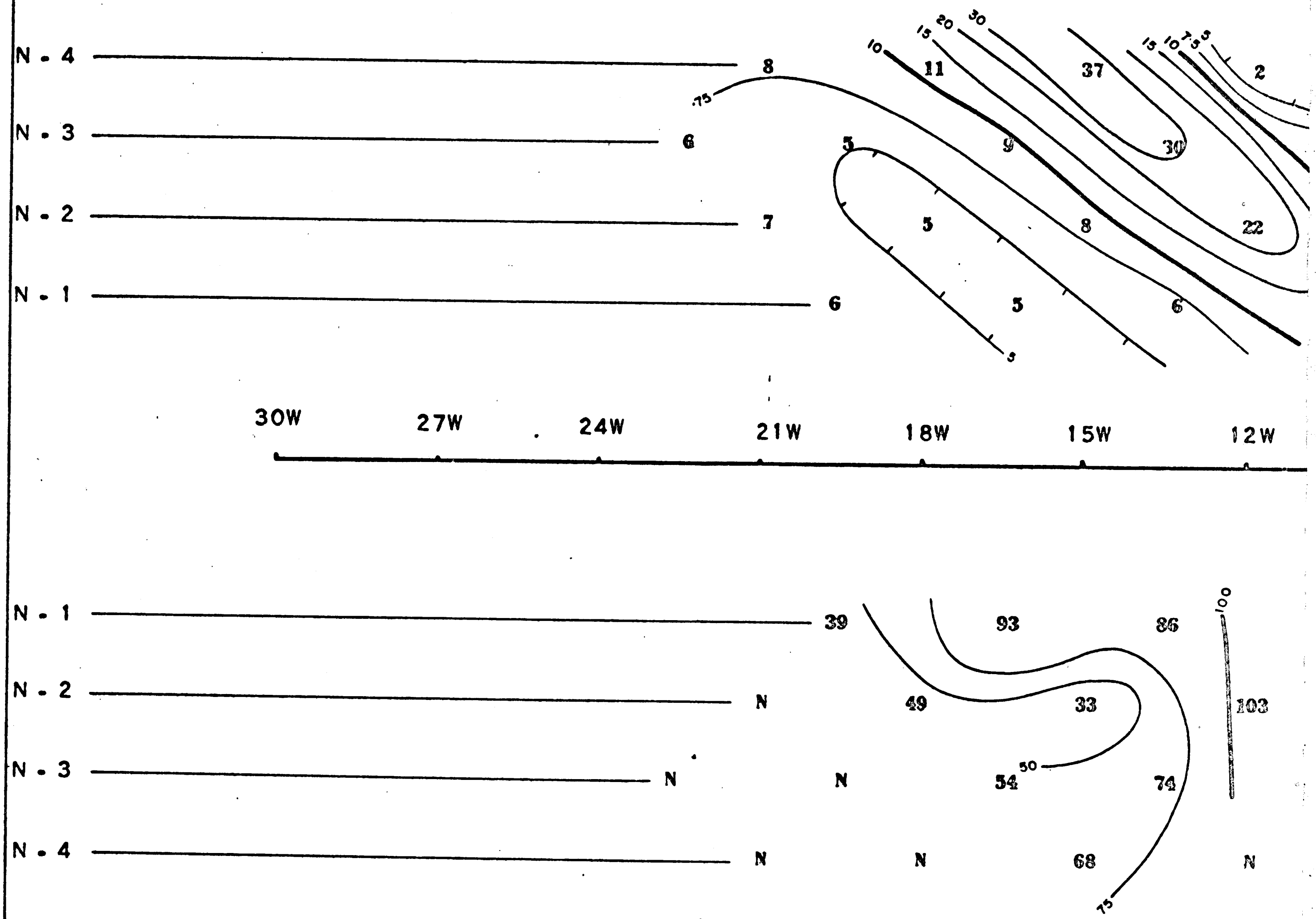
McPHAR GEOPHY

INDUCED POLARIZATION ANI



ELECTRODE CONFIGURATION

X - 300



(10) DOUBTFUL READING

N SIGNAL/NOISE TOO LOW

ANOMALOUS ZONE

POSSIBLE ANOMALOUS ZONE

NOTE

LOGARITHMIC CONTOUR INTERVAL

B.S.& K. MINII

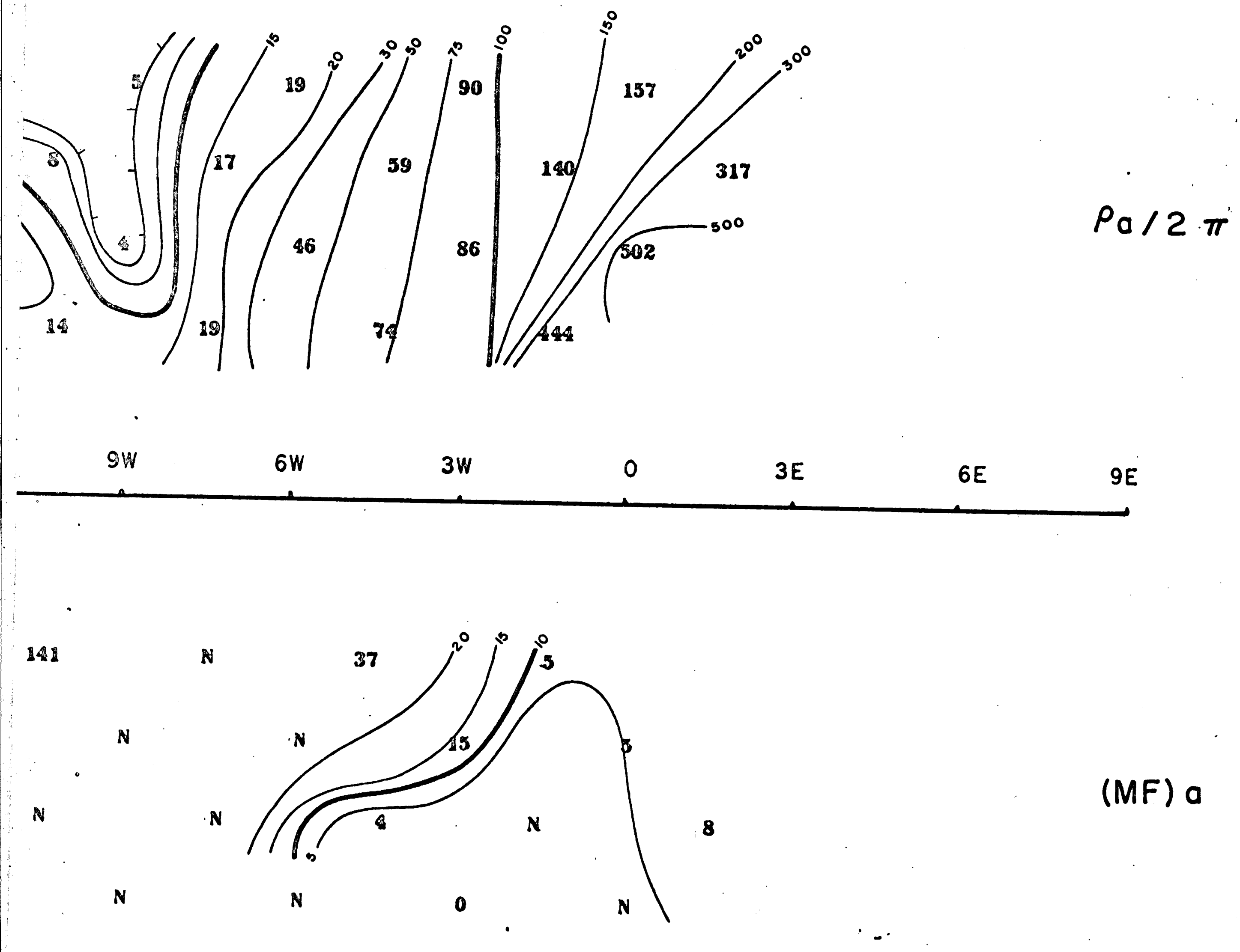
PIMA COUNTY

Scale– One inch

DWG. NO.-I.P.-2771-4

'SICS LIMITED

D RESISTIVITY SURVEY



LINE NO. 2N

FREQUENCY·25 -2.5 C.P.S.

NG COMPANY

Y—ARIZONA.

= 300 Feet

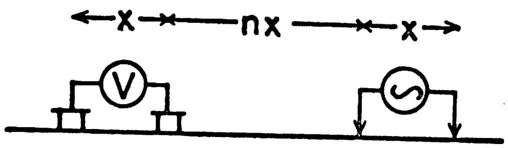
DATE SURVEYED JUNE/60

APPROVED R.A.B.

DATE Nov. 2/60.

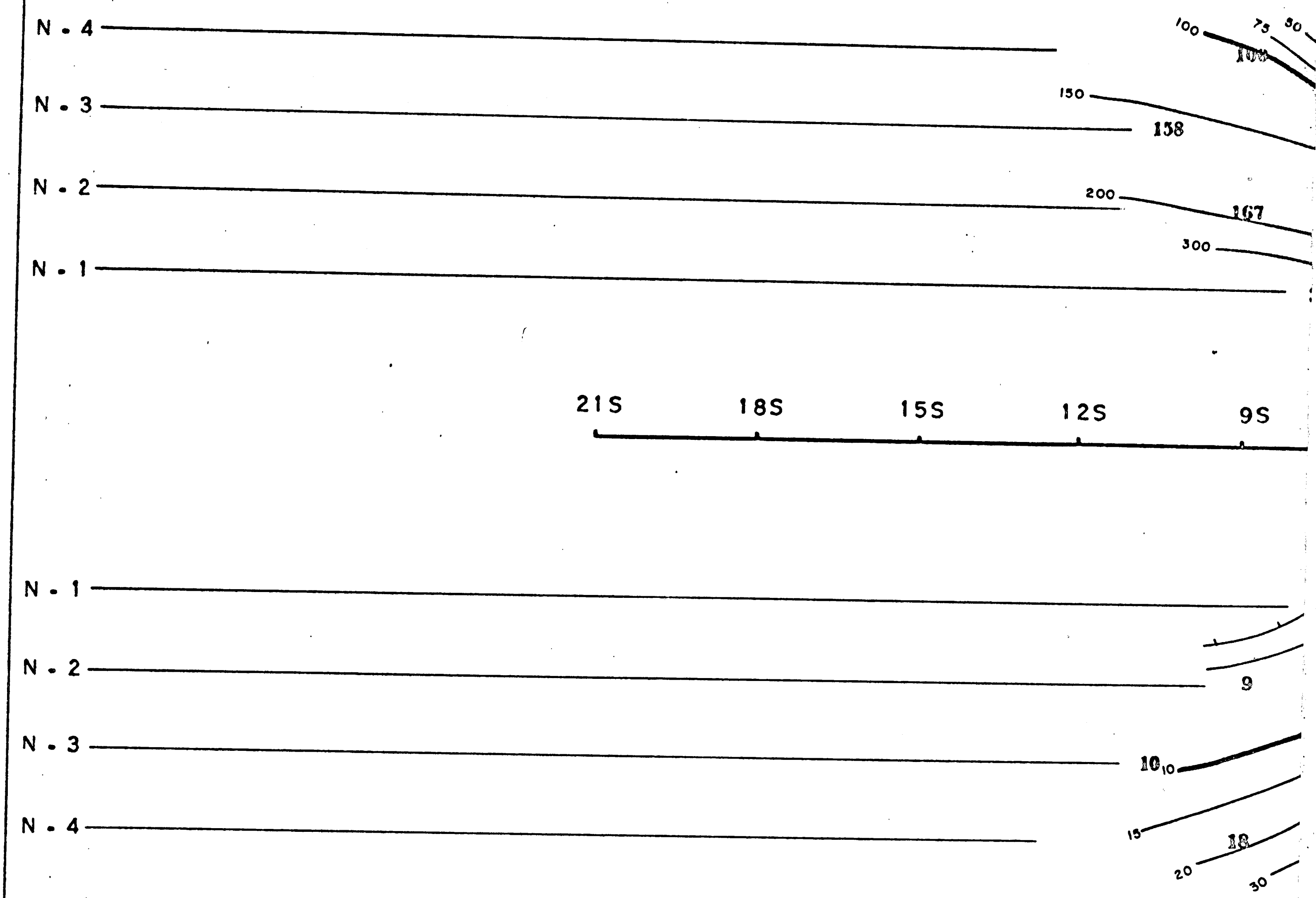
McPHAR GEOPHY

INDUCED POLARIZATION AN



ELECTRODE CONFIGURATION

X = 300



(10) DOUBTFUL READING

N SIGNAL/NOISE TOO LOW

ANOMALOUS ZONE

POSSIBLE ANOMALOUS ZONE

NOTE
LOGARITHMIC CONTOUR INTERVAL

B.S.& K. MININ

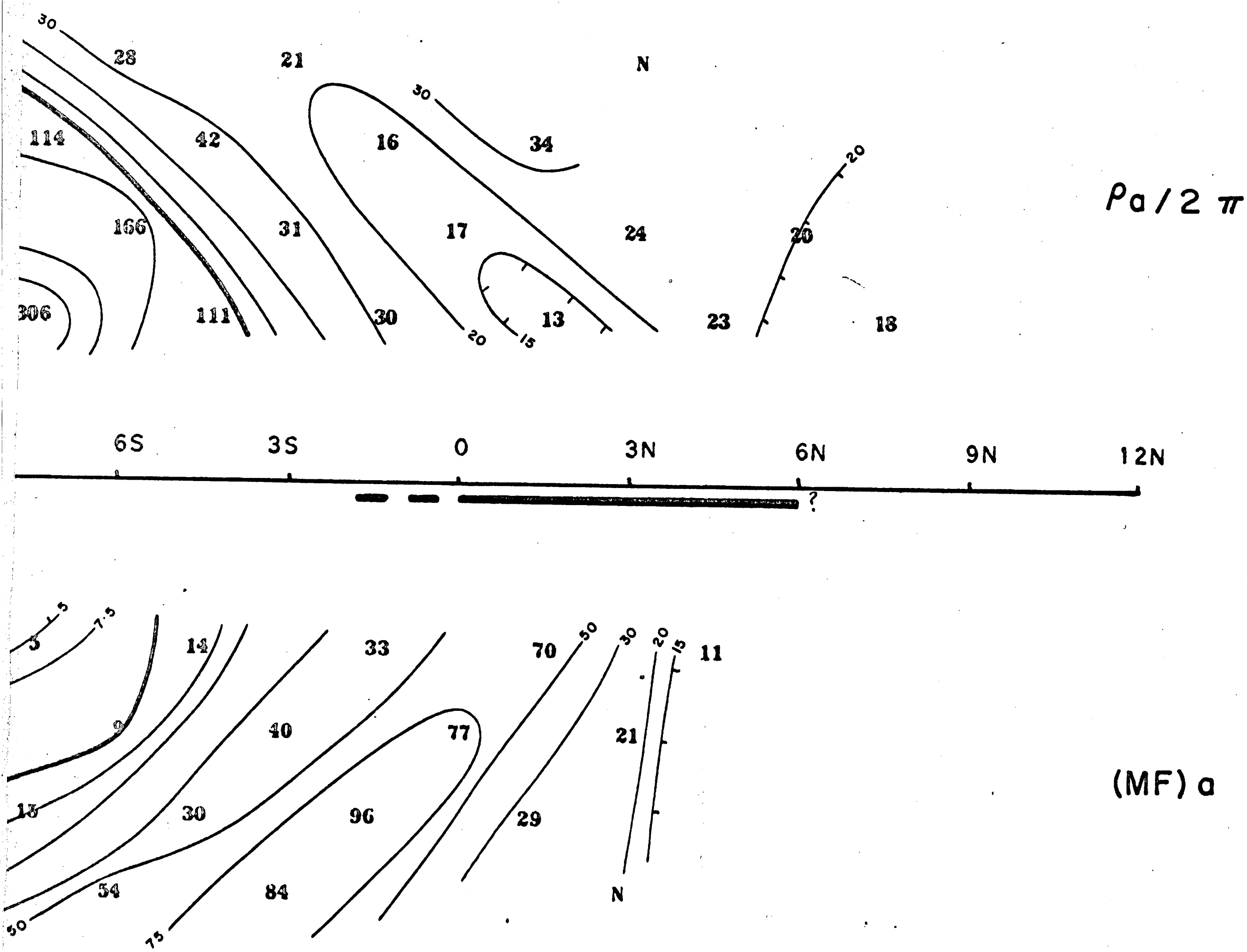
PIMA COUNTY

Scale– One inch

'SICS LIMITED

) RESISTIVITY SURVEY

LINE NO.10W



FREQUENCY·25 –2.5 C.P.S.

DATE SURVEYED JUNE/60

APPROVED R.B.B.

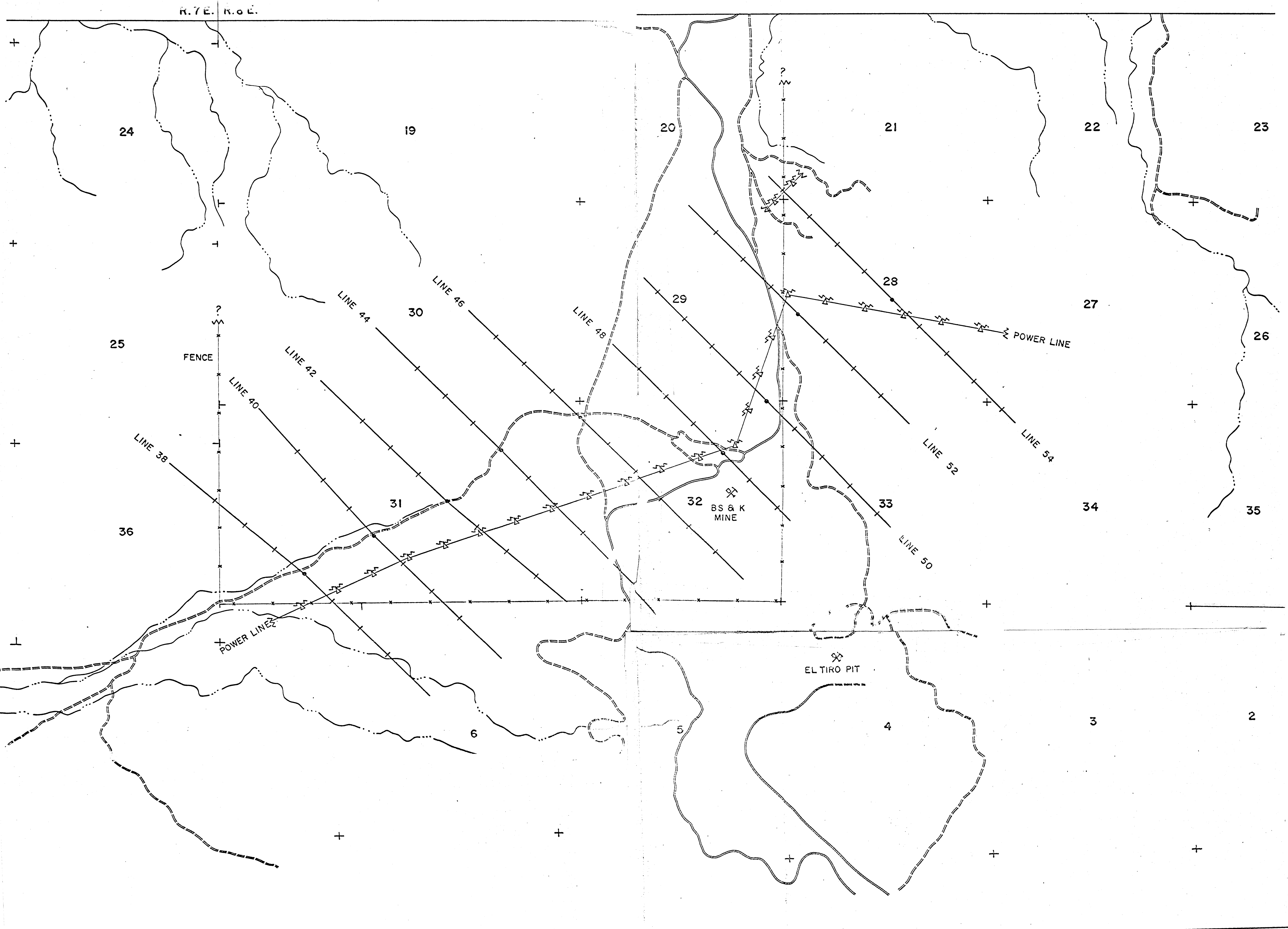
DATE Nov. 2/60.

NG COMPANY

' –ARIZONA.

= 300 Feet

R.7E. R.8E.
24
19
20
21
22
25
30
29
28
27
36
31
32
33
34
6
5
LINE 38
LINE 40
LINE 42
LINE 44
LINE 46
LINE 48
LINE 50
LINE 52
LINE 54
FENCE
POWER LINE
POWER LINE
B S & K MINE
EL TIRO PIT
T 11 S
T 12 S
IP and RESISTIVITY SURVEY
RESISTIVITY CONTOUR PLAN
B S & K PROJECT
SILVER BELL DISTRICT – PIMA COUNTY, ARIZONA
for
THE HANNA MINING COMPANY
by



INCH= 2000 FEET

2000 4000

I.P. and RESISTIVITY SURVEY

PLAN MAP

B S AND K PROJECT

SILVER BELL DISTRICT - PIMA COUNTY, ARIZONA

for

THE HANNA MINING COMPANY

by

CANADIAN AERO

Mineral Surveys LTD.

OTTAWA, ONT., CANADA

TUCSON, ARIZONA, U.S.A.

Samples collected from BS&K
Hole 302

95-100	0.71 %	80 ppm
100-105	0.70 %	83
105-110	0.76	65
110-115	0.95	169
115-120	0.67	70
120-125	0.40	41
125-130	0.50	105
130-135	0.28	149

Hole 300

				Cu	Mo
1 AK-300	0.38	117	170'-175'	0.30	.01
2 AK-300	0.78	0.035 %	175-182	0.62	.01

BS&K	Hole 302		OUT Samples	BSK
Samples (.016)	95	100	.71	.66
(.005)	100	105	.70	.61
(.013)	105	110	.76	.44
(.006)	110	115	.95	.57
(.004)	115	120	.67	.54
(.005)	120	125	.40	.32
(.009)	125	130	.50	.13
(.009)	130	135	.28	.40
↑ BS&K Mo				↑ BS&K Cu

ASSAY— GEOLOGY COMPOSITE LOG

Sheet of

BEARING	Coörd. : N	HOLE Nº 300
INCL.	E	COLLAR ELEV.
		DEPTH

DESCRIPTION

0-92 (could not find boxes 1 thru 7)
Pink [illegible] - greenish [illegible] w/ thin abund [illegible] filled w/ brn [illegible] (from sulf). [illegible] to strong [illegible]. [illegible] feldsp [illegible] [illegible] to epidote. Thin [illegible] units are [illegible]. [illegible] bottom some pale green stains poss from [illegible].
The core is broken in [illegible] (good core [illegible])

[illegible] 98-120 is missing)
[illegible] Alt) [illegible] w/ diss [illegible] ([illegible]?) but also [illegible] fracs (~2% [illegible]?) core [illegible] fractured w/ poss. [illegible] recov.
[illegible] full of mud [illegible] the [illegible]
[illegible] veils (2 mm [illegible]) [illegible] present but very [illegible]
[illegible] poss fault zone
[illegible] [illegible] alteration "
[illegible] w/ [illegible]. Some [illegible] veins + [illegible]
[illegible] estimated visual [illegible] will be about 0.5 %

[illegible] 180-193 [illegible]

% Cu	% As Cu	% Mo	% As Mo	% EQIV
B.S.&K.	HMC		BSK	
Cu 0.30	0.38	Mo 0.011	0.011	
0.6?	0.78	0.017	0.035	

GROUPING — RMKS.

ASSAY—GEOLOGY COMPOSITE LOG

Sheet of

BEARING	Coörd. : N	HOLE Nº BS&K 301
INCL.	E	COLLAR ELEV.
		DEPTH

DESCRIPTION	Geol	Asy	INT.	CR	% Cu	% As Cu	% Mo	% As Mo	% EQIV			GROUPING — RMKS.
0 – 107.1 Strongly argil dacite qtz por. Brown limonitic (heavy) along fracs (fr. m. sulf). Occas lite green stain along fracs, poss leached Cu ox (high py : chalcopy ratio). 45.5 – 43.4 : strongly broken core All core is strongly frac'ed. Low core recov. 107.1 – 206' Gray dacite por. Mod arg, weak serc & chlorite Calcocite along fracs, w/ fine py some chalcopy. Calcocite also in spots finely diss. Core strongly broken to angular chips (poor core recovery ?) 166 : chalcoci along fracs shows slickenside The porphy has pink cxs, poss. ortho. At depth most calcocite is along v thin irreg fracs. and not diss. Rx looks fresher at bottom.												

ASSAY— GEOLOGY COMPOSITE LOG

Sheet of

HOLE # 212

BEARING	Coörd. : N	HOLE Nº
INCL.	E	COLLAR ELEV.
		DEPTH

DESCRIPTION	Geol	Asy	INT.	CR	% Cu	% As Cu	% Mo	% As Mo	% EQIV			GROUPING — RMKS.
245-255 DACITE P. SUL. ESTI. <1% - NO VIS. Cu. - CHLORITE (SOME) 540-550 DACITE P. - SUL ESTI. <1% - SPARSE CPY ON VEINS - SOME CHLORITE 860-870' - SILICIFIED LS. (RED) - NO SUL. - SOME GNI GARNET 1030-1040 DACITE P. - <0.05% SUL. - SOME CHLORITE - SPARSE CPY IN QTZ V. <0.1% Cu. 1185-1195 - GRANODIORITE - SUL. <0.5% - Cu <0.1% - SERP, CHL, GYP. 1365-1375 - RECRYSTALLIZED LS. - SOME CHLORITE - SPARSE SUL. - GYP. & ANHYDRITE												

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT B. S. & K.

Coörd. : N	BEARING	HOLE Nº RDH 309
E	INCL. Vertical	COLLAR ELEV.
START 22 Mar.66 COMPL. 22 Mar 66'		DEPTH 110'

DESCRIPTION	Geol.	Assay	INT.	C/R	% Cu	% Mo	%	%	oz.	oz.	% EQUIV.	GROUPING—RMKS.
SILVERBELL DACITE - argillically altered and siliceous, medium hardness but very abrasive, qtz. sulphide strgrs. w/ very weakly developed sericite near strgrs., thin capping: lim. after py. w/ secondary hm. derived from py.			10		N.S.							
			20		.07	Nil						
			30		.08	Tr.						
			40		.08	Tr.						
			50		.07	.001						
Sulphide zone @52'			60		.44	Tr.						
			70		.40	Nil						
			80		.44	.001						
			92		.38	.001						
			100		.29	.001						
			110		.22	Nil						

LOGGED BY BLW DATE 22 Mar. 66'

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT B. S. & K.

Coörd. : N	BEARING	HOLE Nº RDH 310
E	INCL. Vertical	COLLAR ELEV.
START 22 Mar. 66 COMPL. 22 Mar. 66'		DEPTH 140'

DESCRIPTION	Geol.	Assay	INT.	C/R	% Cu	% Mo	%	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
QUARTZ MONZONITE PORPHYRY												
Argillically altered, "average" hardness.												
Sulphide zone @55'			55		N.S.							
			60		.82	.004						
Some dampness 60 - 70'			70		.82	.009						
			80		.65	.037						
Moisture increase @ 89'			90		.30	.010						
Increase qtz. @ 90½'			100		.26	.009						
			110		.29	.010						
			120		.32	.023						
			130		.26	.011						
			140		.23	.006						

LOGGED BY BLW DATE 22 Mar. 66'

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 2

PROJECT Atlas Mine, Drill Hole for Nevada/Claim

Coörd. : N	BEARING Vert	HOLE Nº 305
E	INCL. Vert	COLLAR ELEV.
START 8-19-65 COMPL. 8-20-65		DEPTH 109

DESCRIPTION

0-15 Dacite Porphyry.
Brown. Oxide zone, soft, Porphyritic, fine grained. Original sulfide content was 4%. Strong Arg. Alt.; tr ser.

15-25 Quartz Monzonite
Brown, oxide zone, soft Holocrystalline, Est. 2% Original sulfide. Wk Arg. Alteration.

25-60 Quartz Monzonite
Gray. Supergene zone Holocrystalline. Est 2% Sulfide. Chalcocite occurs on fractrues. Weak Arg. Alt. No sericite.

60-109 Quartz Monzonite
Gray as above. Hypogene zone. Est 2% sulfide, in fractures. Trace of chalcopyrite.

Geol.	Assay	INT.	C/R	% Cu	% Mo	%	%	oz	oz	% EQUIV.
		0–10	40	.02	.021					
		10–20	70	.02	.017					
		20–25	80	.04	.009					
		25–30	90	.09	.001					
		30–40	78	.28	.001					
		40–50	88	.29	.009					
		50–60	90	.16	.008					
		60–70	90	.13	.015					
		70–80	98	.11	.003					
		80–90	90	.12	.003					
		90–100	90	.07	.007					
		100–109	95	.001						

GROUPING—RMKS.

Average from 30 to 50 is .28% Cu, .005 Mo.

LOGGED BY VFH DATE 8-20-65

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet ___ of ___

PROJECT Atlas Mine, BS&K Mining Co., Hole for BS&K No. 1

Coörd. : N	BEARING Vertical	HOLE Nº 306
E	INCL. Vertical	COLLAR ELEV.
START 8-21-65 COMPL. 8-22-65		DEPTH 100

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu	% Mo	%	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
0-30 Dacite Porphyry Brown, fine grained, soft. Original sulfide now entirely oxidized. Original sulfide was 3% of rock. It occurred entirely in fractures. Arg AH., No Sericite		0–10	30	.04	.007						
		10–20	45	.05	.004						Average from 0'-30' .06 Cu, .027 Mo
		20–30	55	.10	.070						
30-50 Dacite Porphyry Mixed Oxide and sulfide zone Fe Ox and Pyrite, with traces of chalcocite. Rock as above.		30–40	75	.20	.030						Average from 30' to 70' is .29% Cu, .015 Mo.
		40–50	90	.34	.009						
		50–60	90	.38	.009						
50-60 Dacite Porphyry Supergene zone Chalcoite coatings on pyrite. Rock as above.		60–70	85	.23	.011						
		70–80	90	.21	.016						
60-100 Dacite Porphyry Hypogene zone. No chalcocite. Rock as above.		80–90	90	.16	.002						
		90–100	85	.10	.006						

LOGGED BY VFH DATE 8-23-65

ASSAY—GEOLOGY COMPOSITE DRILL LOG

FORM # 355
REVISED 10-62

Sheet 1 of 2

PROJECT Atlas Mine, BS&K Mining Co., BS&K

Coörd. : N	BEARING Vert	HOLE Nº	302
E	INCL. Vert	COLLAR ELEV.	
START 8-11-65 COMPL. 8-12-65		DEPTH	151

DESCRIPTION

0-68 Dacite Porphyry
Oxide zone, Brown, fine grained, porphyritic, strong Argillic Alt. with trace Sericite. Core badly fractured, Original Sulfide content was est. 5%. Some Malachite visible 20' to 68'

68-70 fault zone. Core crushed

70-90 Quartz Monzonite Porphyry
Brown, Oxide zone, Granitic, holocrystalline texture. Weak Argillic Alteration, with No sericite. Fracturing very strong at 70' gradually weakens down the hole. Mineralization fades with fracturing.

90-95 [illegible]nzonite Por.
Mixed Oxide and Sulfide, Copper occurs as chalcocite, with limonite.

95-135 Quartz Monzonite Por.
Supergene zone fracturing weakens with depth. Some Moly visible in rare quartz veinlets.

Geol.	Assay	INT.	C/R	% Cu	% Mo	%	%	oz.	oz.	% EQUIV.	GROUPING—RMKS.
		0-10	45	.07	.009						
		10-20	50	.06 5	.012						
		20-30	62	.09	.006						
		30-40	70	.07 5	.004						
		40-50	70	.07	.009						
		50-60	65	.10 5	.009						
		60-70	50	.19	.007						
		70-80	55	.11 5	.012						
		80-90	60	.20	.010						
		90-95	70	.66	.010						
		95-100	85	.66	.016						
		100-105	85	.61	.005						
		105-110	90	.44	.013						
		110-115	95	57	.006						
		115-120	97	54	.004						
		120-125	90	.32	.005						

LOGGED BY VFH DATE 8-12-65

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT Atlas

Coörd. : N	BEARING Vert	HOLE Nº 302
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH 151

DESCRIPTION	Geol.	Assay INT.	C/R	% Cu	% Mo	%	%	oz.	oz.	% EQUIV.	GROUPING—RMKS.
135-151 Quartz Monzonite Hypogene zone, Holoxline, Weak argillic Alt. Pyrite and trace chalcopyrite sparingly occur in rare fractures. Estimated total sulfide is 2%, occuring entirely as fracture filling.		125 130	90	.43	.009						
		130 135	92	.40	.009						
		135 140	95	.21	.005						
		140 145	90	.20	.004						
		145 151	95	.21	.003						
			END OF HOLE								

LOGGED BY DATE

BSEK 300

ASSAY—GEOLOGY COMPOSITE LOG

Sheet of 1-1

BEARING	Coörd. : N	HOLE Nº 300-R
INCL. VERT.	E	COLLAR ELEV.
BSEK #3		DEPTH 400'

DESCRIPTION

182'-323':
Rock: Dacite porphyry made of rounded quartz eyes and pinkish feldspars in gray siliceous matrix.
Rx Alt.: Thin flat qtz veining w/ rims of secondary orthoclase. Moderate argillization along steep joints
Chalcopyrite & moly, in grains along qtz veins. Minor diss. sulfides

323-340: strongly altered monzonite(?). Abund chlorite after biotite. Some fine diss. sulfides. Very poor core recov.

340-400: Dacite porphyry as 182-323', but chlorite is present
At 348' about 1" Chalcopyrite vein

Geol	Asy	INT.	C/R	% Cu	% As Cu	% Mo	% As Mo	% EQIV	SAMPLE CMC	REC'Y %	GROUPING—RMKS.
		182-190		+1000	.14	+300	.045		1	69.6	
		190-200		+1000	-.15$^{7}_{3}$	165	.016		2	82.8	
		200-210		1000	.10	114	.011		3	91.6	
		210-220		+1000	-.11$^{7}_{3}$	238	.024		4	80.4	
		220-230		+1000	.14	245	.024		5	79.2	
		230-240		+1000	-.12$^{7}_{3}$	171	.017		6	42.3	
		240-250		+1000	.34	+300	.042		7	46.1	
		250-260		+1000	-.20$^{7}_{3}$	193	.019		8	23.1	
		260-270		+1000	.14	205	.020		9	14.1	
		270-280		+1000	-.16$^{7}_{3}$	101	.010		10	21.2	
		280-290		+1000	.17	214	.021		11	25.6	
		290-300		+1000	-.24$^{7}_{3}$	174	.017		12	54.1	
		300-310		+1000	.31	139	.014		13	21.6	
		310-320		+1000	-.16$^{7}_{3}$	+300	.034		14	50.0	
		320-330		+1000	.20	277	.028		15	18.4	
		330-340		+1000	-.28$^{7}_{3}$	41	.004		16	44.5	
		340-350		+1000	.91	+300	.032		17	71.3	
		350-360		+1000	-.37$^{7}_{3}$	+300	.044		18	61.3	
		360-370		+1000	.21	282	.028		19	92.1	
		370-380		+1000	-.18$^{7}_{3}$	272	.027		20	94.0	
		380-390		+1000	.15	178	.018		21	80.5	
		390-400		+1000	.20$^{7}_{3}$	256	.026		22	95.2	
					.227		.024			56.8	AVERAGE REC'Y
					.318						Equiv. Cu-MO

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT

Coörd. : N	BEARING	HOLE No. [illegible]
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION

125-170 Dacite Porphyry

Hypogene zone, Gray, Soft, porphyritic. Copper occurs in seams and veinlets as crushed chalcopyrite, with pyrite. Numerous qtz veinlets. Much pyrite in seams is crushed and black. Total sulfide is 4%. Sulfide is 90% in seams, 10% in diss. Wk Ser. on seams.

170-182 Dacite Porphyrite, Gray

Hypogene Zone Soft, [illegible] porphyritic. Copper occurs [illegible] chalcopyrite with pyrite Total sulfide is 3%. [illegible] 80% in seams and [illegible] and 20% as diss. [illegible] veinlets. Pyrite is [illegible] crushed [illegible] on seams, with Molybdenite visible in quartz veinlets. Largest veinlet is 2" qtz-pyrite-chalcopyrite at 177'. This veinlet also has traces of chalcocite.

Geol.	Assay INT.	C/R	% Cu	% Mo	%	%	oz.	oz.	% EQUTV.
	125 [illegible]	82	.18	.010					
	130 [illegible]	88	.14	.028					
	[illegible]	80	.12 (2/3)	.011					
	[illegible]	76	.11	.01[illegible]					
	[illegible]	70	.11	.010					
	150 [illegible]	75	.12	.015					
	155 [illegible]	80	.16 (2/3)	.016					
	[illegible]	86	.12	.008					
	[illegible]	70	.15	.031					
	170 [illegible]	75	.30	.011					
	175 182	7[illegible]	.162 (2/3)	.017					

GROUPING—RMKS.

Average Hypogene grade is .18 Cu .015 Mo

LOGGED BY [illegible] DATE 8-[illegible]

DUVAL CORPORATION
COPPER DIVISION — ESPERANZA PROPERTY
SAHUARITA, ARIZONA

CERTIFICATE OF ASSAY

August 10, 1965

BS&K

BEAKER NOS.	MARKS, ETC.	SAMPLE GMS.	% Total Cu	% Mo
	Hole-300-10		.08	.002
	20		.08	.002
	30		.09	.002
	40		.14	.001
	50		.14	.008
	60		.16	.004
	70		.15	.009
	80		.16	.006
	90		.17	.009
	95		.94	.025
	100		.79	.015
	105		.51	.010
	110		.60	.009
	115		.24	.008
	120		.12	.011
	125		.11	.013
	130		.18	.010
	135		.14	.028
	140		.12	.011
	145		.11	.011
	150		.11	.010
	155		.12	.015
	160		.16	.016
	165		.12	.008
	170		.15	.031
	175		.30	.011
	182		.62	.017

FORM 311 M.L.

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 3

PROJECT Atlas Mine, BS&K Mining Co., BS&K No 3 Claim

Coörd. : N	BEARING Vert	HOLE No 300
E	INCL. Vert	COLLAR ELEV.
START 8-6-65 COMPL. 8-8-65	NC core size	DEPTH 182 feet

DESCRIPTION	Geol.	Assay	INT.	C/R	% Cu	% Mo	%	%	oz.	oz.	% EQUIV.	GROUPING—RMKS.
0-90 Dacite Porphyry, Brown fine grained, soft, porphyritic, highly fractured, numerous qtz veinlets, Arg. Alteration, Original Sulfide was ± 3%, entirely in fractures. Core very badly broken, No green or blue copper minerals visible, though entire section is oxide.			0-10	56	.08	.002						
			10-20	70	.08	.002						
			20-30	68	.09	.002						
			30-40	76	.14	.001						average oxide is .13 Cu .005 Mo for 90 feet
			40-50	86	.14	.005						
			50-60	90	.16	.00[illegible]						
			60-70	86	.15	.009						
			70-80	85	.16	.006						
			80-90	87	.17	.009						oxide
90-95 Dacite Porphyry, Gray Mixed oxide and sulfide. Soft, porphyritic, strong arg. Alt., numerous qtz veinlets. Copper occurs as oxide and chalcocite.			90-95	90	.94	.025						Mixed
			95-100	86	.79	.015						Supergene Sulfide
			100-105	88	.51	.010						Average grade of Mixed and supergene is 35 feet
			105-110	80	.60	.009						
[illegible] 125 [illegible]ite Porphyry Supergene zone. Gray, soft Copper occurs as chalcocite. [illegible] Sulfide is ± 3%			110-115	87	.24	.00[illegible]						.47 Cu .013 Mo
			115-120	80	.12	.011						
			120-125	88	.11	.013						

LOGGED BY V. F. H DATE 8-8-65

Coörd. : N	BEARING Vert	HOLE Nº 301	
E	INCL. Vert	COLLAR ELEV.	
START 8-9-65	COMPL. 8-10-65		DEPTH 206

DESCRIPTION

0-100 Dacite Porphyry - Brown - oxide zone
Soft, strong Argillic Alt., Porphyritic, fine grained. Original Sulfide was ± 4%, 90% in fractures, 10% diss. Trace sericite lining fractures. Qtz veinlets rare. Some green Cu stain visible.

100-110 Dacite Porphyry Mixed Oxide and Sulfide
Brown, Soft, fine grained, Porphyritic, Wk sericite and strong Arg. Alt. Copper occurs as Malachite and chalcocite, Core badly shattered.

110-125 Dacite Porphyry Supergene Sulfide zone
Dark gray, soft, weak Sericite and strong Arg. Alt. Copper occurs as chalcocite with weak pyrite, mostly in seams. Core badly broken.

Geol.	Assay	INT.	C/R	% Cu	% Mo	%	%	oz.	oz.	% EQUTV.	GROUPING — RMKS.
		0-10	20	.12	.006						0'-30' .16 Cu .09 Mo
		10-20	50	.20	.012						
		20-30	67	.17	.010						
		30-40	80	.18	.009						30'-50' .17 Cu .011 Mo
		40-50	85	.16	.014						
		50-60	80	.11	.016						50-80 .12 Cu .016 Mo
		60-70	86	.12	.016						
		70-80	90	.13	.017						
		80-90	87	.24	.010						80'-100' .17 Cu .009 Mo
		90-100	90	.10	.009						
		100-105	90	.15	.013						100'-125' .83 Cu .018 Mo
		105-110	85	1.31	.040						
		110-115	86	1.74	.019						
		115-120	82	.49	.008						
		120-125	87	.45	.013						

LOGGED BY [illegible] DATE 8-10-65

FORM # 355
REVISED 10-62

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT Atlas Mine

Coörd. : N	BEARING	HOLE Nº 300
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH 206

DESCRIPTION	Geol.	Assay	INT.	C/R	% Cu	% Mo	%	%	oz.	oz.	% EQUIV.	GROUPING — RMKS.
125-206 Dacite Porphyry Supergene zone as above			125 130	80	1.21	.006						125'-150' .74 .009 Mo
			130 135	90	.70	.008						
			135 140	85	.65	.009						
			140 145	70	.39	.015						
			145 150	65	.76	.009						
			150 155	56	.47	.013						150'-175' .49 Cu .027 Mo
			155 160	72	.38	.043						
			160 165	80	.36	.024						
			165 170	85	.51	.040						
			170 175	86	.72	.014						
			175 180	85	.50	.010						175'-200' .69 Cu .018 Mo
			180 185	85	.57	.052						
			185 190	80	.88	.011						
			190 195	90	1.12	.013						
			195 200	92	.40	.004						
			200 206	85	.19	.006						

End of hole

Average Mo for Hole is 0.0158 Mo.
Average from 105 to 200' is .72% Cu
.018 Mo

DATE 8-10-65

DUVAL CORPORATION
COPPER DIVISION — ESPERANZA PROPERTY
SAHUARITA, ARIZONA

CERTIFICATE OF ASSAY

August 13, 1965

BS&K Drills

BEAKER NOS.	MARKS, ETC.	SAMPLE GMS.	% Total Cu	% Mo				
	# 301-0-10'		.12	.006				
	20'		.20	.012				
	30'		.17	.010				
	40'		.18	.009				
	50'		.16	.014				
	60'		.11	.016				
	70'		.12	.016				
	80'		.13	.017				
	90'		.24	.010				
	100'		.10	.009				
	105'		.15	.013				
	110'		1.31	.040				
	115'		1.74	.019				
	120'		.49	.008				
	125'		.45	.013				
	130'		1.21	.006				
	135'		.70	.008		.72	% Cu,	
	140'		.65	.009		.018	Mo	
	145'		.39	.015				
	150'		.76	.009				
	155'		.47	.013				
	160'		.38	.043				
	165'		.36	.024				
	170'		.51	.040				
	175'		.72	.014				
	180'		.50	.010				
	185'		.57	.052				
	190'		.88	.011				
	195'		1.12	.013				
	200'		.40	.004				
	206'		.19	.006				

FORM 311 M.L.

AEB

CBH copy

HAL Miller of General Electric

W. J. RICHMOND
AMIL J. AJAMIE
RICHARD E. FAY
ALAN L. HAMMOND

LAW OFFICES
RICHMOND, AJAMIE & FAY
SUITE 705 UNITED BANK BUILDING
3550 NORTH CENTRAL AVENUE
PHOENIX, ARIZONA 85012

264-2786

proved reserves 78,000,000 - 40,000,000 .48% Cu Abes ground as of 5-12-71

February 5, 1970

Mr. Jerome M. Willis
Director of Natural Resources Division
Essex International, Inc.
5315 E. Broadway - 104
Tucson, Arizona 85711

Re: B. S. & K. Mining Company

C O P Y

Dear Mr. Willis:

I have been commissioned by Mr. Abe M. Kalaf, President of B. S. & K., to articulate his thinking.

First, it must be made clear that he does not intend for this letter to be considered an agreement; nor should anyone rely upon it, except to the extent that it is merely indicative of his present thinking. B. S. & K. Mining Company is not committed to anyone; and, until a formal, written agreement is fully executed, my client is free to negotiate and contract with anyone it chooses.

$100,000 1. B. S. & K. is to be paid an initial payment of $200,000.00 upon signing of a formal agreement; thereafter, it is to be paid $300,000.00 in monthly installments of $8,333.33 for 36 months, or less, as hereinafter appears. REVISED

2. Within said 36 months, a copper processing plant must be placed on the premises and in operation. It must be capable of producing 30,000 pounds of electrolitically refined copper, or its equivalent, per day; and it must be operating on a 300 business day year.

RETAIN 3. If the plant is not in and operating per paragraph 2, the $500,000.00 is forfeited, as

Mr. Jerome M. Willis
Page 2
February 5, 1970

liquidated damages; and the developer forfeits any and all interest in and to the B. S. & K. property.

$250,000

4. Once the plant is in and operating per paragraph 2, the monthly installments of $8,333.33 are to cease; and the unpaid balence of the $300,000.00 is not to be paid. Thereafter, however, the following conditions shall obtain: The developer gets a 51% interest in the B. S. & K. property, B. S. & K. retaining 49%; and all profits from the operation of the property and any other property within one mile of its boundaries, adjusted per paragraph 6, infra, are to be divided between the developer and B. S. & K. in the same ratios.

RETAIN

SUBJECT TO NEGOTIATION

5. The developer must finance the entire operation and any future expansion, and "no lien" notices are to be conspicuously posted per law.

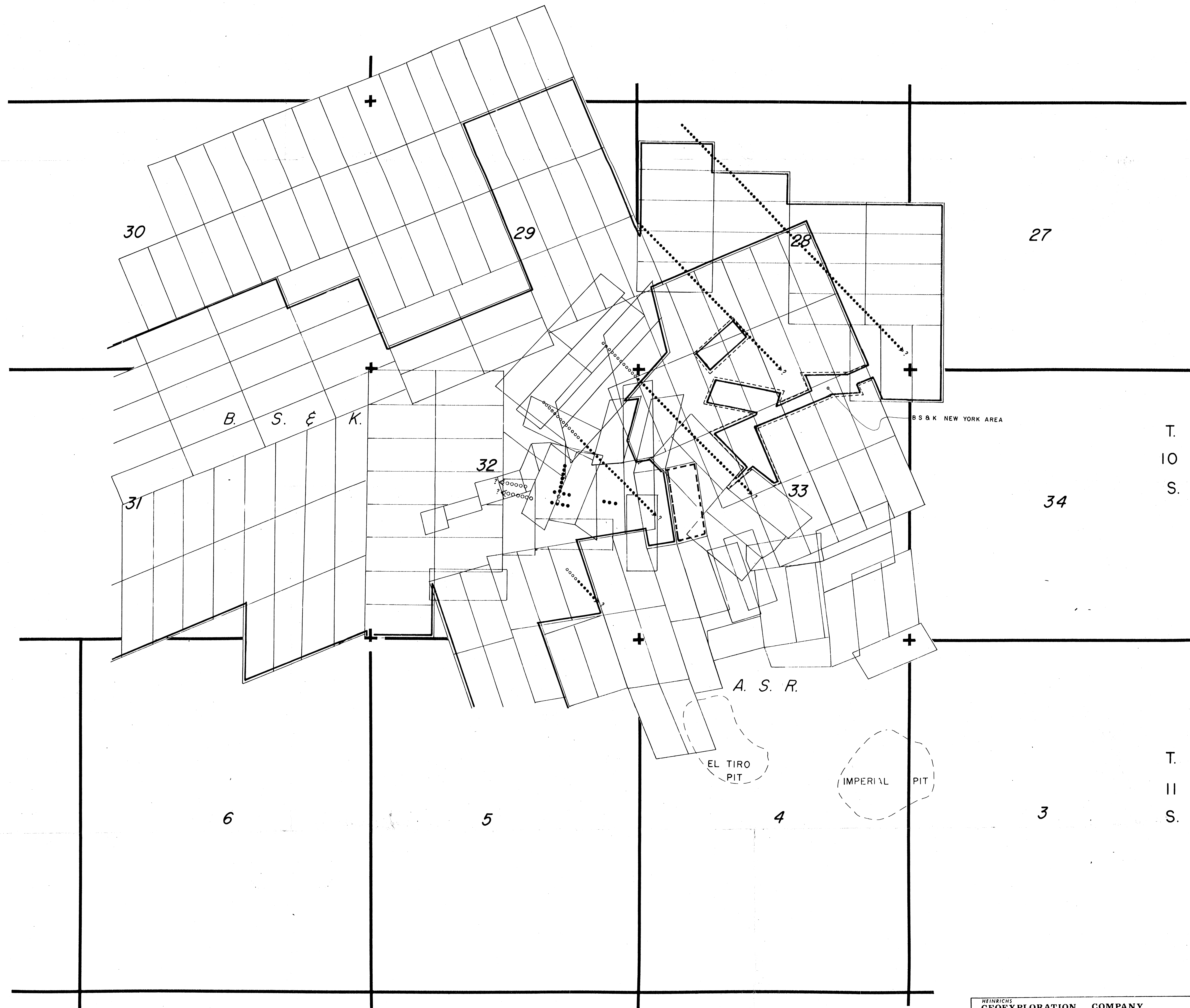
REVISED

6. That portion of the $500,000.00, called for in paragraphs 1 and 2, supra, which has been paid to B. S. & K. and the capital invested in putting in the copper refining plant and in putting it into operation is to be recovered by the developer from profits, amortized on a monthly basis over the estimated life of the operation on a ratio satisfactory to the Internal Revenue Service of the United States of America. B. S. & K. Mining Company shall be entitled to an equity accumulation in said capital investment in direct proportion to its share of the amounts amortized and as those amounts are charged off.

Respectfully,

Amil J. Ajamie

AJA:mh



WEAK STRONG I. P. ANOMALISM (GEOEX, CANADIAN AERO & MCPHAR)

B. S. & K. BOUNDARY

HEINRICHS
GEOEXPLORATION COMPANY
POST OFFICE BOX 5671, TUCSON, ARIZONA 85703
Phone: 602/623-0578 Cable GEOEX, Tucson
vancouver
sydney

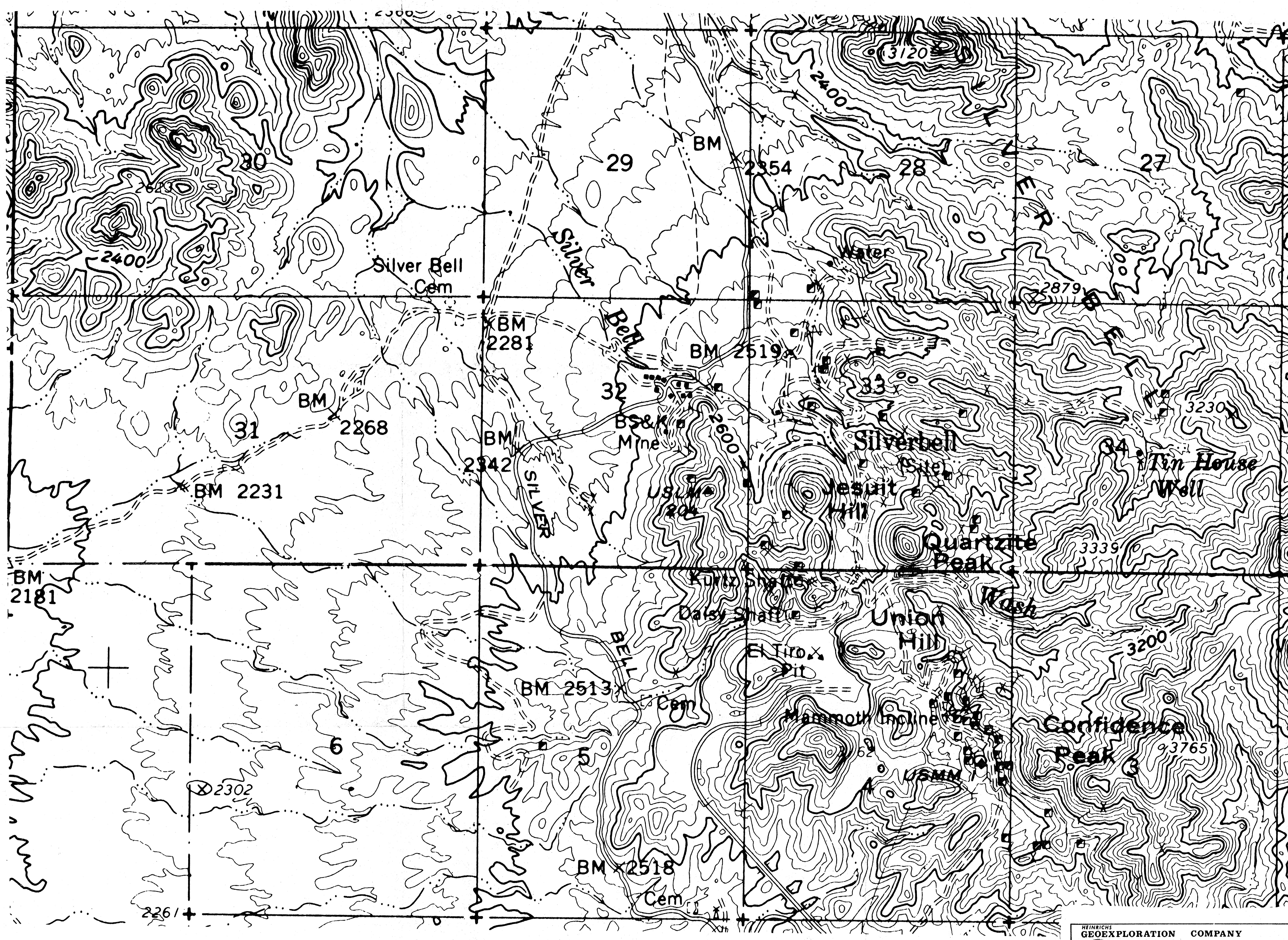
B.S. & K. MINING CO.
ATLAS MINE & VICINITY
PIMA COUNTY, ARIZONA

OWNERSHIP

FOR

ESSEX INTERNATIONAL INC.

SCALE 1" = 1000'	DRAWN BY EGH & JCD	DATE MARCH 1970



HEINRICHS
GEOEXPLORATION COMPANY
POST OFFICE BOX 5671, TUCSON, ARIZONA, 85703
Phone: 602/623-0578 Cable: GEOEX, Tucson
geophysical engineers
vancouver
sydney
511 - 70

TOPOGRAPHIC MAP
B. S. & K. MINING CO. AREA
PIMA COUNTY, ARIZONA

FOR

ESSEX INTERNATIONAL INC.

SCALE: 1" = 1000'	DRAWN BY: EGH-JD	DATE: MAR 1970