CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

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IP Survey
Miami Area
&
IP Survey
Copper Creek Area
Gila & Pinal Counties, Arizona

for

Canus, Ltd. & Beth Properties, Ltd.

September, 1977

by

GEOEX

GEOEX Job# 1199

HEINRICHS GEOEXPLORATION COMPANY

P.O. BOX 5964, TUCSON, ARIZONA 85703, 806 WEST GRANT ROAD, PHONE: (602) 623-0578

November 7, 1977

Mr. Kirby C. Coryell
Canus, Ltd.
5140 East Burns Street
Tucson, AZ 85711

Re: IP Survey
Miami Area
Gila County, Arizona
GEOEX Job #1199

Dear Mr. Coryell:

Attached hereto are three expander plots and a location map for the recently completed IP survey you requested on behalf of Canus, Ltd. in the Miami (Kay Bohme) Area. This work was done during August 1977 and consists of three pole-pole array IP expanders. The purpose of this survey was to locate possible deeply buried extensive disseminated sulfide zones below a thick section of Gila Conglomerate and unmineralized Pinal Schist. Also, the work is to serve as a partial fulfillment of annual Federal mining claim assessment requirements.

The locations of the expanders and the current and voltage "infinites" are shown on the accompanying plan map. The expander results are presented as standard electrical soundings on double logarithmic plot sheets, one for each expander, showing the apparent resistivity and percent frequency effects (PFEs) plotted against the "a" spacing. The "a" spacing is the separation distance between the current and voltage electrodes and varied from 200 to 4000 feet. This would typically be expected to give useful information from about 100 feet to as much as 6000 feet below surface.

The PFE data was obtained using a frequency pair of 1.0 vs 0.1Hz on all three expanders. In addition, Expanders #2 and 3 also utilized a frequency pair of 0.3 vs 0.1Hz and the resulting PFEs in this case have been multiplied by a 2.1 factor to normalize the data to a standard decade frequency spread to allow a direct comparison of data on the two different frequency pairs.

Considerable telluric and sferic electrical noise was present during the course of the field readings and the data is therefore only accurate to

about +/- 0.5 PFE. The resistivity data is accurate as plotted and has been corrected for the actual positions of the "infinites". Resistivities are in units of ohm-meters.

The IP data on Expander #1 shows only typical background response. Expander #2 may be very weakly anomalous at depth but electromagnetic (EM) coupling interference appears to account for much of the response in that the PFEs at 1.0 vs 0.1Hz are appreciably higher than the normalized PFEs at 0.3 vs 0.1Hz. Were all the measured IP response due to sulfide polarization, i.e., no EM coupling present, PFEs on both frequency pairs would be approximately equal. The difference in response seen here indicates that some EM coupling is present, even at the lower pair of frequencies, and if all coupling effects were removed, the lower frequency PFE data would be reduced to perhaps just under 2 PFE. This is considered high background or just borderline anomalous response for the rock types involved.

Expander #3 shows somewhat higher IP response than on Expander #2 and, for the deeper data at least, the difference between PFEs at the two frequency pairs is not large. Therefore, perhaps 2.5 to 3.0 PFE coupling corrected IP response may remain. This is weak, but possibly significant IP anomalism, and is compatible with the expected target of an extended body buried roughly 4000 to 5000 feet deep having an intrinsic IP response of 6 to 10 PFE. Somewhat weaker response from a shallower depth could also explain the observed anomalism but is perhaps less likely considering the geology based on nearby drilling.

A partially grounded metal pipeline is present between Expanders #2 and 3, about 1000 feet distant from both expanders, that could possibly be causing or be contributing to the anomalous IP response. Additional work would be necessary to definitively determine how much, if any, response is due to the pipeline. However, the ground was quite dry during the survey and the expanders were kept at a reasonably large distance from the pipeline so spurious interference is probably not a factor in this case.

Resistivities on all three expanders indicate a three-layer situation: an intermediately high resistivity surface layer situated above a relatively conductive layer that rests upon a fairly high resistivity layer. Expander #2, through curve matching, suggests a possible interpretation of a surface layer about 650 feet thick with a 90 ohm-meter intrinsic resistivity resting on a 30 ohm-meter middle layer about 1300 feet thick in turn resting on an extended zone of 900 ohm-meter material.

Expander #3 indicates a possible interpretation of 800 feet of upper layer material having a resistivity of about 170 ohm-meters lying on a layer about 1500 feet thick of 17 ohm-meter resistivity in turn resting on an extended zone of 1700 ohm-meter material. Expander #1 did not present a very

interpretable curve perhaps due to lateral variations in resistivity.

The three interpreted layers may represent Gila above and below the water table resting on a high resistivity bedrock. (Pinal Schist?) Another three-layer possibility may involve a more sandy Gila resting on a more clayey Gila resting on resistive bedrock.

Respectfully submitted,

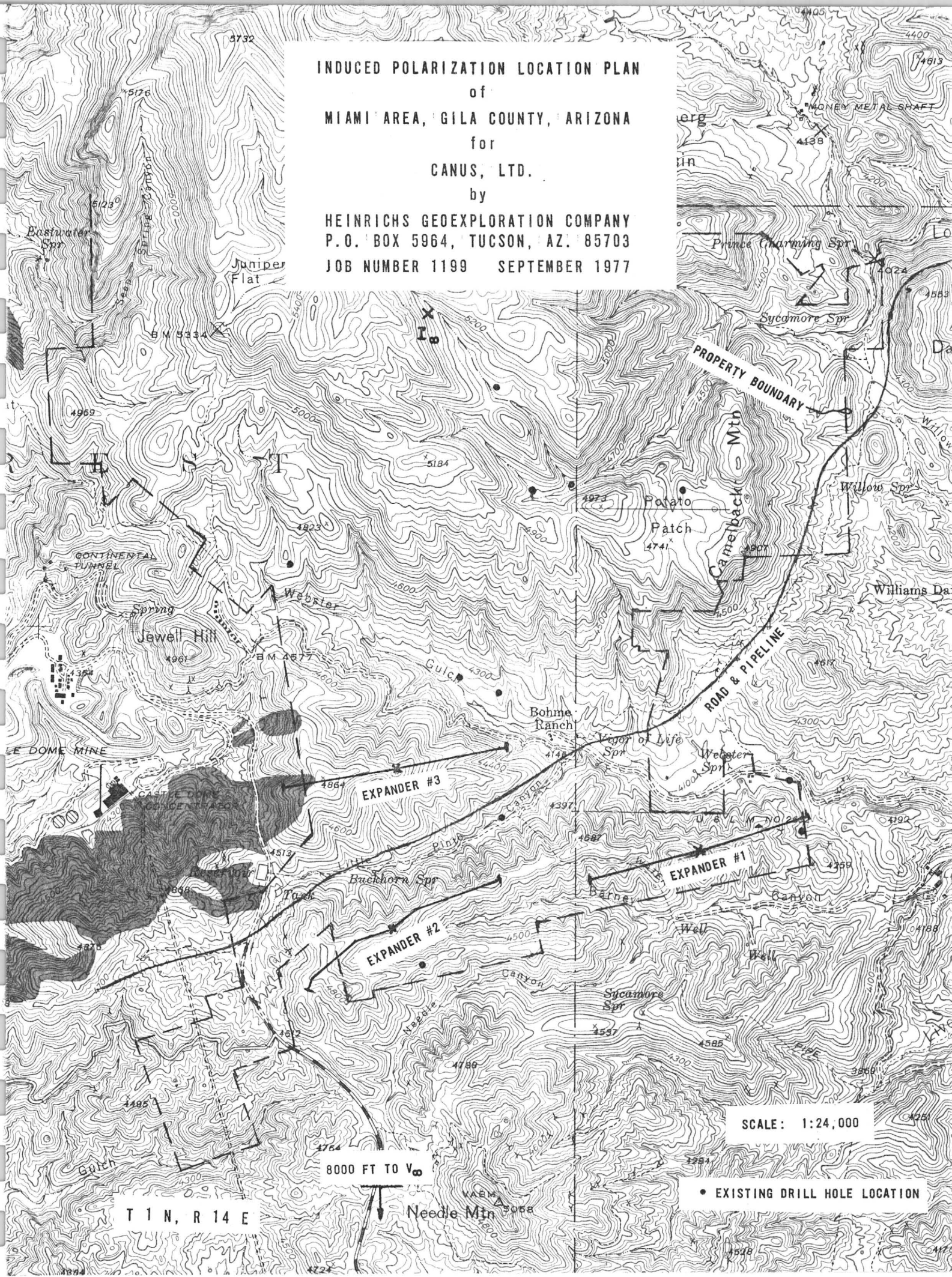
Heinrichs GEOEXploration Company

Chris S. Ludwig

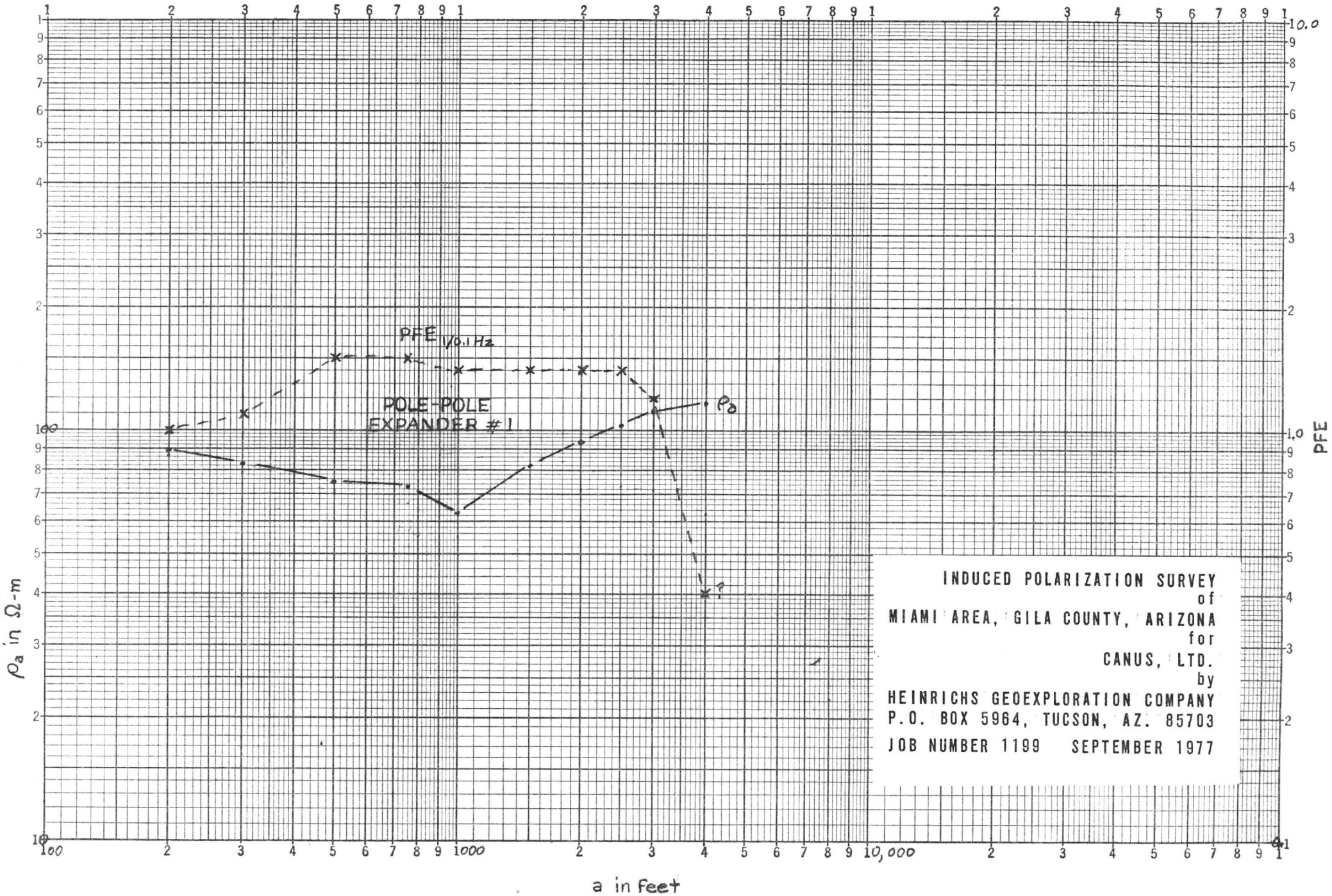
Chris S. Ludwig
Chief Geophysicist

CSL:mt

GEOEX Job #1199
P.O. Box 5964
Tucson, AZ
11/7/77


INDUCED POLARIZATION LOCATION PLAN
of
MIAMI AREA, GILA COUNTY, ARIZONA
for
CANUS, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 SEPTEMBER 1977
PROPERTY BOUNDARY
ROAD & PIPELINE
EXPANDER #1
EXPANDER #2
EXPANDER #3
SCALE: 1:24,000
• EXISTING DRILL HOLE LOCATION
8000 FT TO V∞
T 1 N, R 14 E
Needle Mtn
Jewell Hill
Potato Patch
Camelback Mtn
Bohme Ranch
Vigor of Life Spr
Webster Spr
Sycamore Spr
Prince Charming Spr
Willow Spr
Eastwater Spr
Juniper Flat
Buckhorn Spr
Barney Well Canyon
Pipe Canyon
Webster Gulch
Little Pinto Canyon
CONTINENTAL TUNNEL
CASTLE DOME CONCENTRATOR
MONEY METAL SHAFT
BM 5334
BM 4577
U.S.L.M. NO 2

K+E LOGARITHMIC 2 X 3 CYCLES 46 7323
MADE IN U.S.A.
KEUFFEL & ESSER CO.



INDUCED POLARIZATION SURVEY
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for
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P.O. BOX 5964, TUCSON, AZ. 85703
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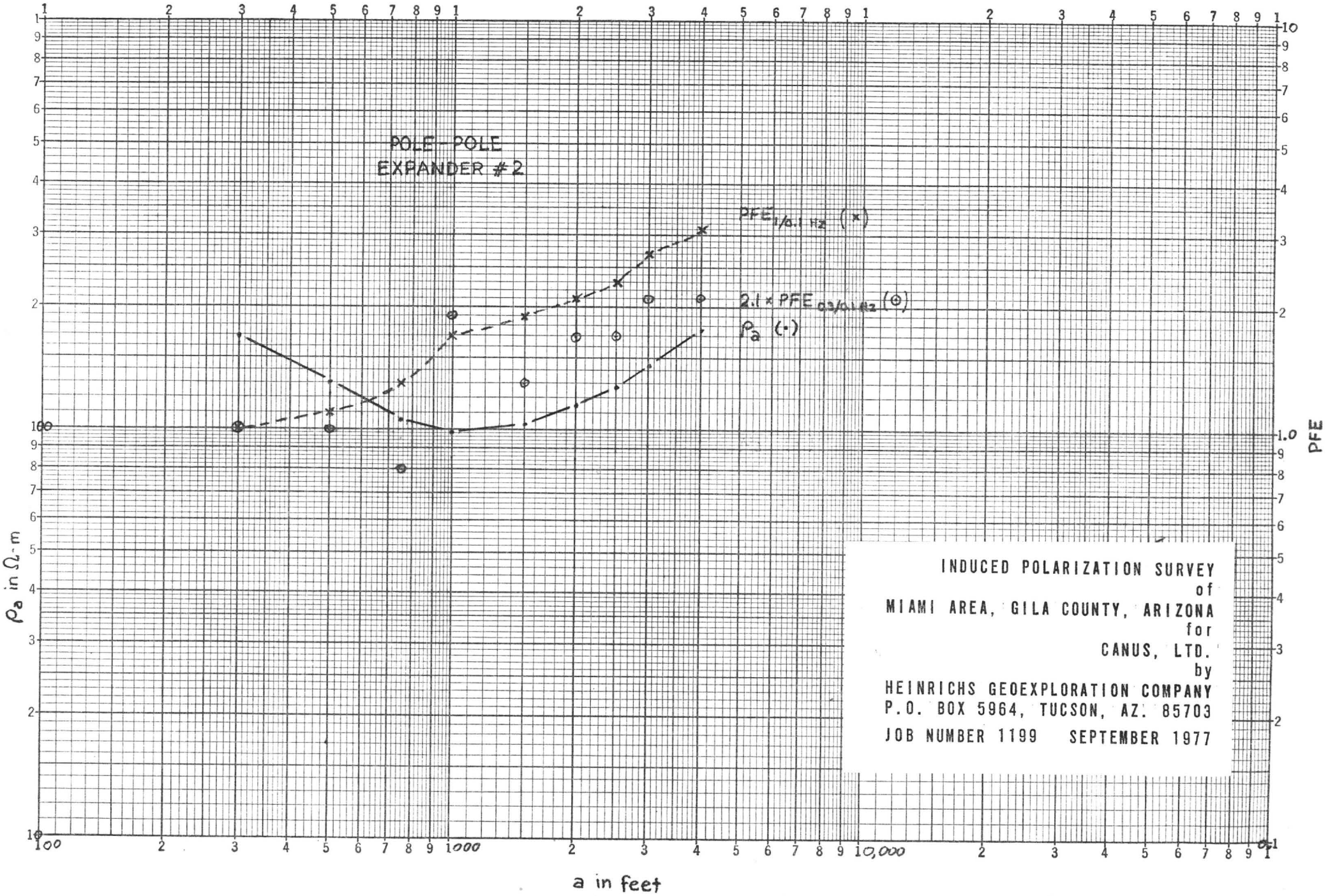
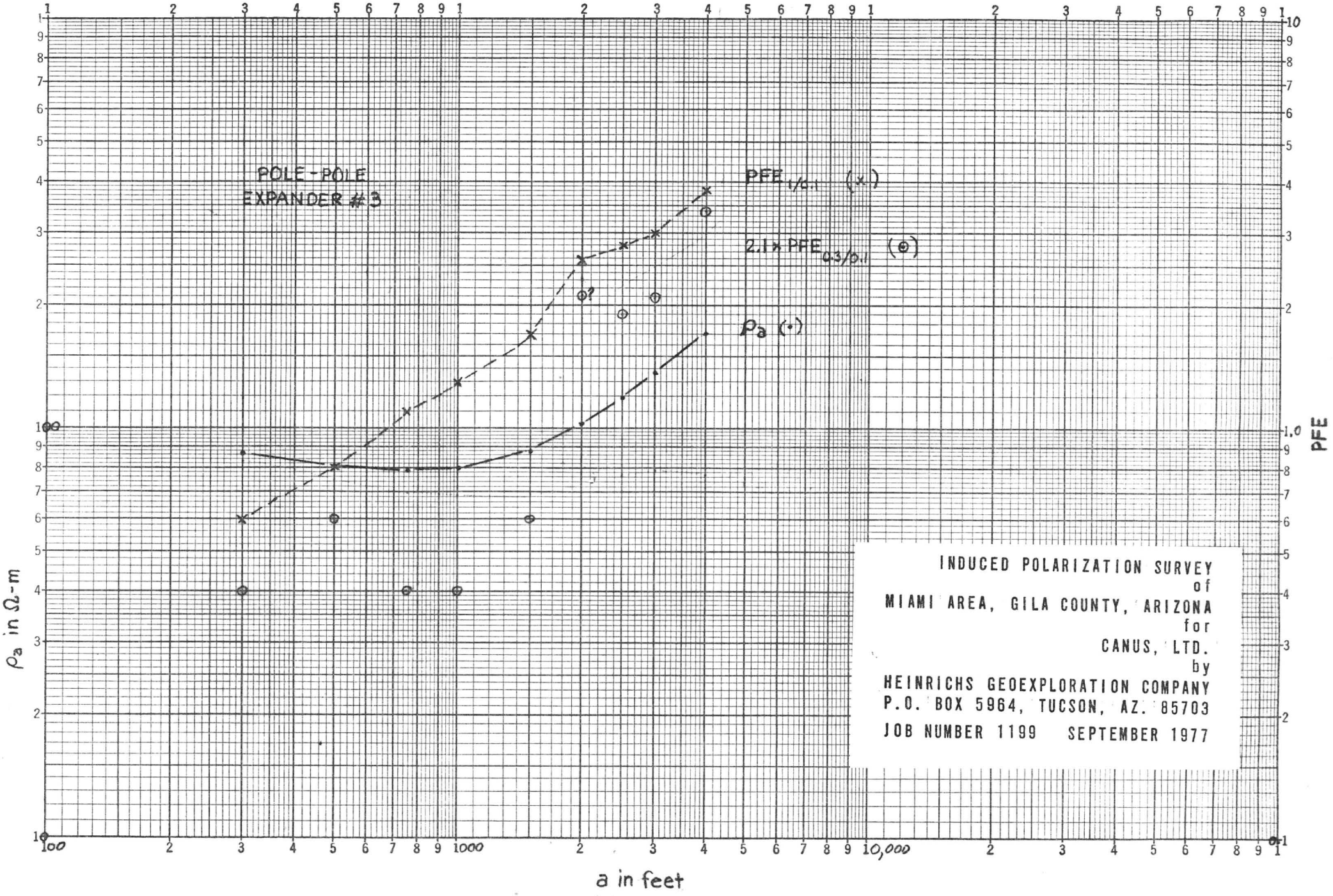
K+E LOGARITHMIC 2 X 3 CYCLES 46 7323 MADE IN U.S.A.
KEUFFEL & ESSER CO.



K+E LOGARITHMIC 2 X 3 CYCLES 46 7323 MADE IN U.S.A.
KEUFFEL & ESSER CO.



INDUCED POLARIZATION SURVEY
of
MIAMI AREA, GILA COUNTY, ARIZONA
for
CANUS, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 SEPTEMBER 1977

HEINRICHS GEOEXPLORATION COMPANY

P.O. BOX 5964, TUCSON, ARIZONA 85703, 806 WEST GRANT ROAD, PHONE: (602) 623-0578

November 4, 1977

Mr. Kirby C. Coryell
Beth Properties, Ltd.
5140 East Burns Street
Tucson, Arizona 85711

Re: IP Survey
Copper Creek Area
Pinal County, Arizona
GEOEX Job #1199

Dear Mr. Coryell:

Included herewith are the final plots and data tabulation of the six pole-pole IP expanders completed by us during August and September, 1977, at your request for Beth Properties, Ltd., in the Copper Creek Area, Pinal County, Arizona. The purpose of this survey was to prospect for large scale disseminated sulfide zones at depths in excess of 4000 feet below a thick section of Gila Conglomerate and post-ore volcanics. In addition, this work is in partial fulfillment of Federal mining claim annual labor requirements.

The pole-pole expander locations are shown on the accompanying location plan. This plan also shows the position of the voltage and current "infinites". The results of Expanders #1, 2 and 3 are presented as standard electrical soundings on double logarithmic plot sheets, one for each expander, for the percent frequency effect (PFE) and the apparent resistivity. PFEs were read on two different frequency pairs, i.e., 0.1 vs 1.0Hz and 0.1 vs 0.3Hz. The 0.1 vs 0.3Hz PFE pair data has been multiplied by a 2.1 factor to normalize it to a standard decade frequency spread. This allows data from the two pairs to be directly compared.

Results for Expanders #4, 5 and 6 are shown in tabular form since they involve only the two deepest "a" spacings. For Expanders #1, 2 and 3, the "a" spacing, or the separation between the current electrode and the voltage electrode, was expanded from 300 feet out to 4000 feet. This should typically yield useful information from about 150 feet below surface down to perhaps as much as 6000 feet below surface.

Expanders #3 and 4 involved a buried electrode in addition to the normal surface electrode. The buried electrode was placed at 1200 feet depth in the

3605 foot deep vertical drill hole in the south central part of Section 31. Ideally, the electrode would have been grounded at the bottom of the hole but a caved zone at 1200 feet precluded doing so. Data from the buried electrode is presented in the same manner as the surface electrode data and where the "a" spacing is the distance between the drill hole collar and the voltage measuring point.

The field PFE data was difficult to obtain accurately due to strong telluric, sferic and perhaps man-made electrical noise arising from San Manuel, however, the data is considered accurate to within +/- 0.5 PFE. The resistivity data has been calculated taking into account the actual finite location of the "infinites" and is presented in units of ohm-meters.

The IP data are not considered anomalous. Even though some of the 1.0 vs 0.1Hz data is over 5 PFE, the corresponding equivalent decade normalized 0.3 vs 0.1Hz data is everywhere less than 3 PFE. This is indicative of considerable electromagnetic (EM) coupling interference present, even at 0.3Hz. Thus, the "true" or corrected decade PFE with all EM coupling removed, would likely be less than 2 PFE and is therefore within the typical background, normal unmineralized, response-range of the rocks involved.

The resistivity data for Expander #1 suggests a relatively resistive surface layer, about 100 ohm-meters in average resistivity, approximately 700 feet thick overlying a thick section of about 30 ohm-meter material. This interface could possibly be the water table but is perhaps more likely sands and gravels overlying more clayey lake bed sediments. No bedrock depth estimate can be made from this expander as only two layers are indicated.

Expanders #2 and 3 suggest, very roughly, 4000 feet of 50 to 60 ohm-meter material resting on 100+ ohm-meter material. This is compatible with Gila Conglomerate overlying a volcanic or intrusive bedrock and is within the expected overburden depth range. The buried electrode survey for Expander #3 suggests a somewhat lower, 30 ohm-meter, Gila resistivity but a similar bedrock resistivity and depth.

Expanders #4, 5 and 6 are only two data points each so no curve fitting is possible. However, the lower apparent resistivities on Expander #4 indicate a somewhat deeper (or more conductive) overburden than do Expanders #2 and 3. And, higher apparent resistivity on Expanders #5 and 6 may indicate a somewhat shallower overburden than do Expanders #2 and 3.

In conclusion, no large scale sulfide zones were detected in the areas surveyed down to perhaps as deep as 6000 feet. However, that does not rule out the possibility of important mineralization still being present. These expanders were widely separated, leaving many untested areas, and also they would not likely give a detectable response to possibly significant sulfide zones having dimensions less than their depth of burial.

Respectfully submitted,

Heinrichs GEOEXploration Co.

Chris S. Ludwig

Chris S. Ludwig
Chief Geophysicist

CSL:mt

Job #1199
11/4/77
Box 5964
Tucson, AZ 85703

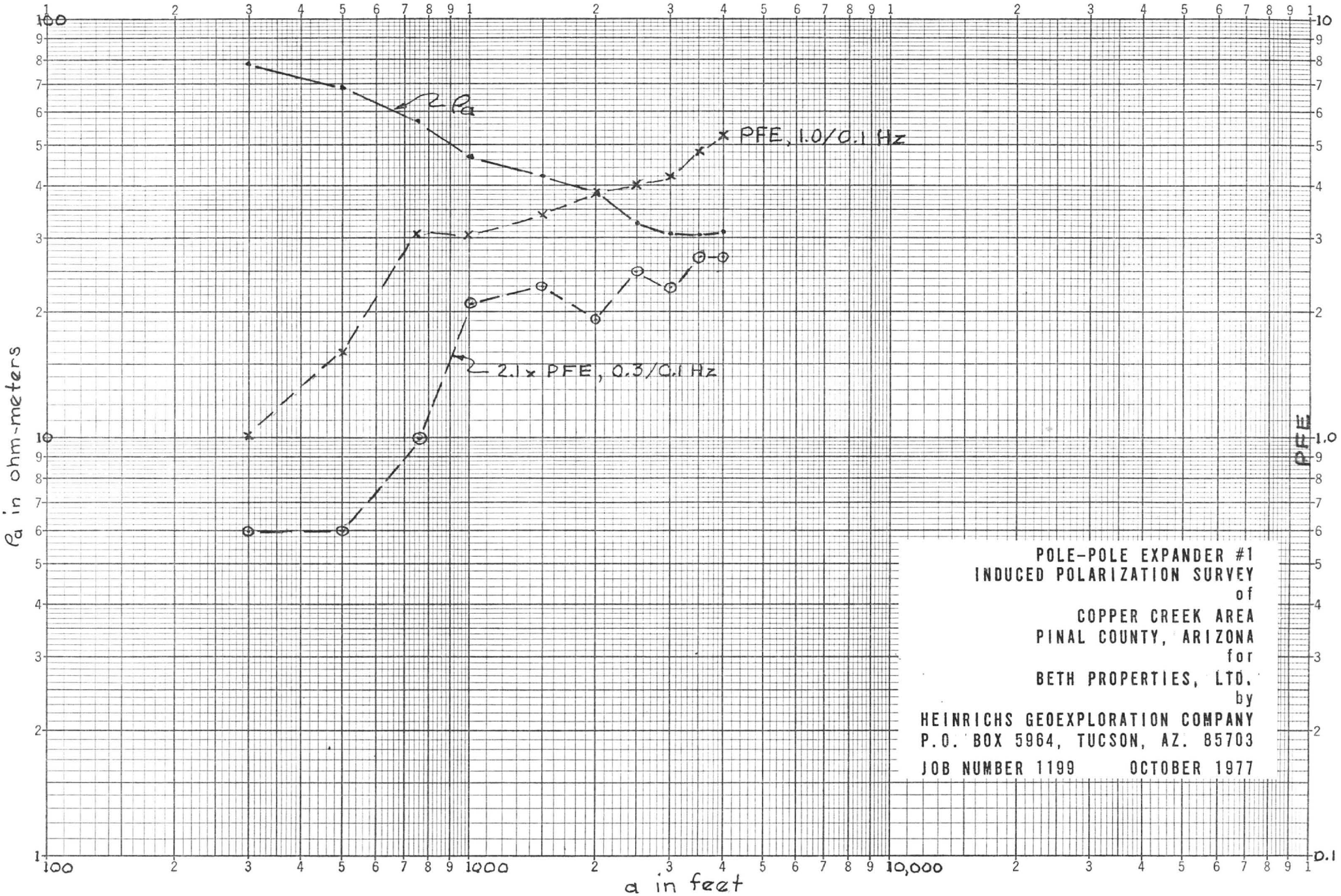
TABLE OF DATA FOR

POLE-POLE EXPANDERS #4, 5 & 6

Expander #	"a" in feet	Resistivity in ohm-meters	PFE @ 1 & 0.1Hz	2.1 X PFE @ 0.3 & 0.1Hz
4 (surface current electrode)	3500	40.8	4.5	1.7
	4000	41.0	5.0	2.1
4 (buried current electrode)	3500	37.0	5.0	1.9
	4000	37.2	5.9	2.5
5	3600	99.2	4.9	1.6
	4100	102.0	5.0	2.0
6	3500	79.1	4.5	2.1
	4000	83.9	4.8	2.3

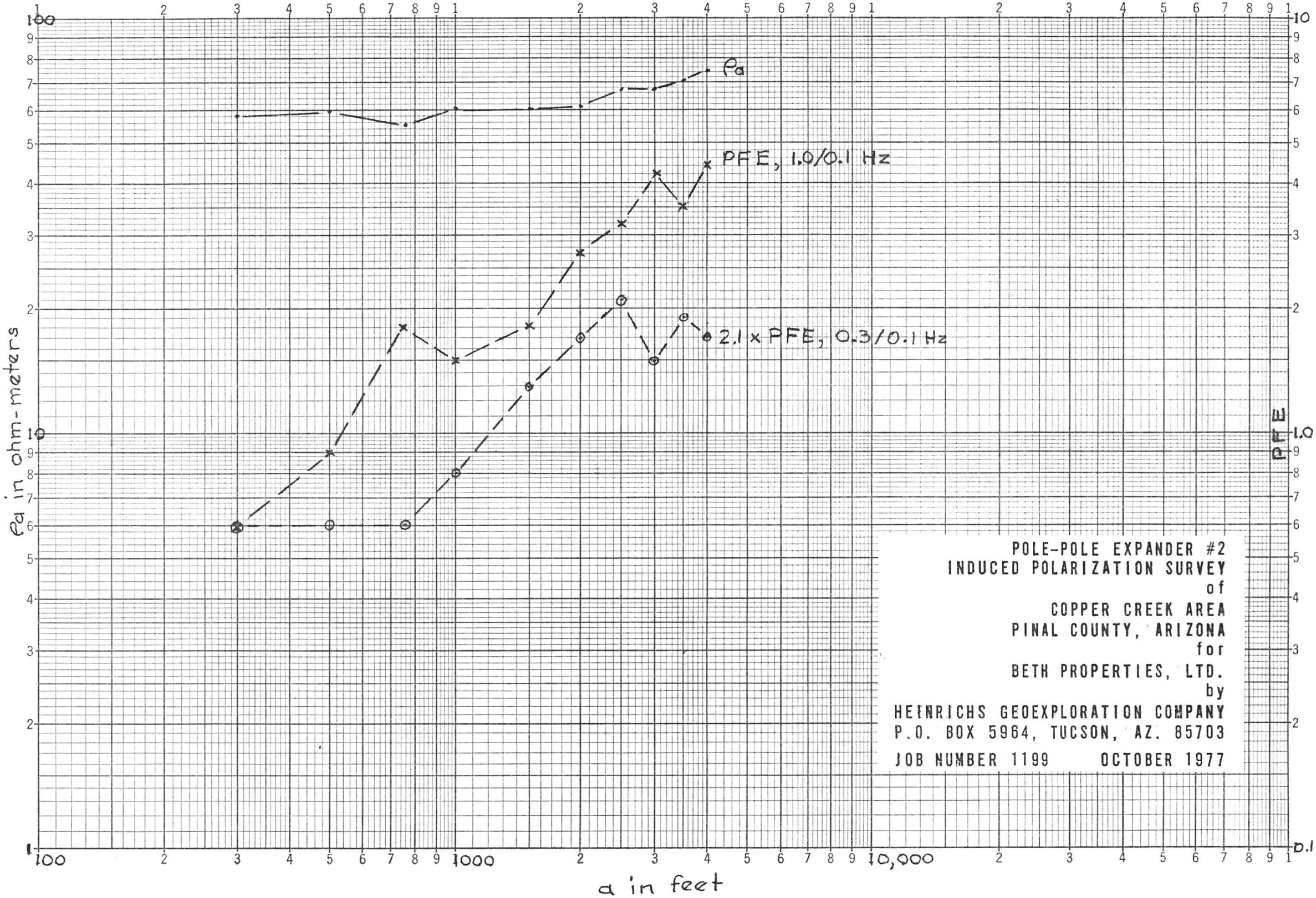
Note: For Expander #4, the buried electrode was grounded 1200 feet below surface.

K+E LOGARITHMIC 2 X 3 CYCLES 46 7320 MADE IN U.S.A.
KEUFFEL & ESSER CO.



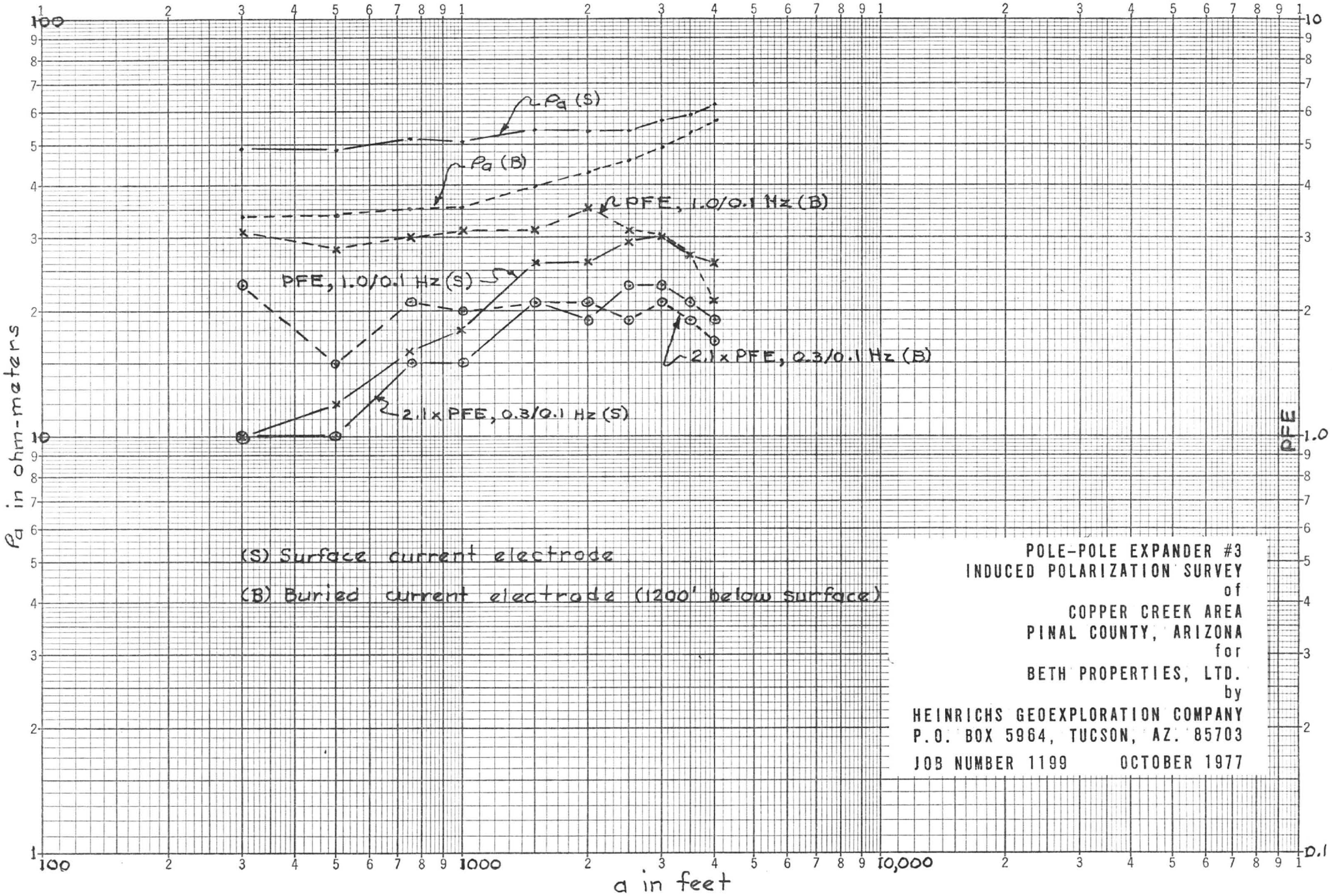
POLE-POLE EXPANDER #1
INDUCED POLARIZATION SURVEY
of
COPPER CREEK AREA
PINAL COUNTY, ARIZONA
for
BETH PROPERTIES, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 OCTOBER 1977

K+E LOGARITHMIC 2 X 3 CYCLES 46 7320 MADE IN U.S.A.
KEUFFEL & ESSER CO.



POLE-POLE EXPANDER #2
INDUCED POLARIZATION SURVEY
of
COPPER CREEK AREA
PINAL COUNTY, ARIZONA
for
BETH PROPERTIES, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 OCTOBER 1977

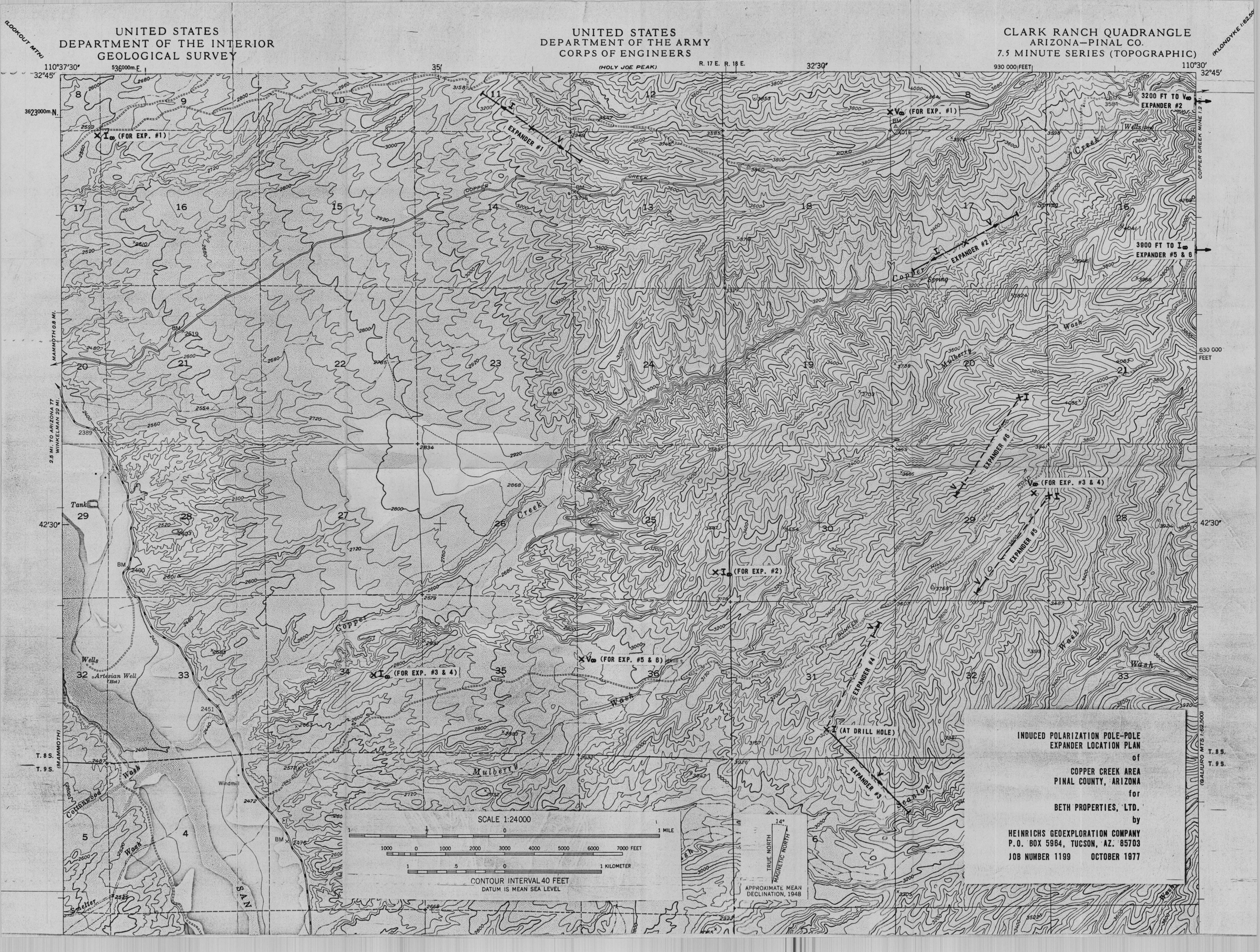
K+E LOGARITHMIC 46 7520
2 X 3 CYCLES MADE IN U.S.A.
KEUFFEL & ESSER CO.



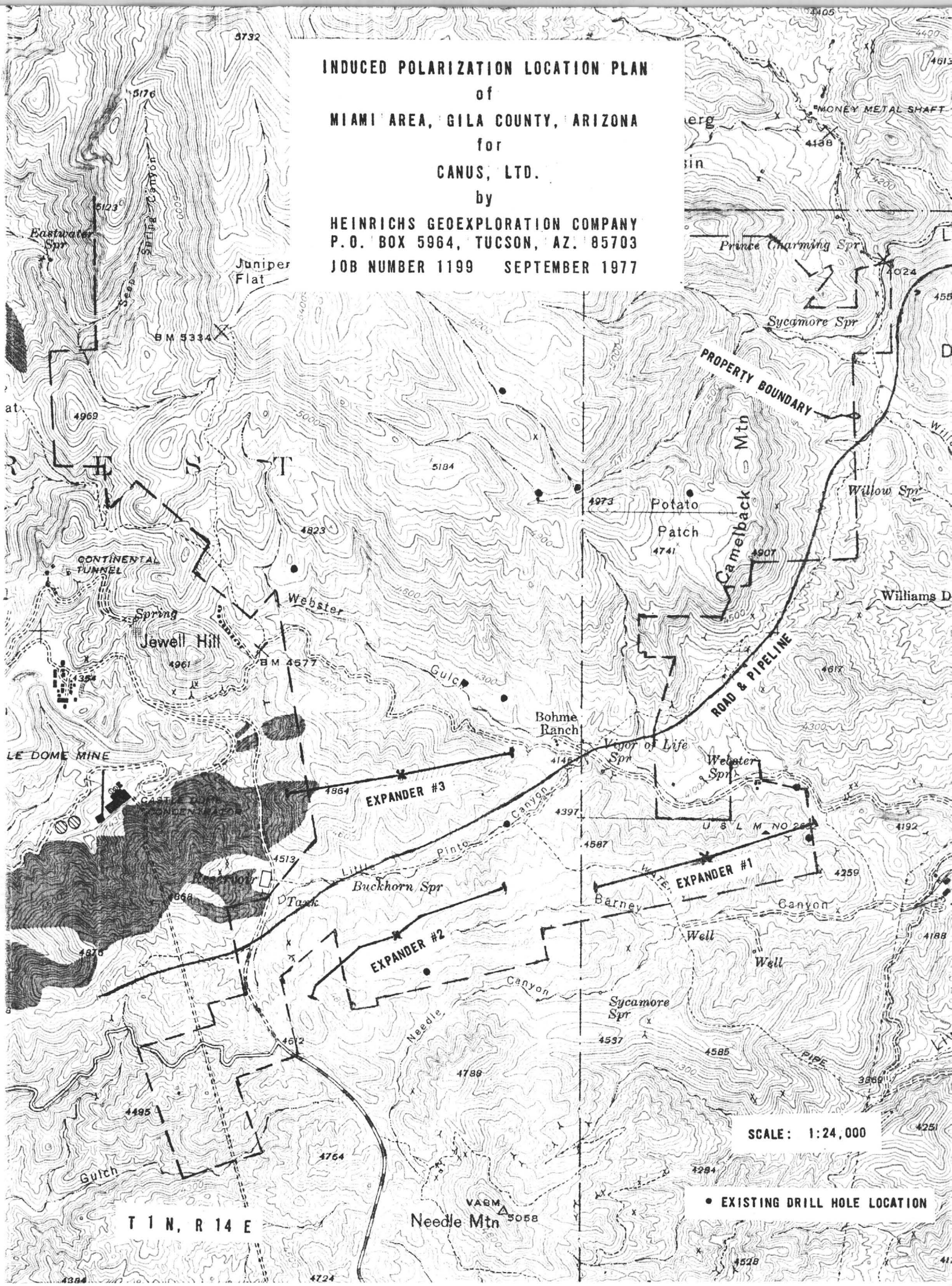
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS

CLARK RANCH QUADRANGLE
ARIZONA—PINAL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



INDUCED POLARIZATION POLE-POLE
EXPANDER LOCATION PLAN
of
COPPER CREEK AREA
PINAL COUNTY, ARIZONA
for
BETH PROPERTIES, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 OCTOBER 1977


INDUCED POLARIZATION LOCATION PLAN
of
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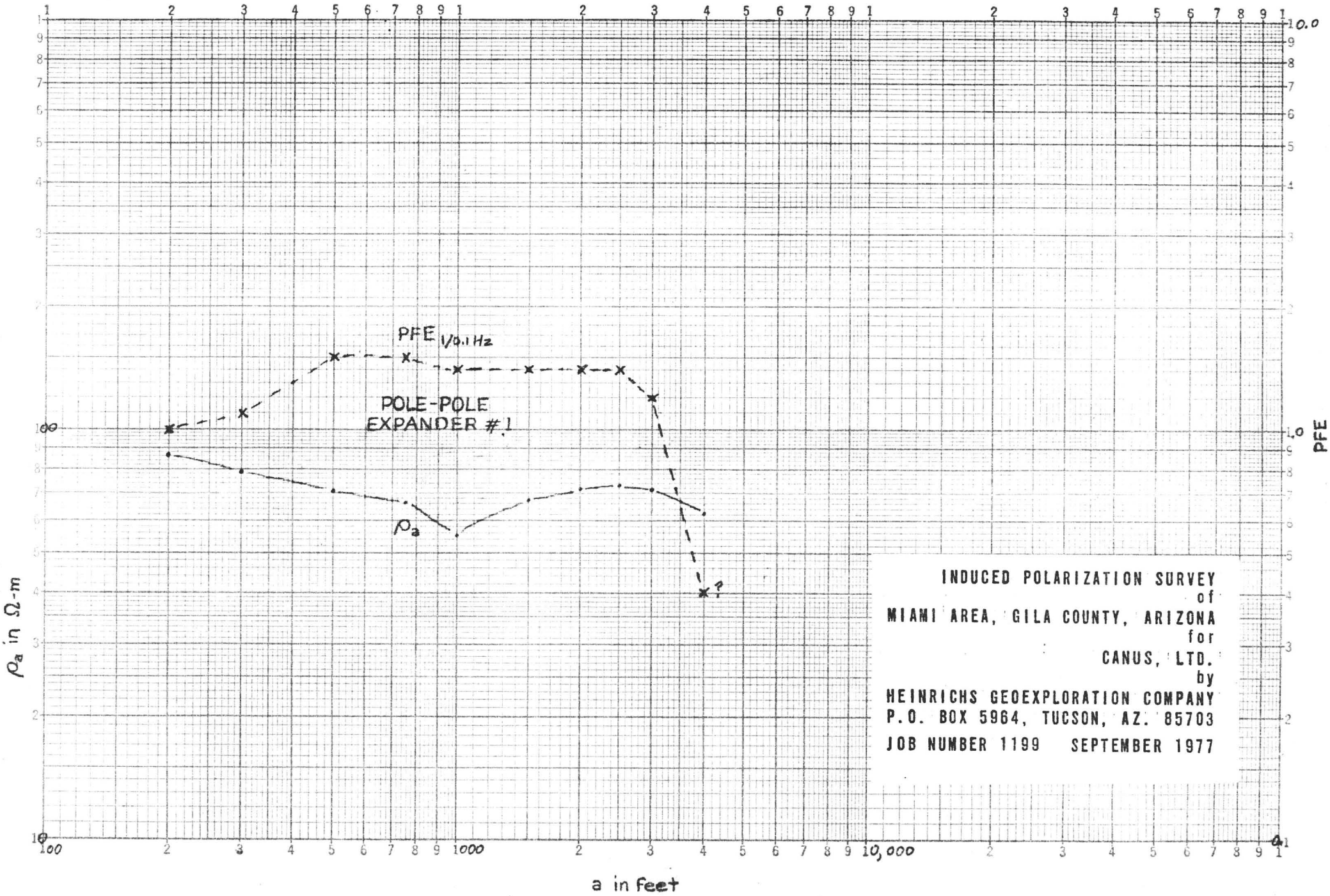
for
CANUS, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 SEPTEMBER 1977
PROPERTY BOUNDARY
ROAD & PIPELINE
EXPANDER #1
EXPANDER #2
EXPANDER #3
Potato Patch
Camelback Mtn
Bohme Ranch
Vigor of Life Spr
Webster Spr
Sycamore Spr
Prince Charming Spr
Willow Spr
Jewell Hill
Webster Gulch
Pinto Canyon
Little Buckhorn Spr
Barney Canyon
Needle Canyon
Needle Mtn
Gulch
Eastwater Spr
Juniper Flat
CONTINENTAL TUNNEL
Spring
LE DOME MINE
MONEY METAL SHAFT
Well
Tank
PIPE
SCALE: 1:24,000
• EXISTING DRILL HOLE LOCATION
T 1 N, R 14 E

K+E LOGARITHMIC 46 7323
2 X 3 CYCLES MADE IN U.S.A.
KEUFFEL & ESSER CO.



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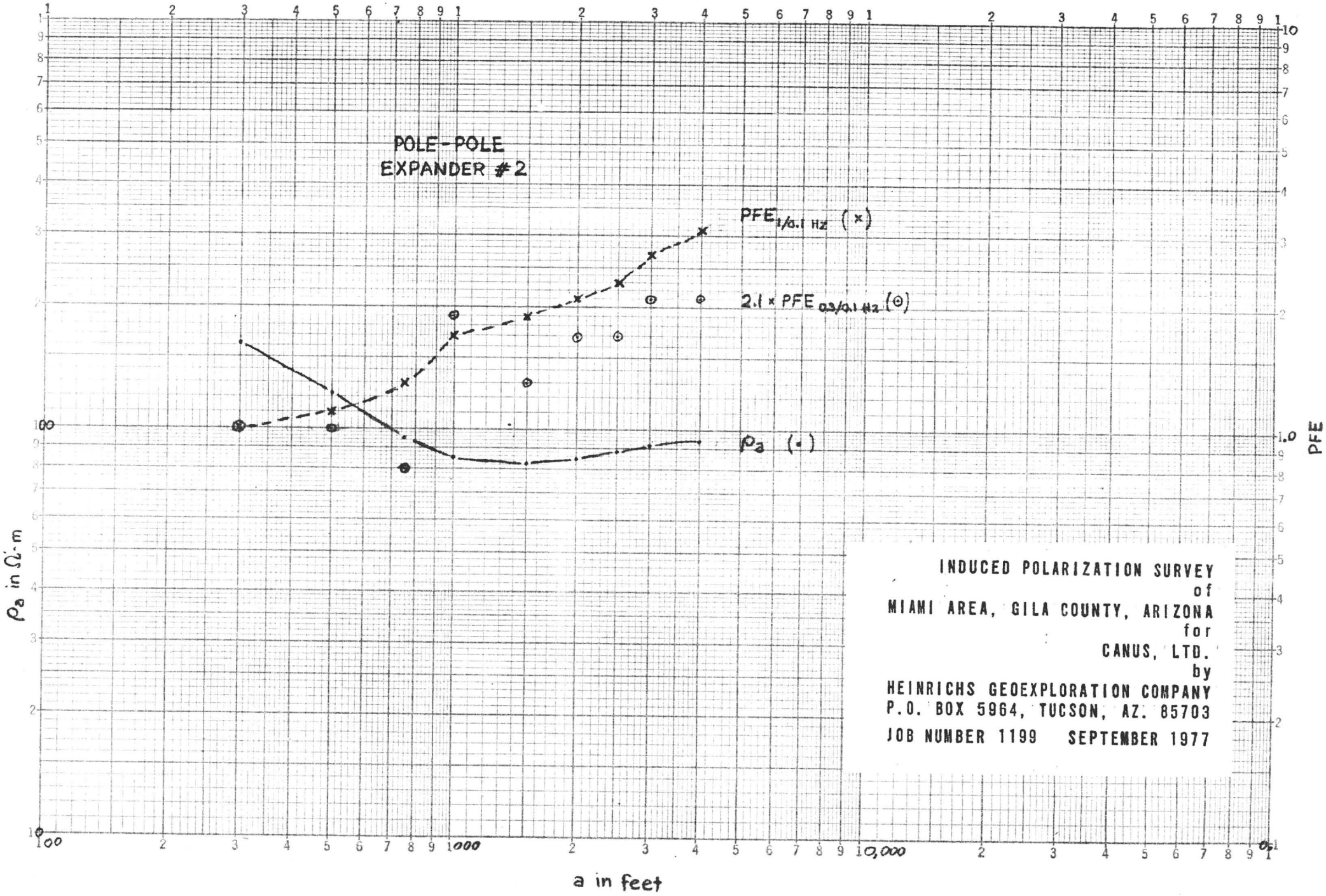

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P.O. BOX 5964, TUCSON, AZ. 85703
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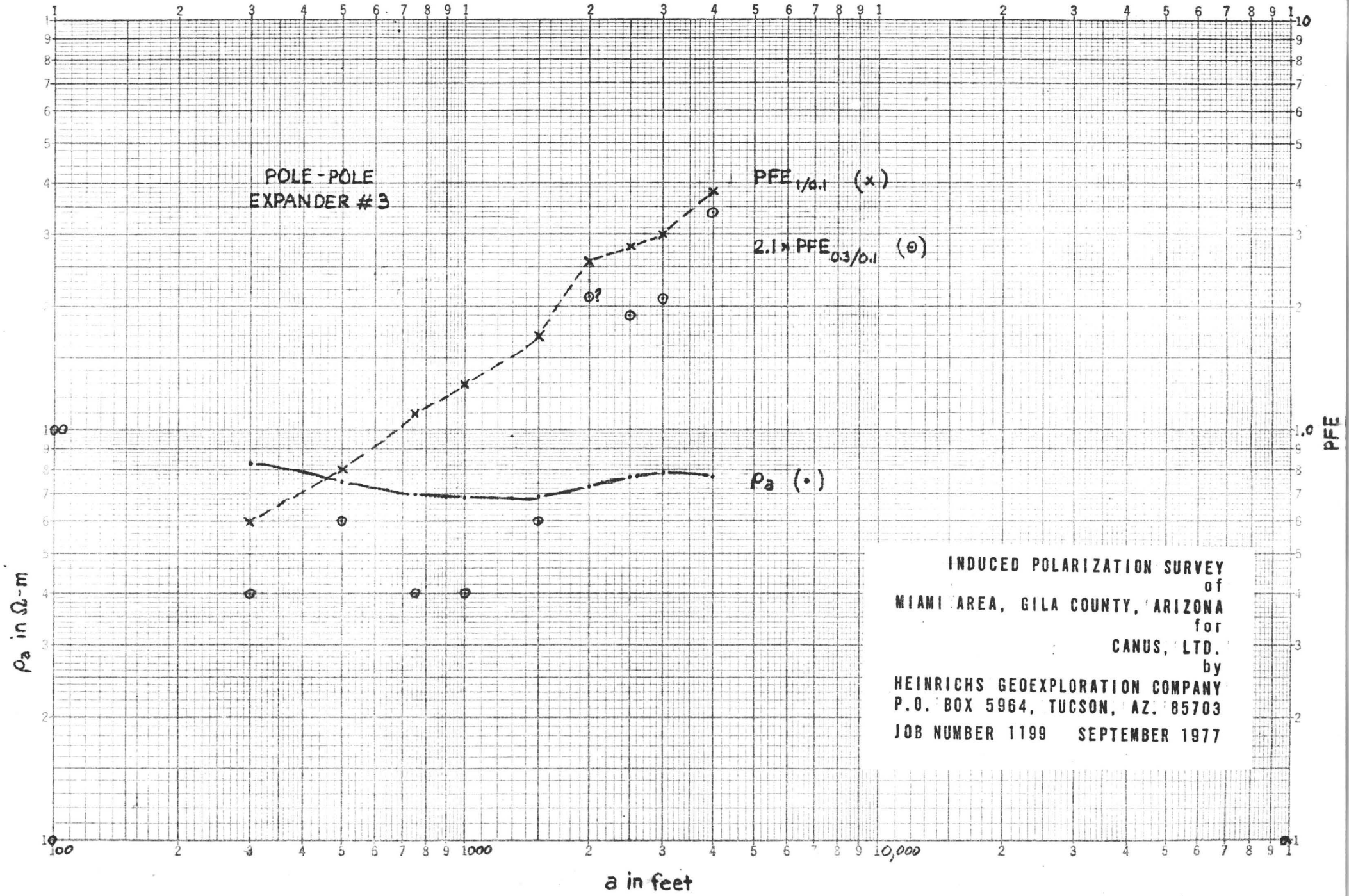

INDUCED POLARIZATION SURVEY
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HEINRICHS GEOEXPLORATION COMPANY
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JOB NUMBER 1199 SEPTEMBER 1977

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS

CLARK RANCH QUADRANGLE
ARIZONA—PINAL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

Kirby Coryell

Mapped, edited, and published by the Geological Survey

Control by USGS

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1945. Field check 1948

Polyconic projection. 1927 North American datum
10,000-foot grid based on Arizona coordinate system, central zone

1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Dashed land lines indicate approximate locations

Revisions shown in purple compiled from aerial photographs taken 1972. This information not field checked

UTM GRID AND 1972 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

ROAD CLASSIFICATION

HARD-SURFACE ALL WEATHER ROADS		DRY WEATHER ROADS
Heavy-duty	4 LANE / 2 LANE	Improved dirt
Medium-duty	4 LANE / 2 LANE	Unimproved dirt

Loose-surface, graded, or narrow hard-surface

U. S. Route — State Route

PIMA BLUEPRINT CO.
4655 E. BROADWAY
Phone 327-3421
TUCSON, ARIZONA 85711

CLARK RANCH, ARIZ.
N3237.5-W11030/7.5

1948
PHOTOREVISED 1972
AMS 3849 II NE—SERIES V898

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

ARIZONA
INSPIRATION QUADRANGLE
7½-MINUTE SERIES

Mapped by the Geological Survey
1945

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U. S. Route

UTM GRID AND 1945 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

Contour interval 25 feet
Datum is mean sea level

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
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A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Polyconic projection. 1927 North American datum
10000 foot grid based on Arizona (East) rectangular coordinate system

1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

PIMA BLUEPRINT CO.
4655 E. BROADWAY
Phone 327-3421
TUCSON, ARIZONA

INSPIRATION, ARIZ.

N3322.5—W11052.5/7.5
1945
AMS 3850 IV NW—SERIES V898

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MINERAL INVESTIGATIONS
FIELD STUDIES MAP MF—81

Base map by Topographic Division
U. S. Geological Survey, 1949

Geology mapped in 1947 and 1957—59

EXPLANATION

QUATERNARY

Recent

Qal
Alluvium
Gravel, sand, and silt along intermittent stream beds and in semi-enclosed basins

Qt
Coarse residual detritus, soil, and slope wash; mapped only in part

TERTIARY AND QUATERNARY

Pliocene and Pleistocene

UNCONFORMITY

QTg (QTgt)
Gila conglomerate
QTg, loose to firmly cemented alluvial fan and fluviatile valley-fill deposits
QTgt, interbedded tuffaceous sandstone older than the latest period of deformation

QTb
Basalt
Brownish-gray aphanitic, probably remnants of small local extrusions

TERTIARY(?)

UNCONFORMITY

Td
Dacite
Massive sheet of pinkish-gray to light brownish-gray welded tuff of dacitic composition; remnants are as much as 1,800 feet thick

Tw
Whitetail conglomerate
Local accumulations of detrital material in channels and low-lying areas of the predacite terrane

CRETACEOUS OR TERTIARY

Upper Cretaceous or lower Tertiary

UNCONFORMITY

TKsg / **TKgp**
Schultze granite
TKsg, stock of porphyritic biotite-quartz monzonite grading locally into porphyritic granite
TKgp, granite porphyry dikes and sills not obviously connected with the main stock may include some unrelated dikes in the southeastern part of the quadrangle

db
Diabase
Dikes, sills, and irregular intrusive bodies of greenish-black, fine- to medium-grained diabase

TKs
Solitude granite
Nearly white, medium-grained, nonporphyritic muscovite granite; eastern part of the mass in the adjacent quadrangle contains biotite in addition to muscovite

PRECAMBRIAN

Upper Precambrian

Apache group

UNCONFORMITY

p€ds
Dripping Spring quartzite
Light-gray to light brownish-gray, medium- to coarse-grained, feldspathic quartzite; shows distinct separation into beds which are thinly laminated and locally crossbedded only the lower part of the formation is present. Included with the Dripping Spring at its base, for convenience in mapping is the Barnes conglomerate which in this area ranges from a thin layer of coarse feldspathic sandstone containing a few scattered pebbles to a 6-foot-thick bed of closely packed ellipsoidal pebbles of hard vitreous quartzite, white vein quartz, and red jasper

p€p
Pioneer formation
Grayish-red to brownish-gray, fine-grained argillaceous sandstone or graywacke. Scanlan conglomerate, a bed of coarse arkose, probably not more than 2 feet thick, containing a few pebbles of schist and white quartz, occurs at the base and is included in the Pioneer for convenience in mapping

Lower Precambrian

UNCONFORMITY

p€g
Granite on Manitou Hill
Sill-like bodies intruding Pinal schist; yellowish-gray, fine- to medium-grained, slightly gneissic, muscovite granite

p€md
Madera diorite
Bright-gray, mostly medium-grained, biotite-quartz diorite; locally contains abundant epidote

p€ps
Pinal schist
A thick sequence of weakly to moderately metamorphosed, thin-bedded sedimentary rocks ranging in grain size from silt to very coarse arkosic sand; composed essentially of quartz and sericite; foliation is parallel with the bedding; beds are tilted at angles ranging from 35° to vertical but otherwise are only slightly deformed; in zones bordering granitic intrusions more intensely metamorphosed and crumpled

Contact
Dashed where approximately located and where bounding Gila conglomerate and surficial deposits

Fault, showing dip
Dashed where approximately located; dotted where concealed. U, upthrown side; D, downthrown side

Strike of vertical foliation and bedding of schist

Generalized strike and dip of crumpled or undulating bedding of schist

Vertical fault

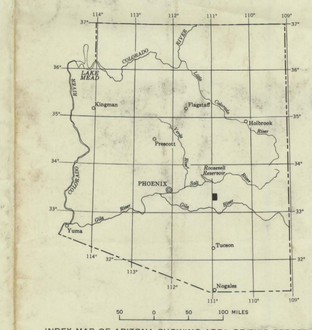
Strike and dip of beds

Strike and dip of foliation and bedding of schist

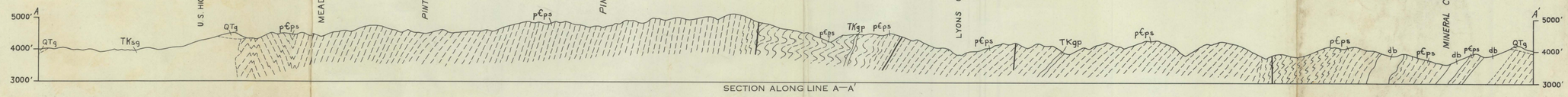
Shaft

Adit

Small prospect pit



INDEX MAP OF ARIZONA SHOWING AREA OF THIS REPORT



SECTION ALONG LINE A—A′

PRELIMINARY GEOLOGIC MAP OF THE PINAL RANCH QUADRANGLE, ARIZONA

By

Nels P. Peterson

APPROXIMATE MEAN DECLINATION, 1960

SCALE 1:24000

CONTOUR INTERVAL 25 FEET
DATUM IS MEAN SEA LEVEL

1961

MINERAL INVESTIGATIONS
FIELD STUDIES MAP MF—81

For sale by U. S. Geological Survey, price 50 cents

HEINRICHS GEOEXPLORATION COMPANY

P.O. BOX 5964, TUCSON, ARIZONA 85703, 806 WEST GRANT ROAD, PHONE: (602) 623-0578

November 4, 1977

Mr. Kirby C. Coryell
Beth Properties, Ltd.
5140 East Burns Street
Tucson, Arizona 85711

Re: IP Survey
Copper Creek Area
Pinal County, Arizona
GEOEX Job #1199

Dear Mr. Coryell:

Included herewith are the final plots and data tabulation of the six pole-pole IP expanders completed by us during August and September, 1977, at your request for Beth Properties, Ltd., in the Copper Creek Area, Pinal County, Arizona. The purpose of this survey was to prospect for large scale disseminated sulfide zones at depths in excess of 4000 feet below a thick section of Gila Conglomerate and post-ore volcanics. In addition, this work is in partial fulfillment of Federal mining claim annual labor requirements.

The pole-pole expander locations are shown on the accompanying location plan. This plan also shows the position of the voltage and current "infinites". The results of Expanders #1, 2 and 3 are presented as standard electrical soundings on double logarithmic plot sheets, one for each expander, for the percent frequency effect (PFE) and the apparent resistivity. PFEs were read on two different frequency pairs, i.e., 0.1 vs 1.0Hz and 0.1 vs 0.3Hz. The 0.1 vs 0.3Hz PFE pair data has been multiplied by a 2.1 factor to normalize it to a standard decade frequency spread. This allows data from the two pairs to be directly compared.

Results for Expanders #4, 5 and 6 are shown in tabular form since they involve only the two deepest "a" spacings. For Expanders #1, 2 and 3, the "a" spacing, or the separation between the current electrode and the voltage electrode, was expanded from 300 feet out to 4000 feet. This should typically yield useful information from about 150 feet below surface down to perhaps as much as 6000 feet below surface.

Expanders #3 and 4 involved a buried electrode in addition to the normal surface electrode. The buried electrode was placed at 1200 feet depth in the

3605 foot deep vertical drill hole in the south central part of Section 31. Ideally, the electrode would have been grounded at the bottom of the hole but a caved zone at 1200 feet precluded doing so. Data from the buried electrode is presented in the same manner as the surface electrode data and where the "a" spacing is the distance between the drill hole collar and the voltage measuring point.

The field PFE data was difficult to obtain accurately due to strong telluric, sferic and perhaps man-made electrical noise arising from San Manuel, however, the data is considered accurate to within +/- 0.5 PFE. The resistivity data has been calculated taking into account the actual finite location of the "infinites" and is presented in units of ohm-meters.

The IP data are not considered anomalous. Even though some of the 1.0 vs 0.1Hz data is over 5 PFE, the corresponding equivalent decade normalized 0.3 vs 0.1Hz data is everywhere less than 3 PFE. This is indicative of considerable electromagnetic (EM) coupling interference present, even at 0.3Hz. Thus, the "true" or corrected decade PFE with all EM coupling removed, would likely be less than 2 PFE and is therefore within the typical background, normal unmineralized, response-range of the rocks involved.

The resistivity data for Expander #1 suggests a relatively resistive surface layer, about 100 ohm-meters in average resistivity, approximately 700 feet thick overlying a thick section of about 30 ohm-meter material. This interface could possibly be the water table but is perhaps more likely sands and gravels overlying more clayey lake bed sediments. No bedrock depth estimate can be made from this expander as only two layers are indicated.

Expanders #2 and 3 suggest, very roughly, 4000 feet of 50 to 60 ohm-meter material resting on 100+ ohm-meter material. This is compatible with Gila Conglomerate overlying a volcanic or intrusive bedrock and is within the expected overburden depth range. The buried electrode survey for Expander #3 suggests a somewhat lower, 30 ohm-meter, Gila resistivity but a similar bedrock resistivity and depth.

Expanders #4, 5 and 6 are only two data points each so no curve fitting is possible. However, the lower apparent resistivities on Expander #4 indicate a somewhat deeper (or more conductive) overburden than do Expanders #2 and 3. And, higher apparent resistivity on Expanders #5 and 6 may indicate a somewhat shallower overburden than do Expanders #2 and 3.

In conclusion, no large scale sulfide zones were detected in the areas surveyed down to perhaps as deep as 6000 feet. However, that does not rule out the possibility of important mineralization still being present. These expanders were widely separated, leaving many untested areas, and also they would not likely give a detectable response to possibly significant sulfide zones having dimensions less than their depth of burial.

Respectfully submitted,

Heinrichs GEOEXploration Co.

Chris S. Ludwig
Chief Geophysicist

CSL:mt

Job #1199
11/4/77
Box 5964
Tucson, AZ 85703

TABLE OF DATA FOR

POLE-POLE EXPANDERS #4, 5 & 6

Expander #	"a" in feet	Resistivity in ohm-meters	PFE @ 1 & 0.1Hz	2.1 X PFE @ 0.3 & 0.1Hz
4 (surface current electrode)	3500	40.8	4.5	1.7
	4000	41.0	5.0	2.1
4 (buried current electrode)	3500	37.0	5.0	1.9
	4000	37.2	5.9	2.5
5	3600	99.2	4.9	1.6
	4100	102.0	5.0	2.0
6	3500	79.1	4.5	2.1
	4000	83.9	4.8	2.3

Note: For Expander #4, the buried electrode was grounded 1200 feet below surface.

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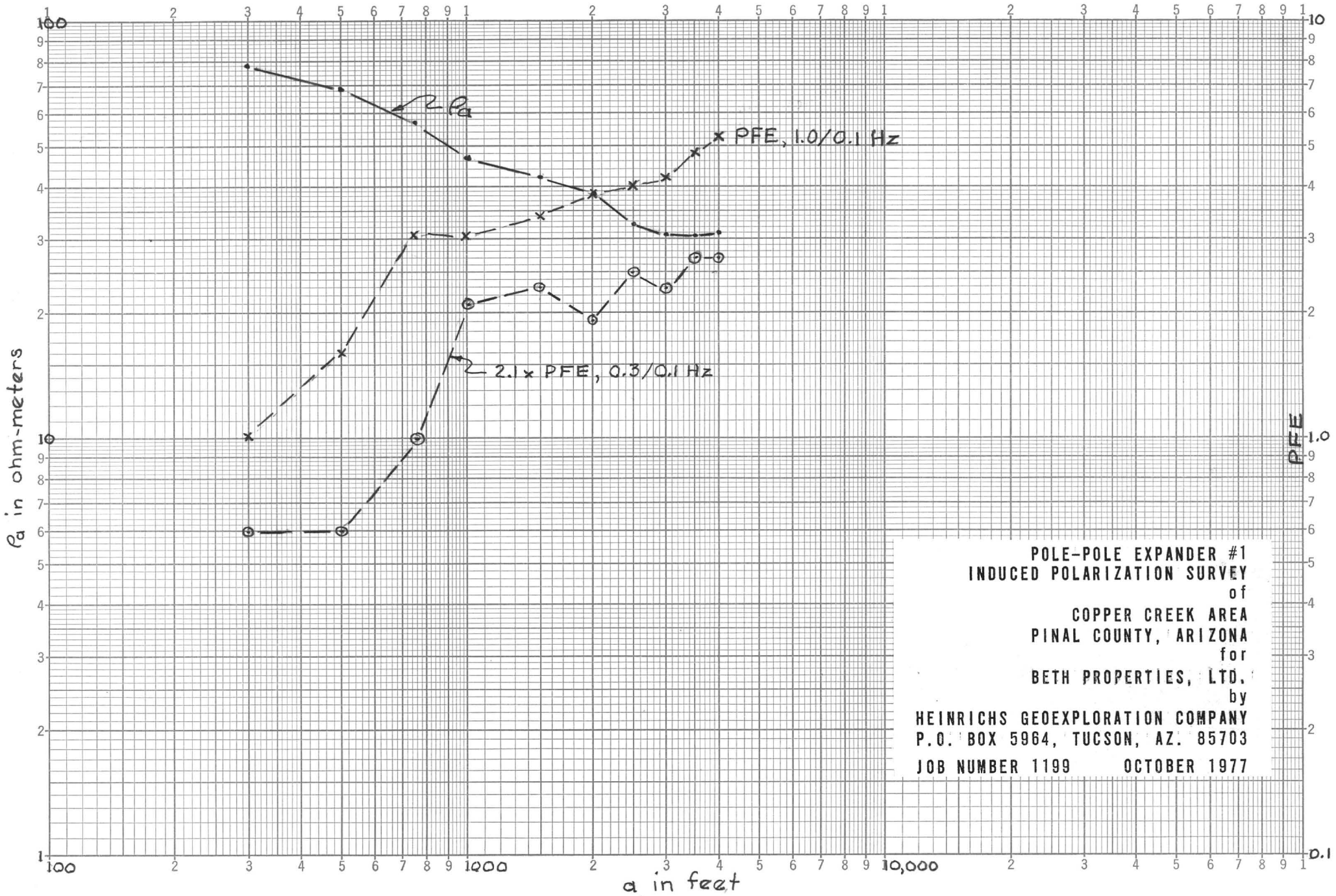
KEUFFEL & ESSER CO.



POLE-POLE EXPANDER #1
INDUCED POLARIZATION SURVEY
of
COPPER CREEK AREA
PINAL COUNTY, ARIZONA
for
BETH PROPERTIES, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 OCTOBER 1977

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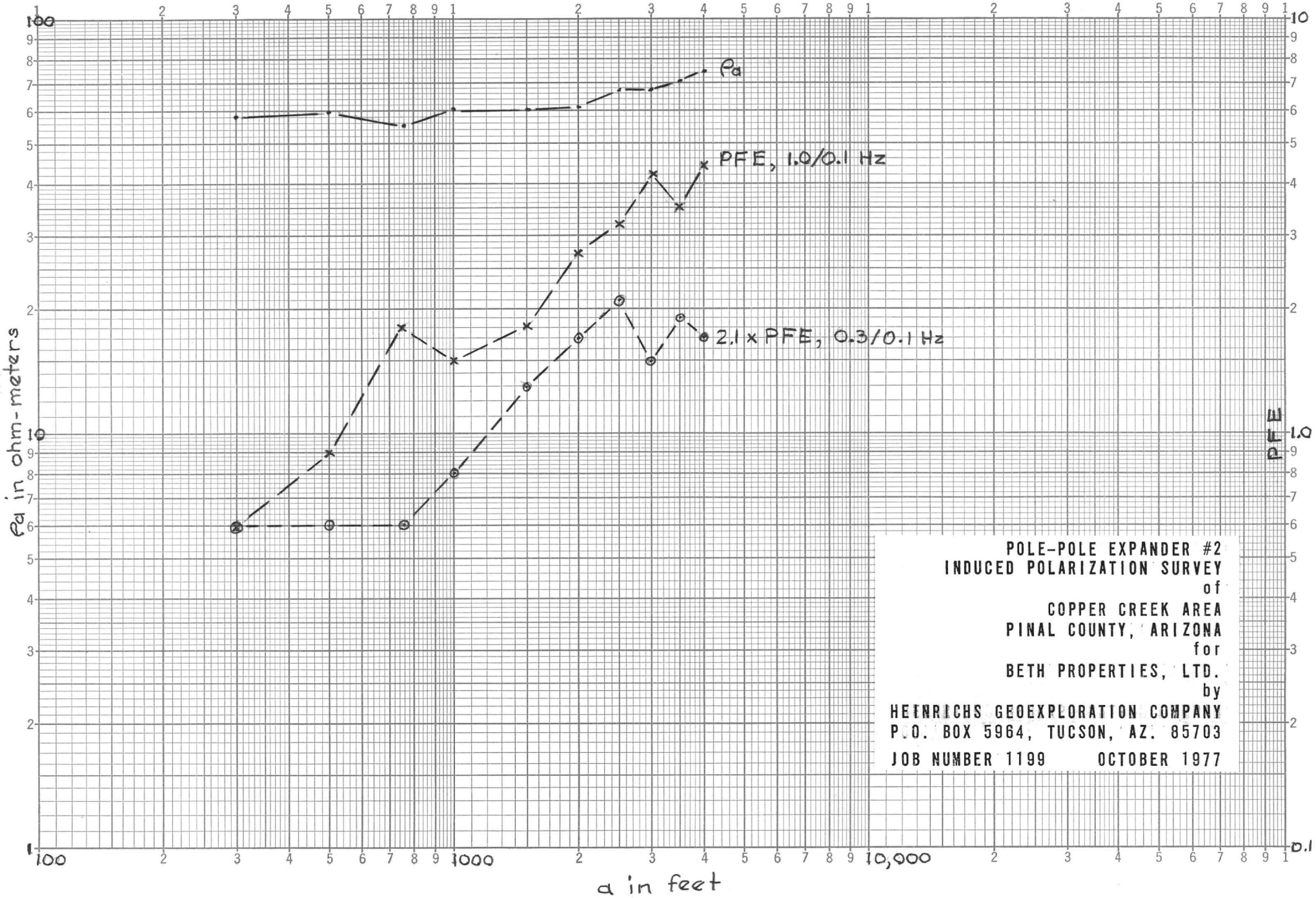

POLE-POLE EXPANDER #2
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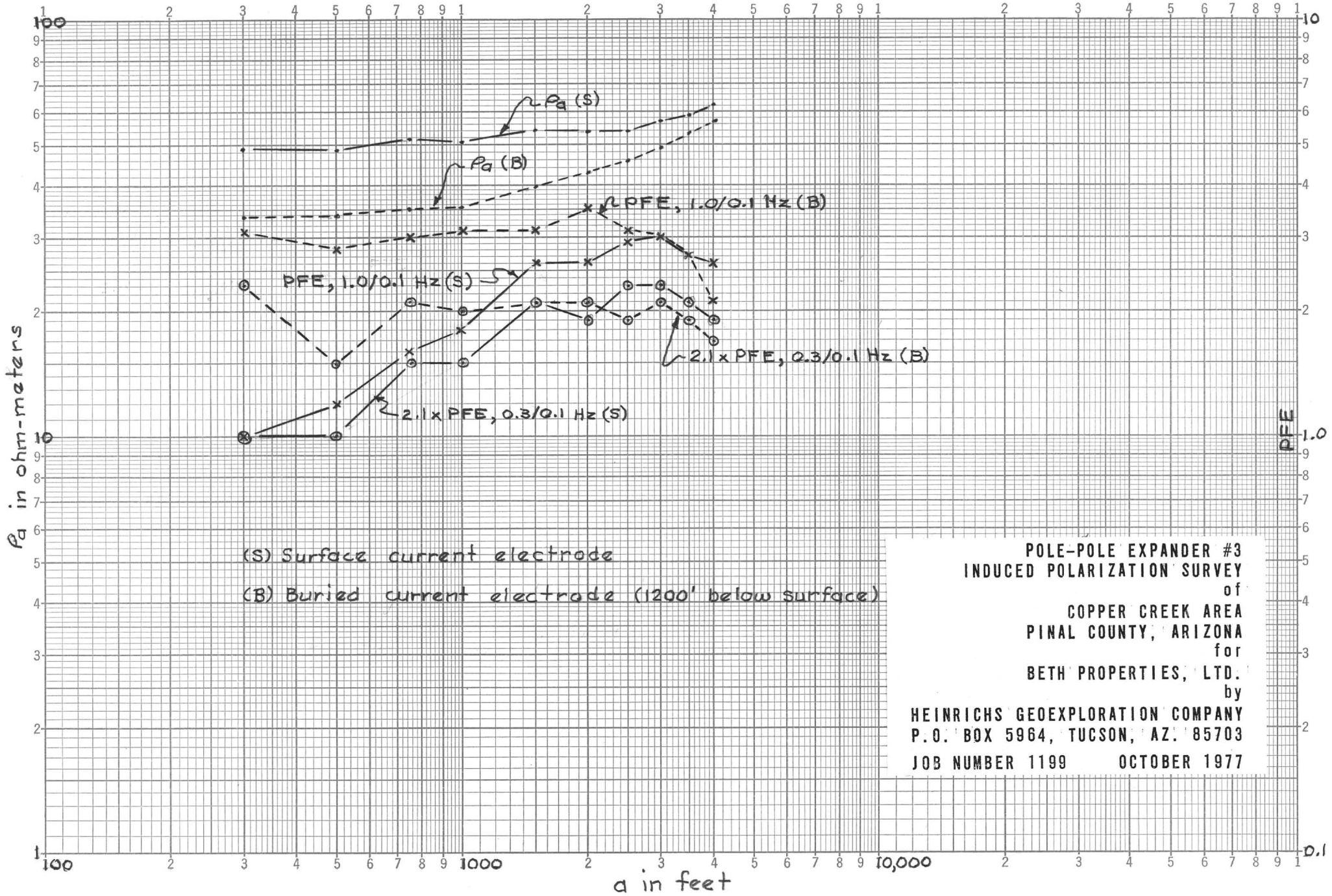


HEINRICHS GEOEXPLORATION COMPANY

P.O. BOX 5964, TUCSON, ARIZONA 85703. 806 WEST GRANT ROAD. PHONE: (602) 623-0578

November 7, 1977

Mr. Kirby C. Coryell
Canus, Ltd.
5140 East Burns Street
Tucson, AZ 85711

Re: IP Survey
Miami Area
Gila County, Arizona
GEOEX Job #1199

Dear Mr. Coryell:

Attached hereto are three expander plots and a location map for the recently completed IP survey you requested on behalf of Canus, Ltd. in the Miami (Kay Bohme) Area. This work was done during August 1977 and consists of three pole-pole array IP expanders. The purpose of this survey was to locate possible deeply buried extensive disseminated sulfide zones below a thick section of Gila Conglomerate and unmineralized Pinal Schist. Also, the work is to serve as a partial fulfillment of annual Federal mining claim assessment requirements.

The locations of the expanders and the current and voltage "infinites" are shown on the accompanying plan map. The expander results are presented as standard electrical soundings on double logarithmic plot sheets, one for each expander, showing the apparent resistivity and percent frequency effects (PFEs) plotted against the "a" spacing. The "a" spacing is the separation distance between the current and voltage electrodes and varied from 200 to 4000 feet. This would typically be expected to give useful information from about 100 feet to as much as 6000 feet below surface.

The PFE data was obtained using a frequency pair of 1.0 vs 0.1Hz on all three expanders. In addition, Expanders #2 and 3 also utilized a frequency pair of 0.3 vs 0.1Hz and the resulting PFEs in this case have been multiplied by a 2.1 factor to normalize the data to a standard decade frequency spread to allow a direct comparison of data on the two different frequency pairs.

Considerable telluric and sferic electrical noise was present during the course of the field readings and the data is therefore only accurate to

about +/- 0.5 PFE. The resistivity data is accurate as plotted and has been corrected for the actual positions of the "infinites". Resistivities are in units of ohm-meters.

The IP data on Expander #1 shows only typical background response. Expander #2 may be very weakly anomalous at depth but electromagnetic (EM) coupling interference appears to account for much of the response in that the PFEs at 1.0 vs 0.1Hz are appreciably higher than the normalized PFEs at 0.3 vs 0.1Hz. Were all the measured IP response due to sulfide polarization, i.e., no EM coupling present, PFEs on both frequency pairs would be approximately equal. The difference in response seen here indicates that some EM coupling is present, even at the lower pair of frequencies, and if all coupling effects were removed, the lower frequency PFE data would be reduced to perhaps just under 2 PFE. This is considered high background or just borderline anomalous response for the rock types involved.

Expander #3 shows somewhat higher IP response than on Expander #2 and, for the deeper data at least, the difference between PFEs at the two frequency pairs is not large. Therefore, perhaps 2.5 to 3.0 PFE coupling corrected IP response may remain. This is weak, but possibly significant IP anomalism, and is compatible with the expected target of an extended body buried roughly 4000 to 5000 feet deep having an intrinsic IP response of 6 to 10 PFE. Somewhat weaker response from a shallower depth could also explain the observed anomalism but is perhaps less likely considering the geology based on nearby drilling.

A partially grounded metal pipeline is present between Expanders #2 and 3, about 1000 feet distant from both expanders, that could possibly be causing or be contributing to the anomalous IP response. Additional work would be necessary to definitively determine how much, if any, response is due to the pipeline. However, the ground was quite dry during the survey and the expanders were kept at a reasonably large distance from the pipeline so spurious interference is probably not a factor in this case.

Resistivities on all three expanders indicate a three-layer situation: an intermediately high resistivity surface layer situated above a relatively conductive layer that rests upon a fairly high resistivity layer. Expander #2, through curve matching, suggests a possible interpretation of a surface layer about 650 feet thick with a 90 ohm-meter intrinsic resistivity resting on a 30 ohm-meter middle layer about 1300 feet thick in turn resting on an extended zone of 900 ohm-meter material.

Expander #3 indicates a possible interpretation of 800 feet of upper layer material having a resistivity of about 170 ohm-meters lying on a layer about 1500 feet thick of 17 ohm-meter resistivity in turn resting on an extended zone of 1700 ohm-meter material. Expander #1 did not present a very

interpretable curve perhaps due to lateral variations in resistivity.

The three interpreted layers may represent Gila above and below the water table resting on a high resistivity bedrock. (Pinal Schist?) Another three-layer possibility may involve a more sandy Gila resting on a more clayey Gila resting on resistive bedrock.

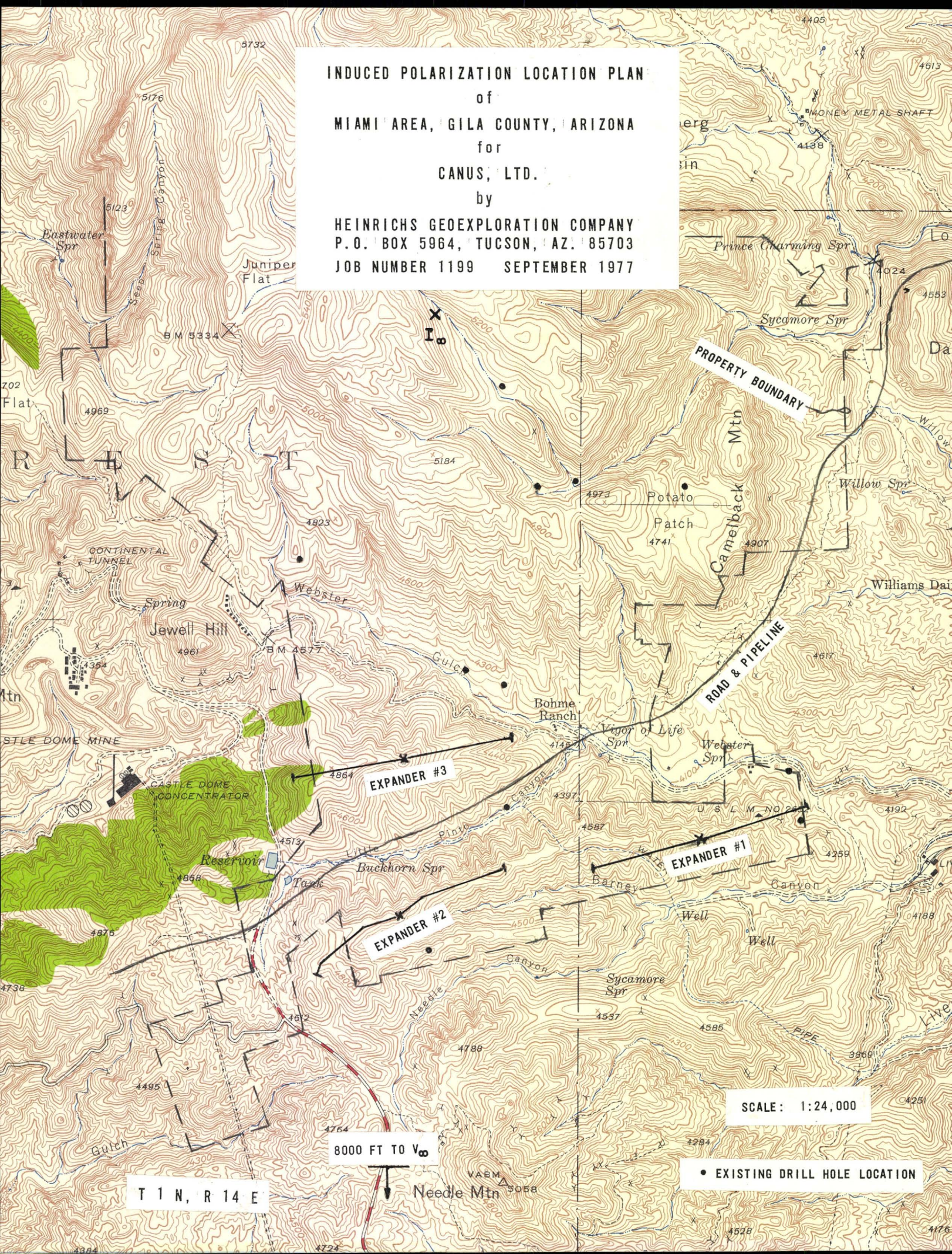
Respectfully submitted,

Heinrichs GEOEXploration Company

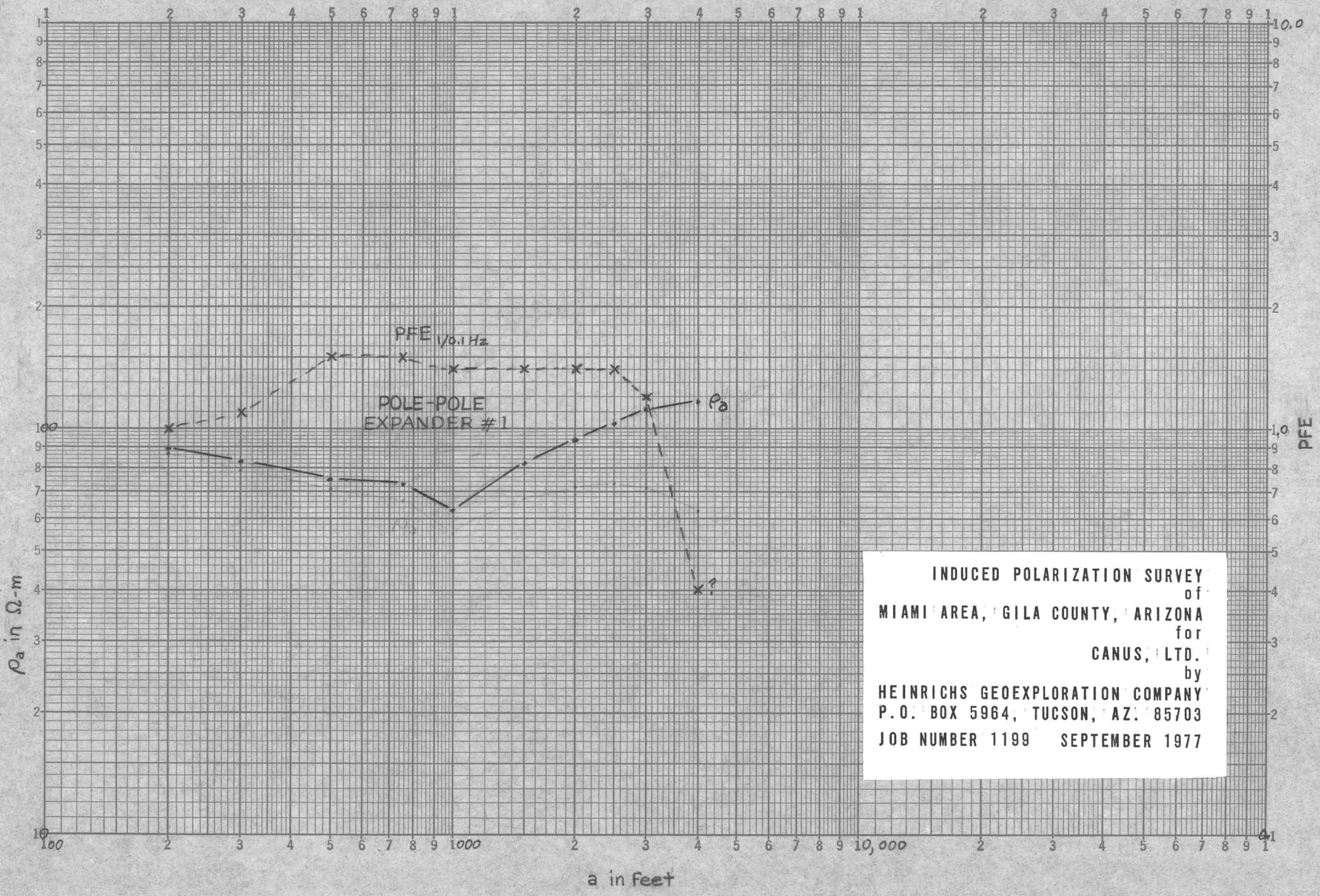
Chris S. Ludwig
Chief Geophysicist

CSL:mt

GEOEX Job #1199
P.O. Box 5964
Tucson, AZ
11/7/77


INDUCED POLARIZATION LOCATION PLAN
of
MIAMI AREA, GILA COUNTY, ARIZONA
for
CANUS, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 SEPTEMBER 1977
PROPERTY BOUNDARY
ROAD & PIPELINE
EXPANDER #1
EXPANDER #2
EXPANDER #3
SCALE: 1:24,000
8000 FT TO V∞
• EXISTING DRILL HOLE LOCATION
T 1 N, R 14 E
Needle Mtn
Camelback Mtn
Potato Patch
Jewell Hill
Bohme Ranch
Vigor of Life Spr
Webster Spr
Sycamore Spr
Prince Charming Spr
Willow Spr
Eastwater Spr
Juniper Flat
Spring Canyon
CONTINENTAL TUNNEL
CASTLE DOME MINE
CASTLE DOME CONCENTRATOR
Reservoir
Tank
Little Buckhorn Spr
Pinto Canyon
Barney Canyon
Needle Canyon
Webster Gulch
MONEY METAL SHAFT
Williams Dai
BM 5334
BM 4577
VABM 5058
U S L M NO 26

K+E LOGARITHMIC 2 X 3 CYCLES 46 7323 MADE IN U.S.A.
KEUFFEL & ESSER CO.



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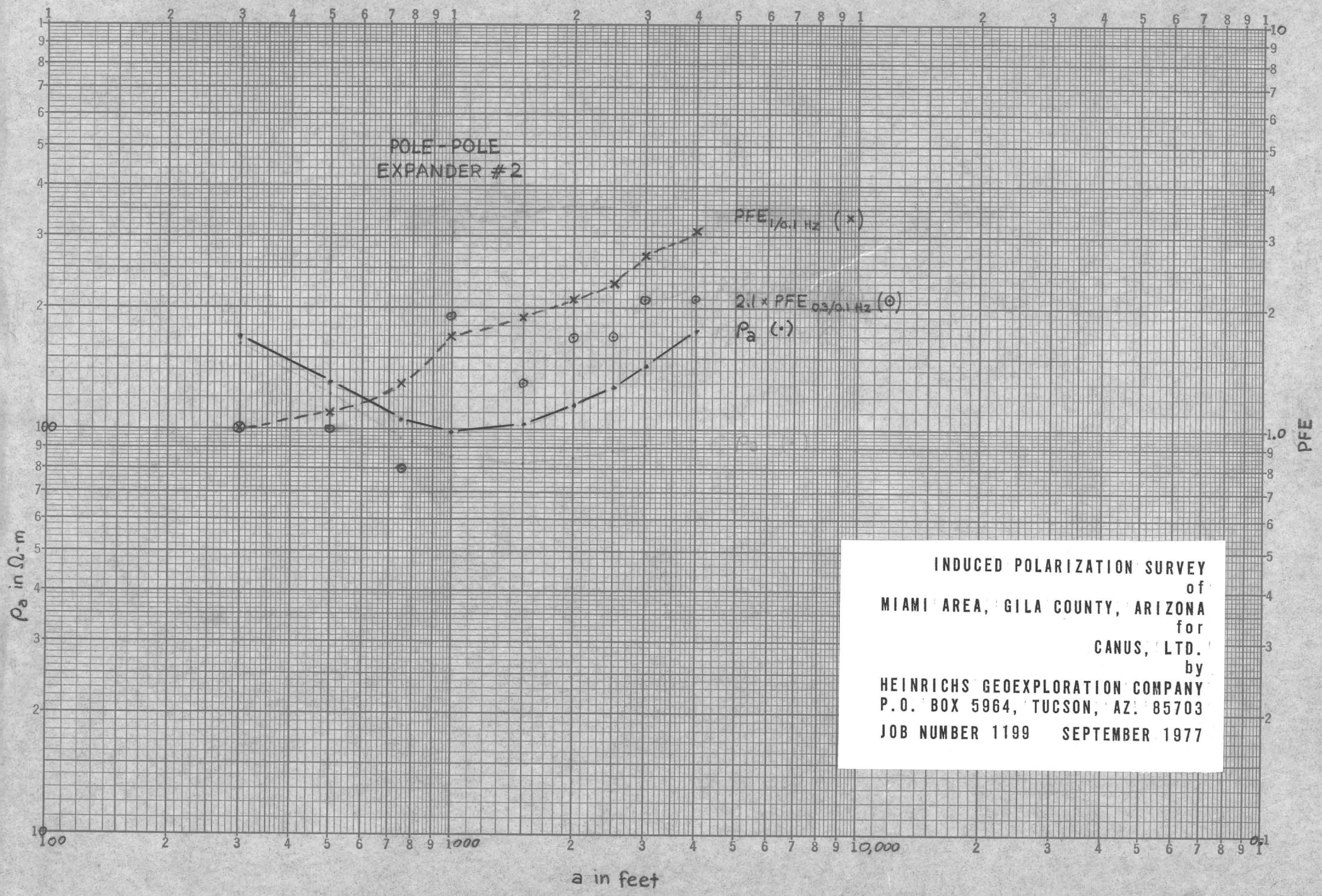

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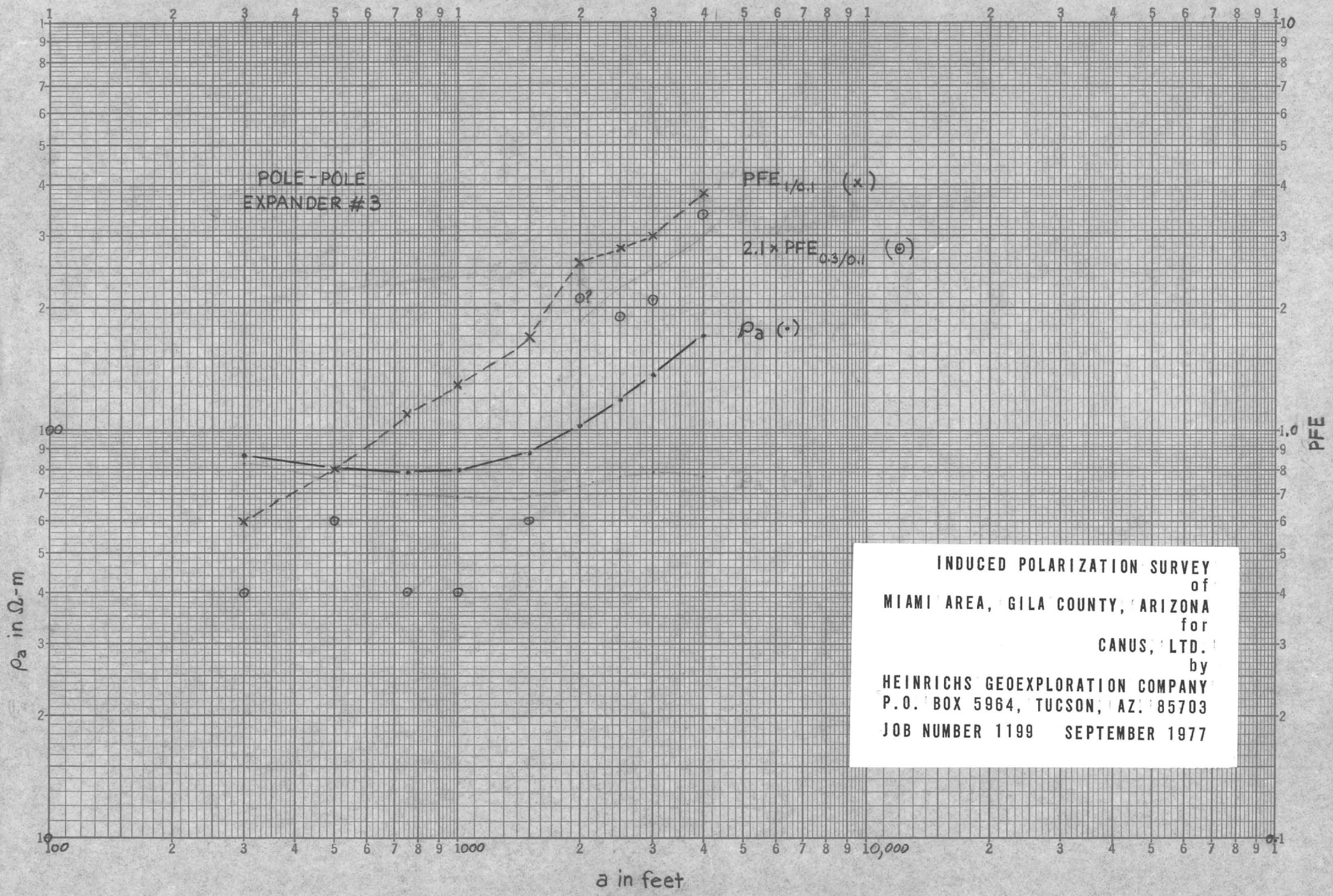

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HEINRICHS GEOEXPLORATION COMPANY

P.O. BOX 5964, TUCSON, ARIZONA 85703, 806 WEST GRANT ROAD, PHONE: (602) 623-0578

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Respectfully submitted,

Heinrichs GEOEXploration Company

Chris S. Ludwig

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Chief Geophysicist

CSL:mt

GEOEX Job #1199
P.O. Box 5964
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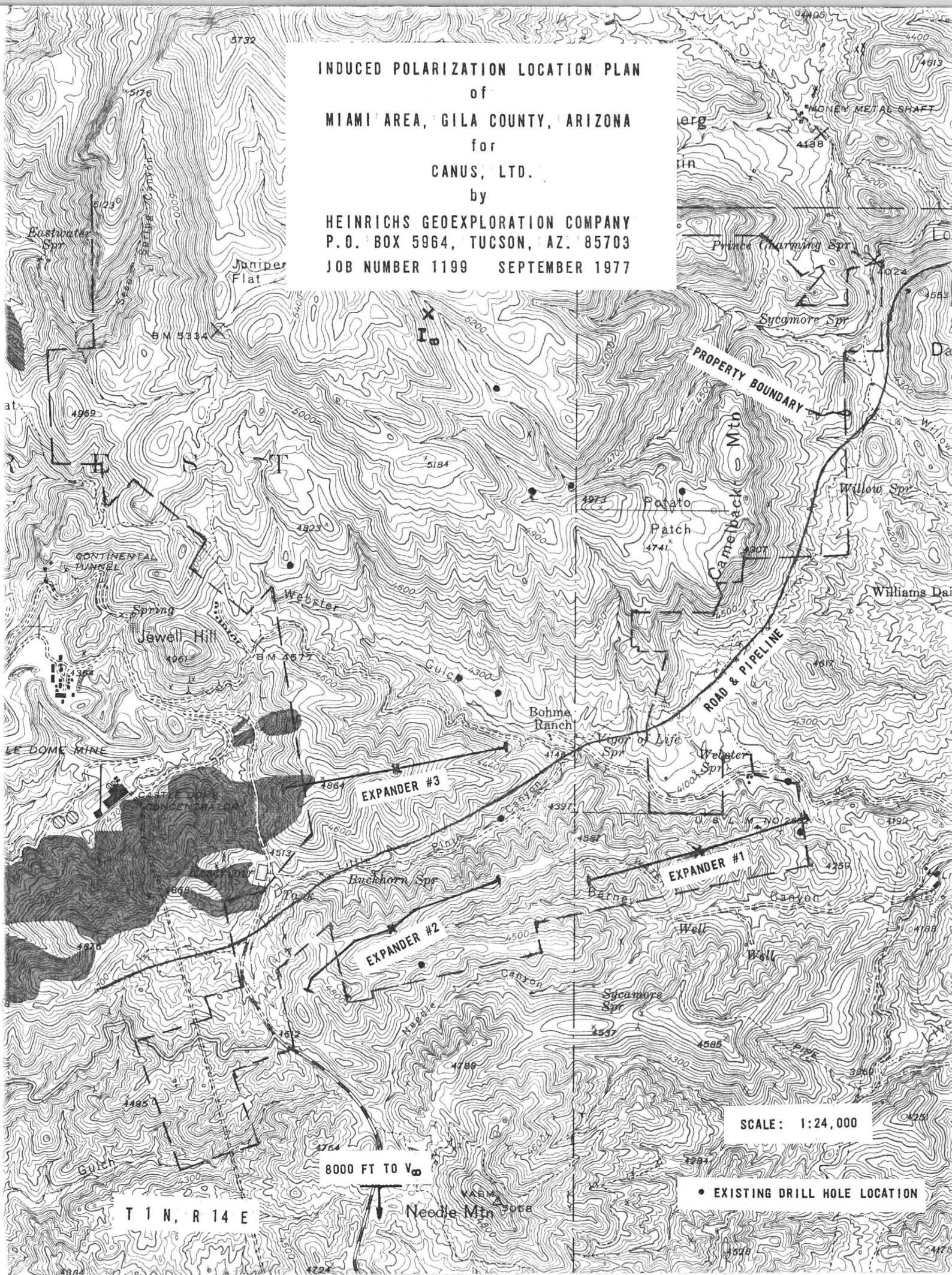
11/7/77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for
CANUS, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 SEPTEMBER 1977
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EXPANDER #2
EXPANDER #3
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SCALE: 1:24,000
8000 FT TO V∞
• EXISTING DRILL HOLE LOCATION
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Potato Patch
Camelback Mtn
Bohme Ranch
Vigor of Life Spr
Webster Spr
Sycamore Spr
Prince Charming Spr
Willow Spr
Buckhorn Spr
Juniper Flat
Eastwater Spr
CONTINENTAL TUNNEL
CASTLE DOME CONCENTRATOR
MONEY METAL SHAFT
Barney Canyon
Well
Gulch
Canyon

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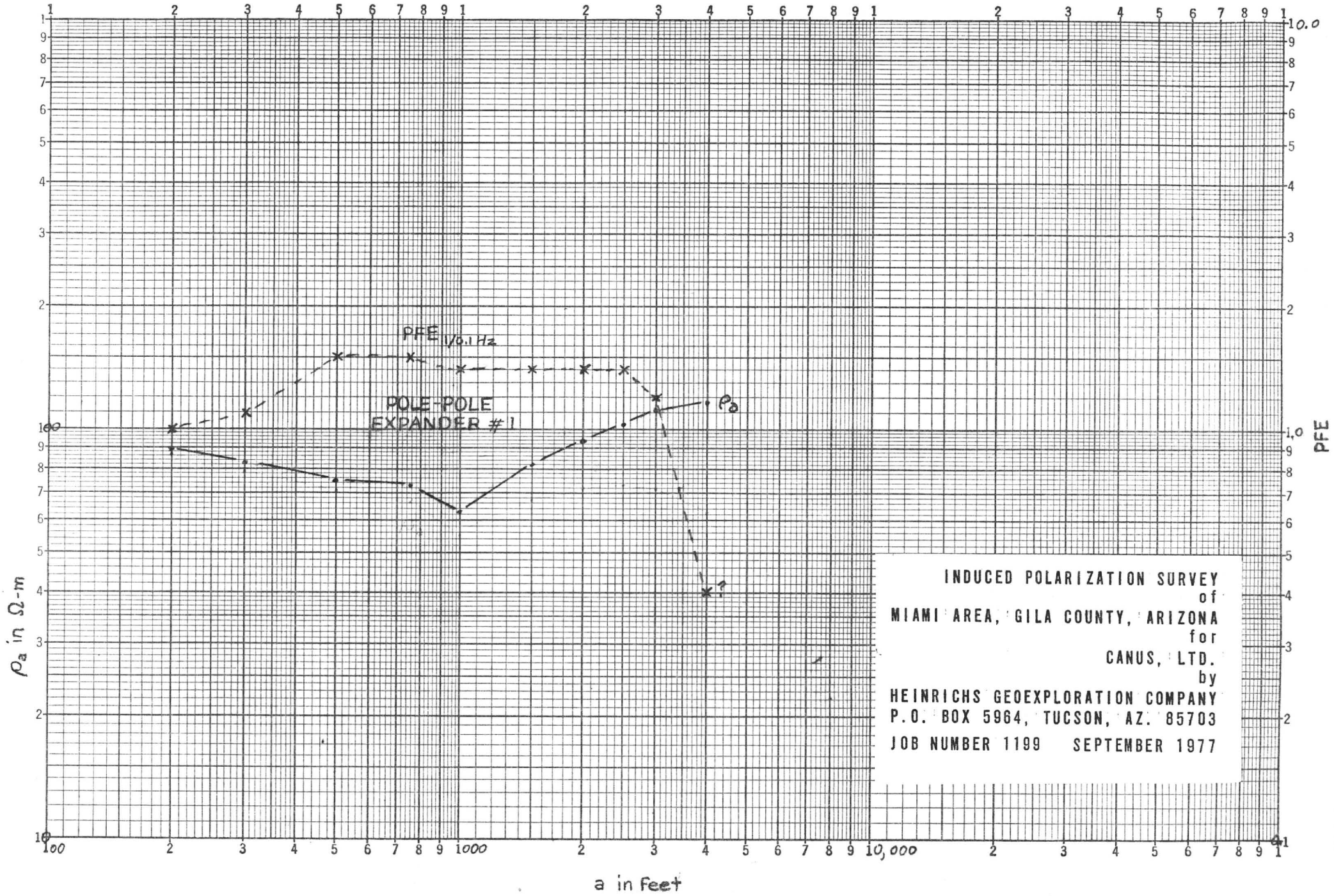

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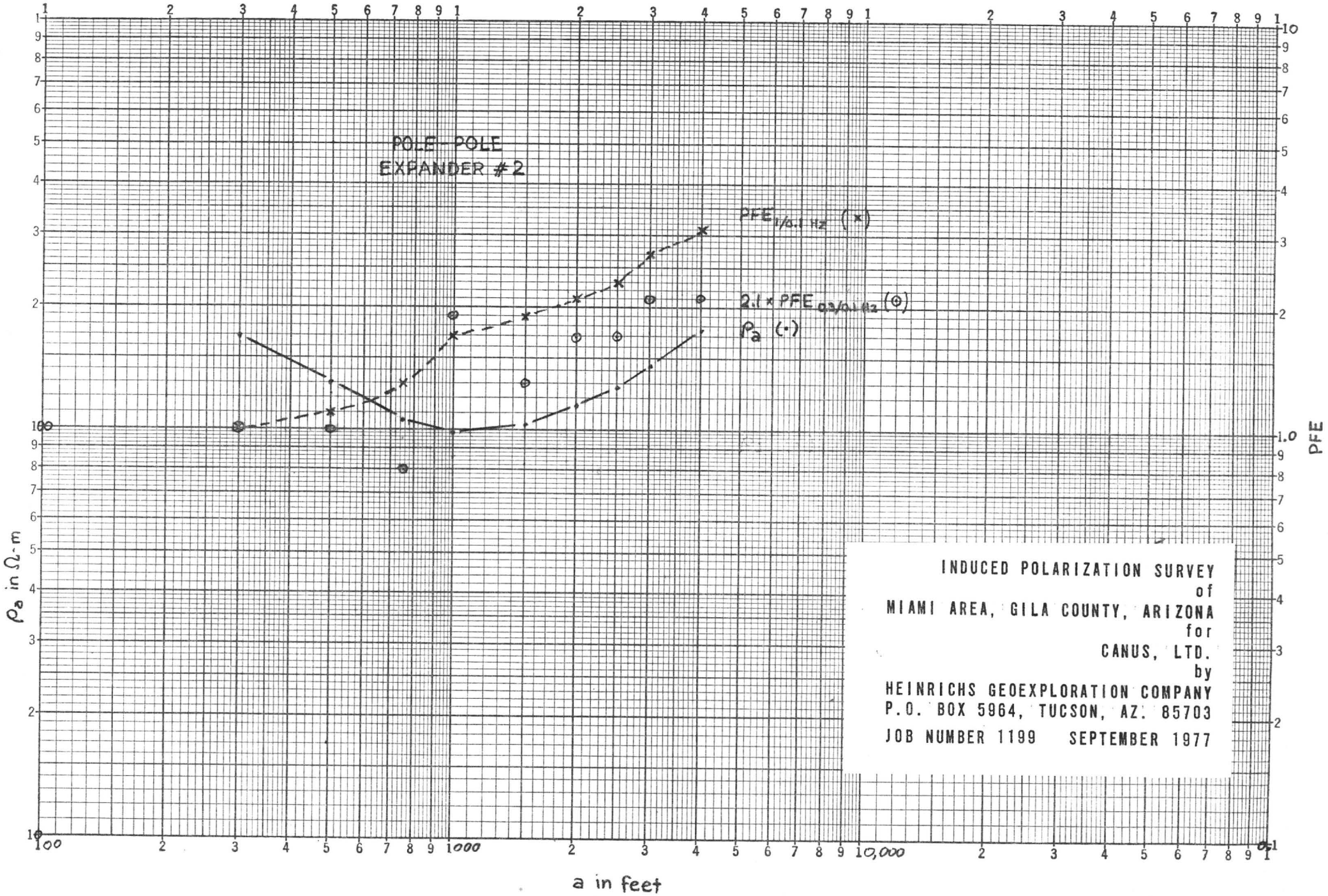

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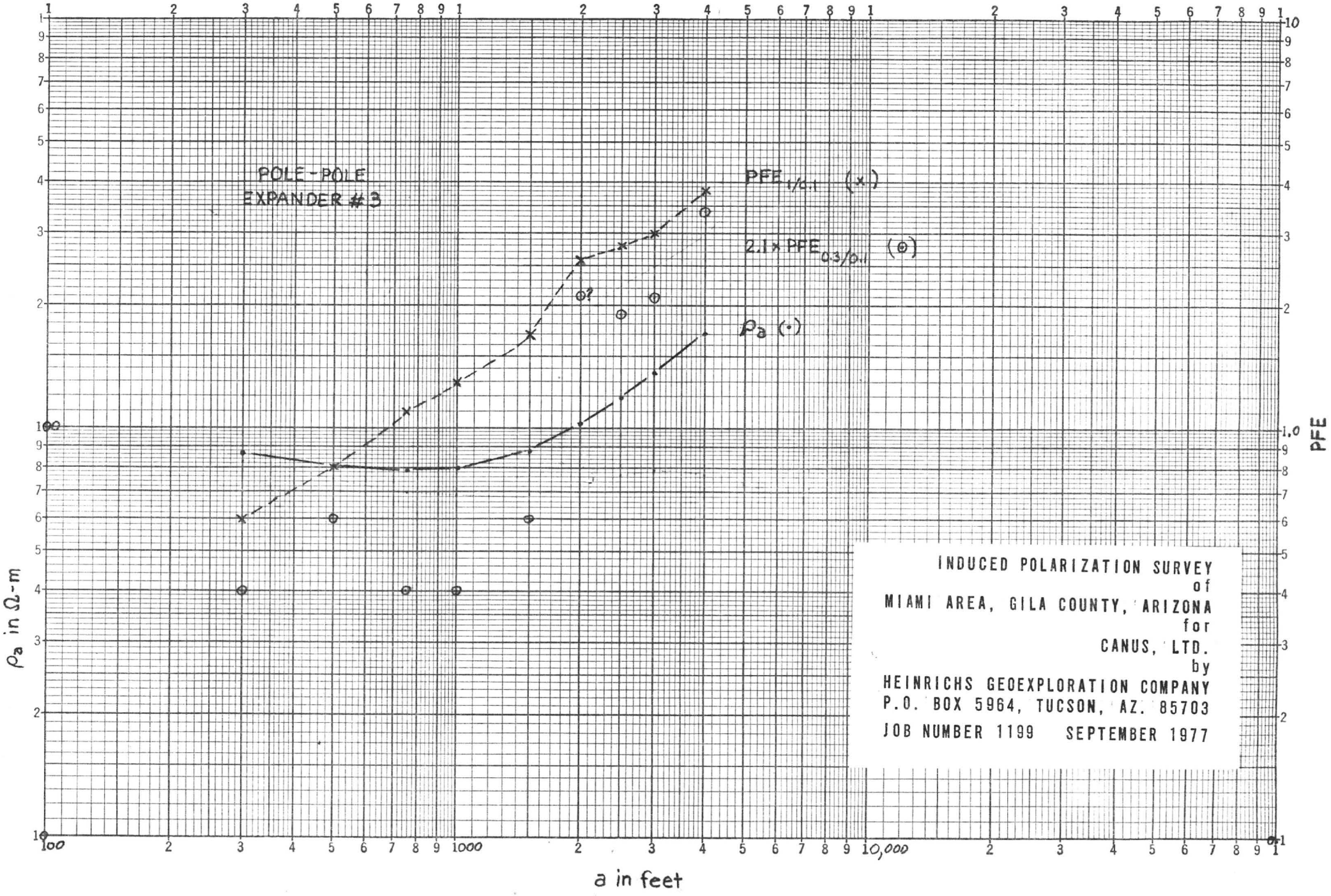

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GEOEX Job #1199

Dear Mr. Coryell:

Included herewith are the final plots and data tabulation of the six pole-pole IP expanders completed by us during August and September, 1977, at your request for Beth Properties, Ltd., in the Copper Creek Area, Pinal County, Arizona. The purpose of this survey was to prospect for large scale disseminated sulfide zones at depths in excess of 4000 feet below a thick section of Gila Conglomerate and post-ore volcanics. In addition, this work is in partial fulfillment of Federal mining claim annual labor requirements.

The pole-pole expander locations are shown on the accompanying location plan. This plan also shows the position of the voltage and current "infinites". The results of Expanders #1, 2 and 3 are presented as standard electrical soundings on double logarithmic plot sheets, one for each expander, for the percent frequency effect (PFE) and the apparent resistivity. PFEs were read on two different frequency pairs, i.e., 0.1 vs 1.0Hz and 0.1 vs 0.3Hz. The 0.1 vs 0.3Hz PFE pair data has been multiplied by a 2.1 factor to normalize it to a standard decade frequency spread. This allows data from the two pairs to be directly compared.

Results for Expanders #4, 5 and 6 are shown in tabular form since they involve only the two deepest "a" spacings. For Expanders #1, 2 and 3, the "a" spacing, or the separation between the current electrode and the voltage electrode, was expanded from 300 feet out to 4000 feet. This should typically yield useful information from about 150 feet below surface down to perhaps as much as 6000 feet below surface.

Expanders #3 and 4 involved a buried electrode in addition to the normal surface electrode. The buried electrode was placed at 1200 feet depth in the

3605 foot deep vertical drill hole in the south central part of Section 31. Ideally, the electrode would have been grounded at the bottom of the hole but a caved zone at 1200 feet precluded doing so. Data from the buried electrode is presented in the same manner as the surface electrode data and where the "a" spacing is the distance between the drill hole collar and the voltage measuring point.

The field PFE data was difficult to obtain accurately due to strong telluric, sferic and perhaps man-made electrical noise arising from San Manuel, however, the data is considered accurate to within +/- 0.5 PFE. The resistivity data has been calculated taking into account the actual finite location of the "infinites" and is presented in units of ohm-meters.

The IP data are not considered anomalous. Even though some of the 1.0 vs 0.1Hz data is over 5 PFE, the corresponding equivalent decade normalized 0.3 vs 0.1Hz data is everywhere less than 3 PFE. This is indicative of considerable electromagnetic (EM) coupling interference present, even at 0.3Hz. Thus, the "true" or corrected decade PFE with all EM coupling removed, would likely be less than 2 PFE and is therefore within the typical background, normal unmineralized, response-range of the rocks involved.

The resistivity data for Expander #1 suggests a relatively resistive surface layer, about 100 ohm-meters in average resistivity, approximately 700 feet thick overlying a thick section of about 30 ohm-meter material. This interface could possibly be the water table but is perhaps more likely sands and gravels overlying more clayey lake bed sediments. No bedrock depth estimate can be made from this expander as only two layers are indicated.

Expanders #2 and 3 suggest, very roughly, 4000 feet of 50 to 60 ohm-meter material resting on 100+ ohm-meter material. This is compatible with Gila Conglomerate overlying a volcanic or intrusive bedrock and is within the expected overburden depth range. The buried electrode survey for Expander #3 suggests a somewhat lower, 30 ohm-meter, Gila resistivity but a similar bedrock resistivity and depth.

Expanders #4, 5 and 6 are only two data points each so no curve fitting is possible. However, the lower apparent resistivities on Expander #4 indicate a somewhat deeper (or more conductive) overburden than do Expanders #2 and 3. And, higher apparent resistivity on Expanders #5 and 6 may indicate a somewhat shallower overburden than do Expanders #2 and 3.

In conclusion, no large scale sulfide zones were detected in the areas surveyed down to perhaps as deep as 6000 feet. However, that does not rule out the possibility of important mineralization still being present. These expanders were widely separated, leaving many untested areas, and also they would not likely give a detectable response to possibly significant sulfide zones having dimensions less than their depth of burial.

Respectfully submitted,

Heinrichs GEOEXploration Co.

Chris S. Ludwig

Chris S. Ludwig
Chief Geophysicist

CSL:mt

Job #1199
11/4/77
Box 5964
Tucson, AZ 85703

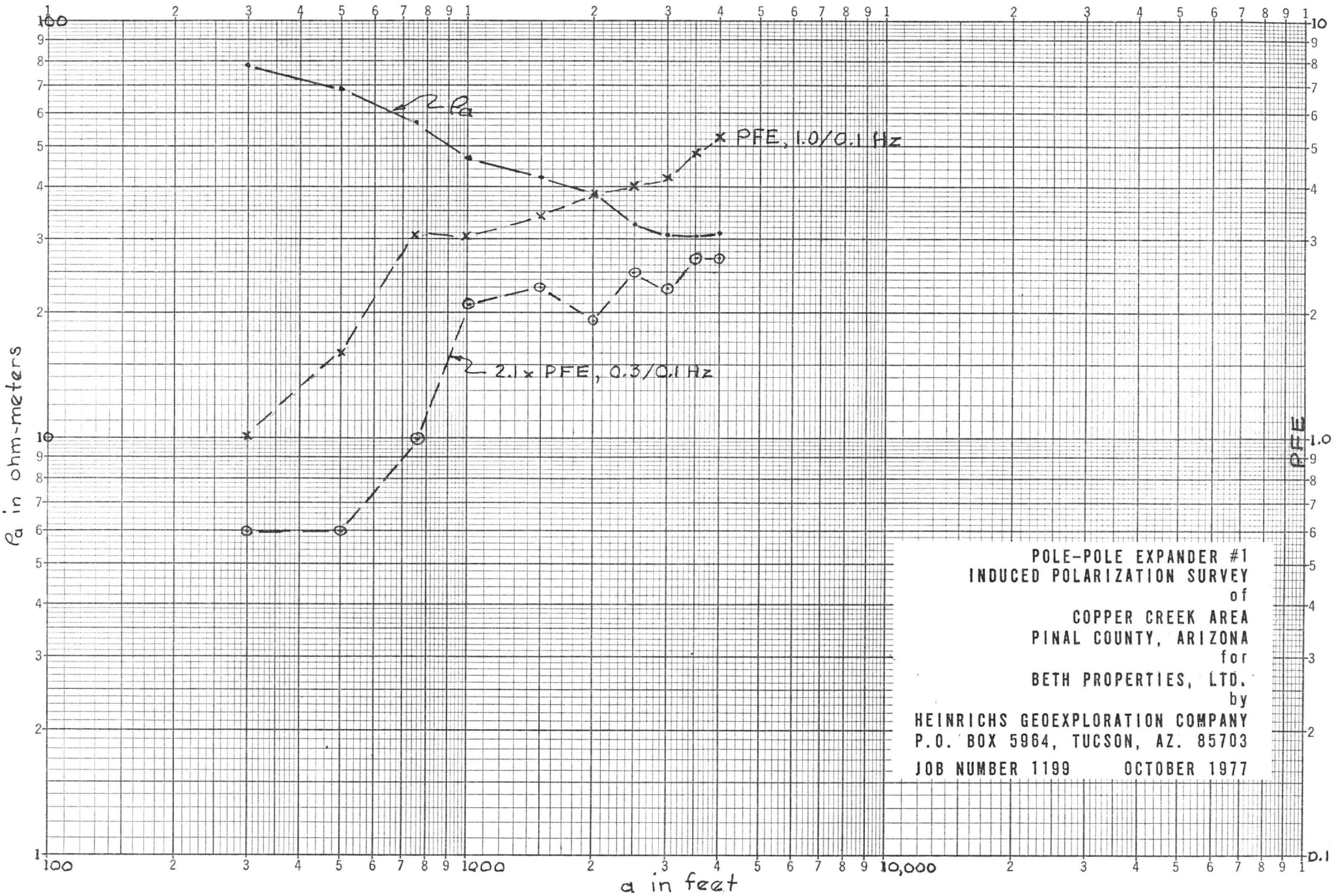
TABLE OF DATA FOR

POLE-POLE EXPANDERS #4, 5 & 6

Expander #	"a" in feet	Resistivity in ohm-meters	PFE @ 1 & 0.1Hz	2.1 X PFE @ 0.3 & 0.1Hz
4 (surface current electrode)	3500	40.8	4.5	1.7
	4000	41.0	5.0	2.1
4 (buried current electrode)	3500	37.0	5.0	1.9
	4000	37.2	5.9	2.5
5	3600	99.2	4.9	1.6
	4100	102.0	5.0	2.0
6	3500	79.1	4.5	2.1
	4000	83.9	4.8	2.3

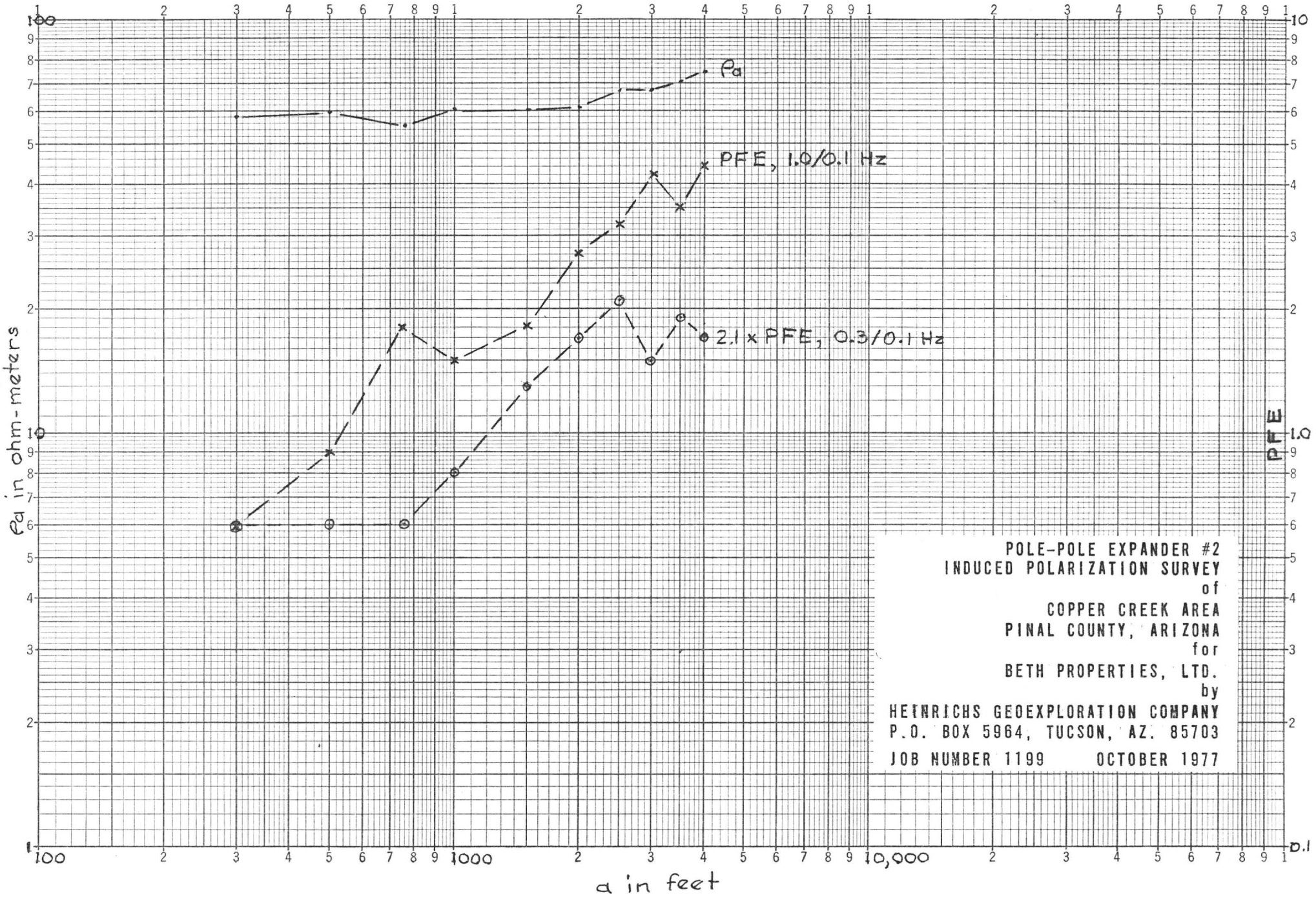
Note: For Expander #4, the buried electrode was grounded 1200 feet below surface.

K+E LOGARITHMIC 2 X 3 CYCLES 46 7320 MADE IN U.S.A.
KEUFFEL & ESSER CO.



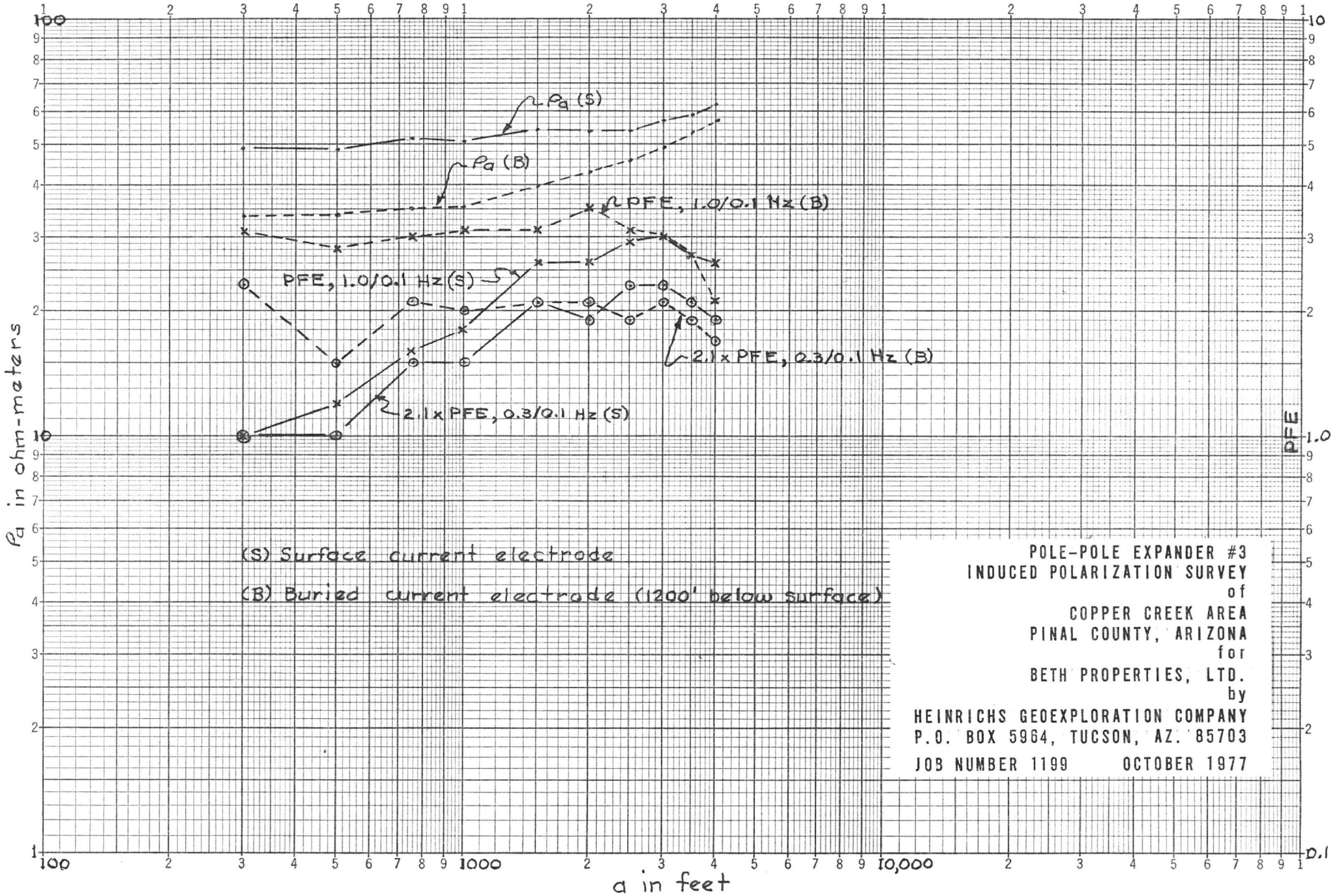
POLE-POLE EXPANDER #1
INDUCED POLARIZATION SURVEY
of
COPPER CREEK AREA
PINAL COUNTY, ARIZONA
for
BETH PROPERTIES, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 OCTOBER 1977

K+E LOGARITHMIC 2 X 3 CYCLES 46 7320 MADE IN U.S.A.
KEUFFEL & ESSER CO.



POLE-POLE EXPANDER #2
INDUCED POLARIZATION SURVEY
of
COPPER CREEK AREA
PINAL COUNTY, ARIZONA
for
BETH PROPERTIES, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 OCTOBER 1977

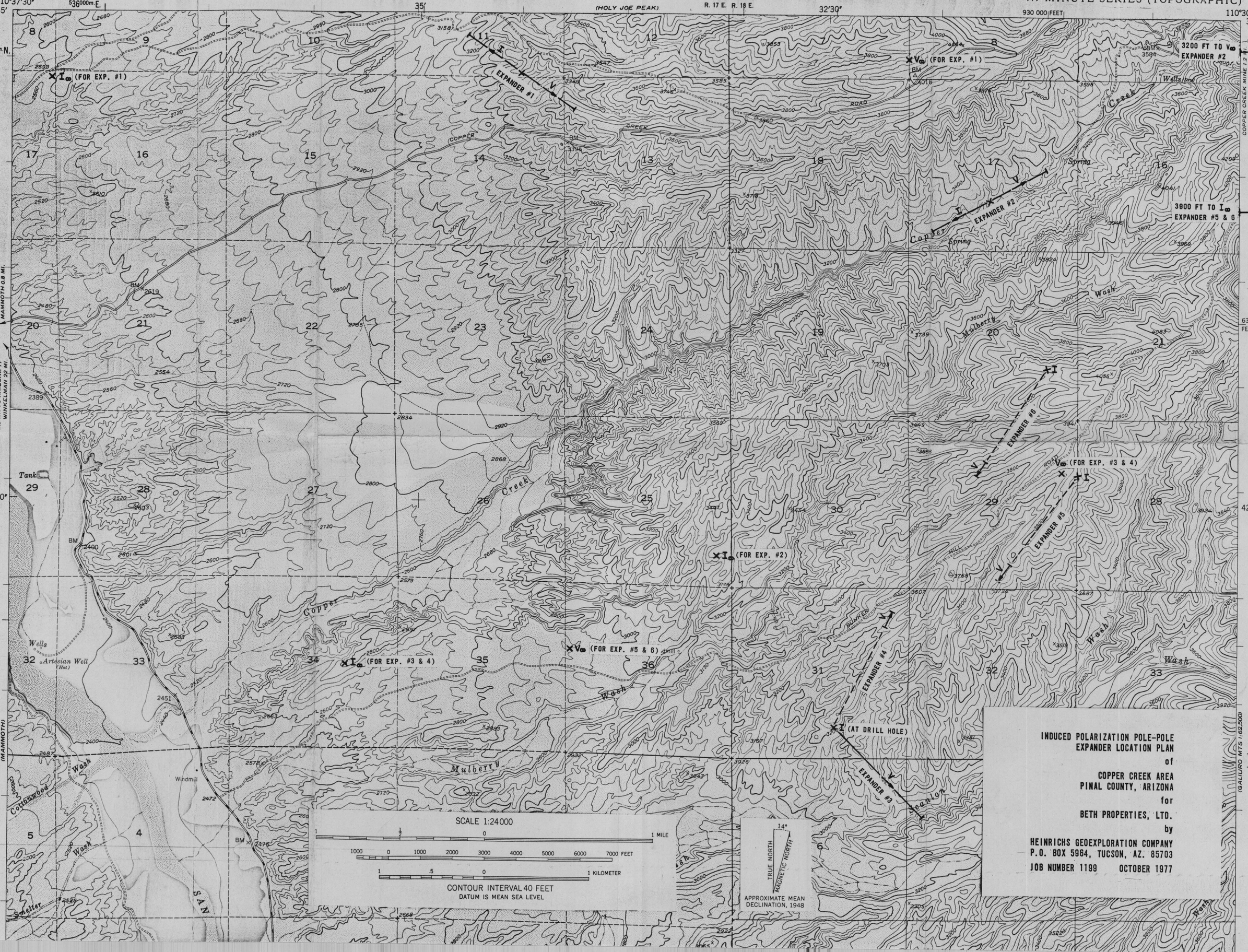
K+E LOGARITHMIC 2 X 3 CYCLES 46 7320 MADE IN U.S.A.
KEUFFEL & ESSER CO.



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS

CLARK RANCH QUADRANGLE
ARIZONA–PINAL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



INDUCED POLARIZATION POLE-POLE
EXPANDER LOCATION PLAN
of
COPPER CREEK AREA
PINAL COUNTY, ARIZONA
for
BETH PROPERTIES, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 OCTOBER 1977

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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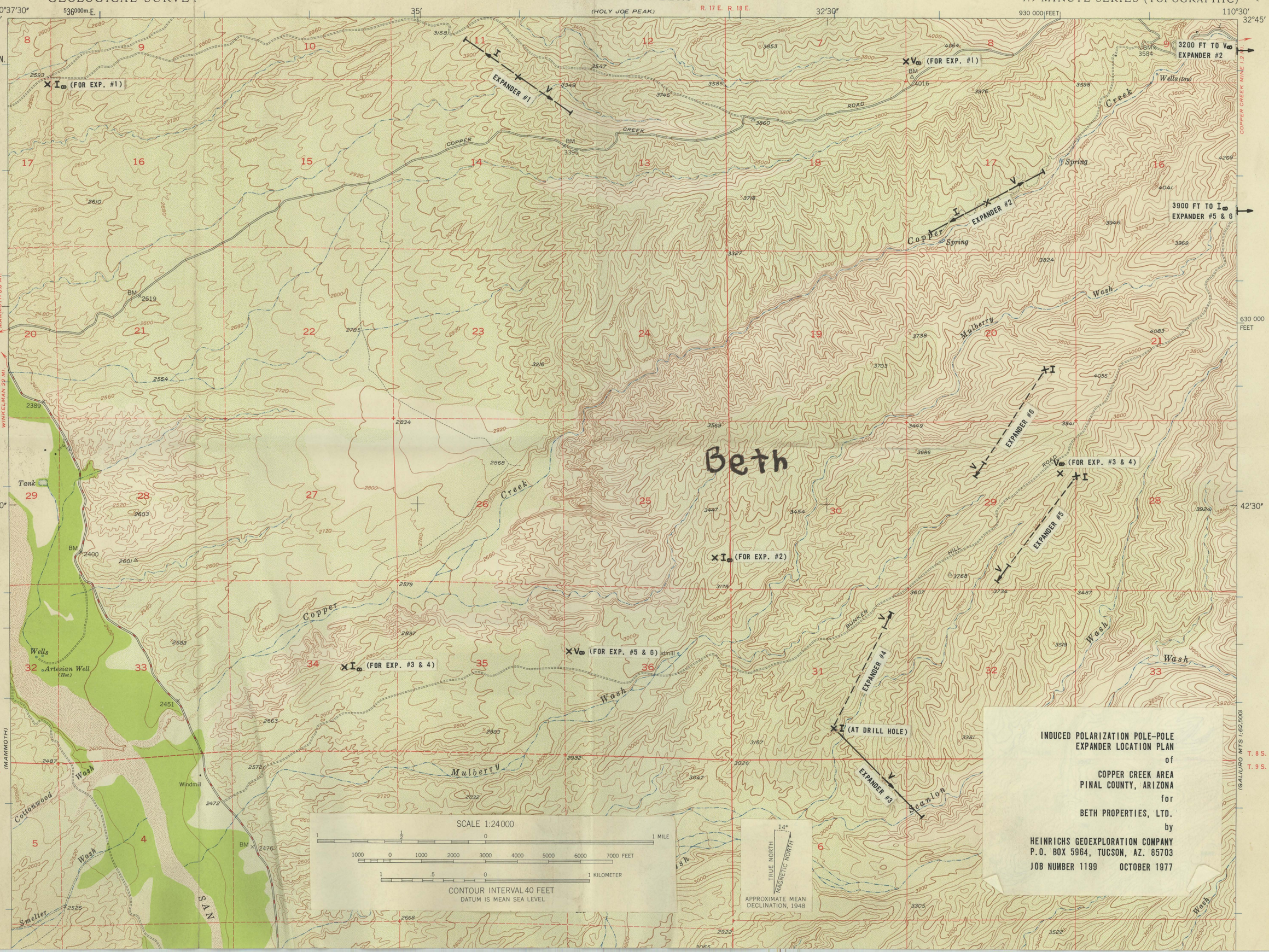
CLARK RANCH QUADRANGLE
ARIZONA—PINAL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



INDUCED POLARIZATION POLE-POLE
EXPANDER LOCATION PLAN
of
COPPER CREEK AREA
PINAL COUNTY, ARIZONA
for
BETH PROPERTIES, LTD.
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1199 OCTOBER 1977

I. P. RECEIVER NOTES, JOB No. 1199, AREA Copper Creek

LINE Ex#1, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE No. _____, DATE 9/2/77

PAGE 1

HEINRICHS GEOEX

SEND		1-2 →										CAL
RECEIVE 9/2		150	250	375	500	750	1000	1250	1500	1750	2000	1-2
MULTIPLIER		10	10	10	1	1	1	1				1 10
PFE												
CUR. (AMPS)		3.5	3.8	3.5	3.9	4.5	4.2	4.0				1.0
POINT No.												
SEP. (n)												
H. F. MV												0.0
DRIFT			↓									↓
3.0 PFE	K_n/1000	-1.0	-2.1 -2.1	-3.3 3.4 3.5	-5.4 (20)	-8.0 (6	-12.8					0.1 0.1
0.3 PFE	ρ_{CAL}	0.7	0.9 1.1	1.7	1.8	2.7 3.3 2.1	4.3 3.6 4.5					0.1 0.2
0.1 PFE	PFE_c	1.1 (1.0)	1.7 1.6	3.1 ~2.5 3.4	3.1 ±0.2	3.4 3.1 2.8 2.8	OVER					0.1 0.8
1.0 MV	$\rho/2\pi$	457.	257.5	127.	84.0 (20	53.7 (20	32.6 (20	20.25				98.0 (0.1)
DRIFT	MCF	0.2	0.6 259. 0.0	0.0 (0 0.46 1.52	0.0 (6	0.2 (6	0.0 (6					0.1 0.0
S. P.												
NOISE												
POT RES.												
CULT & CMTS												

Norm on 0.3 (new sheet)

I. P. RECEIVER NOTES, JOB NO. _____, AREA _____

LINE _____, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE NO. _____, DATE _____

PAGE _____

HEINRICHS GEOEX

SEND											
RECEIVE											
MULTIPLIER											
PFE											
CUR. (AMPS)											
POINT NO.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	$K_n/1000$										
0.3 PFE	ρ_{CAL}										
0.1 PFE	PFE_c										
3.0 MV	$\rho/2\pi$										
DRIFT	MCF										
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

1000'

0.1

3.7 4.8

3.9 5.3

4.3 5.7

4.9 6.0

5.7

5.9 6.1

6.1

5.8 5.5

5.5 4.9

5.2 4.1

5.1 3.7

4.9 3.7

4.7 4.4

4.5 5.7

4.2

4.0 4.8

3.9

3.7

3.7

4.3

I. P. RECEIVER NOTES, JOB No. 1199, AREA Copper Creek

LINE Ex#1, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE No. _____, DATE 9/3/77

PAGE 2

HEINRICHS GEOEX

SEND %	1500	250	375	500	750	1000	1250	1500	1750	2000	CAL
RECEIVE	1-2 →							1-3 4500			1-2
MULTIPLIER	10	10	10	1	1	1	1	1	1	1	10
PFE						4.2		-4.2	1.4		
CUR. (AMPS)	3.5	3.8	3.5	3.9	4.5	-2.8	4.0	4.3 4.3	4.3 (4.5)	4.8	
POINT NO.						-14.1		-24.5 /20			
SEP. (n)						0.9 0.9		1.1 ~ 1.7			
H. F. MV						33.4 /60		15.95 /60			
DRIFT								-1.0 ? generator !			
1.0 PFE K_n/1000	1 -0.3	0.1	0.7	-1.4	-2.3	-4.0		-5.2 /20	-4.8 ~ /20	-5.3 ~ /20	0.1 -0.0
0.3 PFE ρ_{CAL}	3 -1.4	-1.9	-2.7	-6.7	-10.5	-19.0		-25.0 /20	-26 /20	-29 /20	0.3 0.2
0.1 PFE PFE_c	0.1 0.0	0.3	0.5	1.0	1.1 0.2	1.2 ~ 0.6 1.8		OVER 2.0	1.3 ± .2	1.3 ± .2	0.0
3.0 MV $\rho/2\pi$	0.3 459.0	258. /60	127. /60	85.1 /60	55.3 /60	20.0 /60		15.05 /60	13.4 /60	11.8 /60	98.2
DRIFT MCF Δ	-0.3 /60						±.3	-0.6			0.1
S. P.											6 -0.8
NOISE											2.0 -1.2
POT RES.											-2.2
CULT & CMTS											

I. P. RECEIVER NOTES, JOB NO. _____, AREA _____

LINE _____, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE NO. _____, DATE _____

PAGE _____

HEINRICHS GEOEX

SEND											
RECEIVE											
MULTIPLIER											
PFE											
CUR. (AMPS)											
POINT NO.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	$K_n/1000$										
0.3 PFE	ρ_{CAL}										
0.1 PFE	PFE_c										
3.0 MV	$\rho/2\pi$										
DRIFT	MCF										
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

10 sec

15 00

0.1

-2.2	1.1
-1.5	1.1
-0.3	0.7
0.2	0.7
0.9	
1.7	-0.6
2.1	
0.5	
0.3	
1.0	
1.2	
0.7	
-0.4	
0.5	
1.4	
0.3	
0.0	
1.1	

I. P. SENDER NOTES

PAGE 1

JOB NO. _____ AREA COOPER CREEK

LINE Ex #1, HALF _____, SP. _____, DATE 9-2-77

HEINRICHS GEOEX

SEND	CAL	150	250	375	500	750	1000	1250	1500	1750
RECEIVE										
RANGE										
VOLTAGE	220	780	700	800	720	520	660	780		
CURRENT	1.0	3.5	3.8	3.5	3.9	4.5	4.2	4.0		
SEND	2000									CAL
RECEIVE										
RANGE										
VOLTAGE										220
CURRENT										1.0

FREQUENCIES

SENDER NO. 6644-5 | POWER UNIT ID

OPERATOR MSGuire

RECEIVER NO. | HOURS RUN

OPERATOR

COMMENTS:

I. P. SENDER NOTES

JOB NO. _____ AREA _____

LINE _____, HALF _____, SP. _____, DATE 9-2-77

PAGE _____

HEINRICHS GEOEX

SEND	OAL	150	250	375	500	750	1000	1250	1500	1750
RECEIVE										
RANGE										
VOLTAGE	220	280	300	800	720	520	140	70		
CURRENT										
SEND	2000									OAL
RECEIVE										
RANGE										
VOLTAGE										
CURRENT										

FREQUENCIES	
SENDER NO.	POWER UNIT ID
OPERATOR	
RECEIVER NO.	HOURS RUN
OPERATOR	

COMMENTS:

I.P. SENDER NOTES

JOB NO. _____ AREA COOPER CREAK

LINE EV#1, HALF _____, SP. 1, DATE 9-3-77

PAGE 1

HEINRICHS GEOEX

SEND	150	250	375	500	750	1000	1250	1500	1750	2000
RECEIVE										
RANGE										
VOLTAGE	800	720	820	740	520	680	780	700	520	560
CURRENT	3.5	3.8	3.5	3.9	4.5	4.2	4.0	4.3	4.5	4.8
SEND	Cal									
RECEIVE										
RANGE										
VOLTAGE	220									
CURRENT	1.0									

FREQUENCIES 1 3 .1 .3

SENDER NO. 6644-5 | POWER UNIT ID

OPERATOR McGuire

RECEIVER NO. | HOURS RUN

OPERATOR

COMMENTS:

I.P. SENDER NOTES

JOB NO. _____ AREA _____

LINE _____, HALF _____, SP. _____, DATE _____

PAGE _____

HEINRICHS GEOEX

SEND	1.5	50	375	500	750	1000	1250	1500	1750	2000
RECEIVE										
RANGE										
VOLTAGE	800	880	820	740	520	480	780	920	520	560
CURRENT										
SEND	Eal									
RECEIVE										
RANGE										
VOLTAGE	920									
CURRENT										

FREQUENCIES	2.33 LLB
SENDER NO.	POWER UNIT ID
OPERATOR	
RECEIVER NO.	HOURS RUN
OPERATOR	

COMMENTS:

166.6

I.P. RECEIVER NOTES, JOB No. 1199 AREA Miami

LINE EX#1, HALF _____, SP. _____, α = _____, BEARING _____

SENDER STA. _____ = ELECTRODE No. _____, DATE 8/25/77

PAGE 1

HEINRICHS GEOEX

		50'	100'	125'	125'	250'	250'	250'	250'	500'		
SEND		1-2	→			500						CAL
RECEIVE ⁰/₂		100	150	250	375	500/750	750	1000	1250	1500	2000	1-2
MULTIPLIER		10	10	10	10	10	1	1	1	1	1	1
PFE										3.5		
CUR. (AMPS)		2	3.5	1.5	2.75	3.5 3.5	3.5	3.5	4.5	-1.4	5 / 4.5	
POINT NO.										0.7		
SEP. (n)										1.2		
H. F. MV		450.	484							(20s) 43.6		
DRIFT				-0.7	-0.7					0.0	±0.6	
3.0 PFE	K_n/1000	-0.5	-0.5	-0.9	+0.2	-0.9 -0.9	0.3	-0.9	-2.2			0.0
0.3 PFE	P_{CAL}	0.1	0.1	-0.3	+0.5 -1.1	0.7 0.1	1.1 0.7-1.6	0.5 0.2-1.4	0.5		0.7 ~ 1.6	0.0
0.1 PFE	PFE_c	-0.7	-0.5	-1 → -4	-2.1	0.5	2.1 1.7 2.4	1.4 .7 → 2.1	1.4 1.2-1.7		0.4	-0.1
3.0 MV	P/2π	450.	484.	111.	126. 127.	100.4	(20s) 81.1	(20s) 65.3	(20s) 68.2		40.8	98.45
DRIFT	MCF	-0.0	0.0	-0.2	+1.0	+0.2	1.4	0.0	0.0 ±0.2			0.0
S. P.						118. mv		OK?			-1.0	
NOISE						3 0.0 → 0.4					~0.7	
POT RES.						.3 -0.8 - 1.0					-1 - 1.6	
CULT & CMTS						2 -1.4 → -0.4					36.7 (20s)	
						1 -0.6 → .4					0.0 ~ ±.7	

I.P. SENDER NOTES

JOB No. EX#1 AREA Miami

LINE _____, HALF _____, SP. _____, DATE 8/25/77

PAGE 1

HEINRICHS GEOEX

SEND	1-2 →									
RECEIVE 9/1	100	150	250	375	500	750	1000	1250	1500	2000
RANGE										
VOLTAGE	360	700	760	460	500	440	540	380	400	
CURRENT	2.0	3.5	1.5	2.75	3.5	3.5	3.5	4.5	3.5	
SEND										440
RECEIVE										4.5
RANGE										
VOLTAGE										
CURRENT										

FREQUENCIES	
SENDER No. 6644-S	POWER UNIT ID
OPERATOR McGuire	
RECEIVER No.	HOURS RUN
OPERATOR	

COMMENTS:

I. P. RECEIVER NOTES, JOB No. 1199 AREA Miami

LINE EX#2, HALF _____, SP. _____, a = _____, BEARING Along Ely ridge

SENDER STA. _____ = ELECTRODE No. _____, DATE 8/26/77 8/27/77

PAGE 1

HEINRICHS GEOEX

SEND		1-2 →									CAL
RECEIVE	9/2	2000'	1500	1250	1000	750	500	375	250	150	1-2
MULTIPLIER		1 1	1	1	1 1	1 1	1	10	10	10	1 10
PFE											
CUR. (AMPS)		3.5 3.4	3.8	3.3	3.5 3.5	3.3 3.5	2.4	2.8	2.8	2.7	1.0
POINT No. .3		-3.1			3.0 -2.3	-1.9					
SEP. (n) .3		2.1			1.3	1.3					
H. F. Mv. .1		3.1			2.1	1.9					
DRIFT											
3.0 PFE	K_n/1000	-3 ~	-2.7	-2.5	-2.2	-2.5	-1.6	-1.1	-0.8	-0.5	0.3 0.2
0.3 PFE	P_{CAL}	1.2?	1.7	1.5	1.3 .5 2.0	1.1 .5	0.8 .4 1.3	0.9	0.6 .5	0.5 —	0.1 0.0
0.1 PFE	PFE_c	2.5	2.7	2.3	2.0 1.4 2.2	1.5 1.3	1.7	1.3 1.5	1.1 —	1.0 —	0.3 -0.1
3.0 MV	$P/2\pi$	42.5 20	60.7 /6	60.9 /20	66.9 /20	93.8 /20	107.1 /20	185. /20	356. /6	763. /6	97.5 102.
DRIFT	MCF	0.2	0.0 /20	0.0 /6	0.0 1.1 -1.0	-0.8 -1.2	0.0 -1.2	0.0	0.0 /20	0.0 —	0.0 0.0
S. P.		41.9 /6			78.3 /6	101. /20				20	0.0 0.0
NOISE		0.0 /20			0.0 /6	0.0 /6				60	0.0 -0.2
POT RES.											
CULT & CMTS											

.4 1.1 .6

I.P. SENDER NOTES

JOB No. _____ AREA Miami

LINE _____, HALF _____, SP. _____, DATE 8-26-77

PAGE _____

HEINRICHS GEOEX

SEND	2000	1500	1250	1000	750	500	375	250	160	100
RECEIVE										
RANGE										
VOLTAGE	640	720	900	800	720	900	900	860	920	
CURRENT	3.4	3.8	3.3	3.5	3.5	2.4	2.8	2.8	2.7	
SEND										
RECEIVE									CAb	
RANGE										
VOLTAGE									240	
CURRENT									1.0	

FREQUENCIES	
SENDER No. 6644-S	POWER UNIT ID
OPERATOR McGoIRE	
RECEIVER No.	HOURS RUN
OPERATOR	

COMMENTS:

I. P RECEIVER NOTES, JOB No. 1199 AREA Miami

PAGE 1

LINE Ex#3, HALF _____, SP. _____, a = _____, BEARING N 80°W

SENDER STA. _____ = ELECTRODE No. _____, DATE 8/30/77

HEINRICHS GEOEX

SEND		1-2 →										1-2	1-2
RECEIVE	a/2	150'	250	375	500	750	1000	1250	1500	2000	CAL	CAL	
MULTIPLIER		10	10	10	10	1	1	1	1	1	1	1	
PFE									4.5				
CUR. (AMPS)		3.8	3.8	4.0	4.5	4.5	4	4.5	-2.9 ±.2	5	1	1.0+	1.5 1.0
POINT No.									2.0				
SEP. (n)									3.0				
H. F. MV									61.9				
DRIFT									0.0 ± .1				
3.0 PFE	K_n/1000	-0.6	-0.8	-1.0	-1.4 -1.6	-2.0	-2.0 -2.4 -1.8	-2.4 ±.2	-3.0 ±.3	0.1	0.0	0.2	0.0
0.3 PFE	ρ_{CAL}	0.4	0.5	0.9	1.1	1.4	1.5 ~ 1.1	1.9 1.6 2.1	2.2 ~	0.0	-0.3	0.1	-0.1
0.1 PFE	PFE_c	0.6	0.8	1.1	1.3	1.7	2.5 2.5 2.8	2.8 2.6 3.0	50.0	0.0	-1.0	-0.5	-0.1
3.0 MV	$\rho/2\pi$	545.	298.	194.	160.	106.9	76.0	72.0	50.2	98 A	101	148.	97
DRIFT	MCF	0.0	0.0	0.0	0.0	-0.1	-0.2 ±	0.0	+0.3 ±.5	0.0	0.0	0.2	0.3
S. P.											3		
NOISE											.3		
POT RES.											1		
CULT & CMTS											.1		

I.P. SENDER NOTES

JOB No. 1199 AREA Miami

LINE Ex#3, HALF _____, SP. _____, DATE 8-30-77

PAGE 1

HEINRICHS GEOEX

SEND	Col	150	250	375	500	750	1000	1250	1500	2000
RECEIVE										
RANGE										
VOLTAGE	240	620	760	620	520	440	400	500	500	440
CURRENT	1.5	3.8	3.8	4.0	4.5	4.5	4.0	4.5	4.5	5.0
SEND	↑									
RECEIVE	↕									
RANGE	↓									
VOLTAGE	160									
CURRENT	1.0									

FREQUENCIES	
SENDER No. 6644-S	POWER UNIT ID
OPERATOR MEGUIRE	
RECEIVER No.	HOURS RUN
OPERATOR	

COMMENTS:

I. P. RECEIVER NOTES, JOB No. 1199, AREA Copper Creek

LINE Ex#5, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE No. _____, DATE 9/27

PAGE 1

HEINRICHS GEOEX

SEND	1-2	0.1 80.1	-1.2 8.9	1.3	0.3 80	-0.6	1-2	1-2 80	0.4 1.8	-0.2 1.3
RECEIVE a	4000	-0.9 0.6	-1.2 3.0	-0.3	-1.0 -0.5	-0.4	3500	3500 102	0.2 -0.6	-0.4 1.7
MULTIPLIER	1	-2.0 0.5	-0.5 0.2	-0.1	-1.0 -0.4	-0.6	1	1	0.2 -0.9	0.0 1.9
PFE		-1.9 0.7	-0.3 -0.3	1.0	-1.1 -0.5	-0.9		-1.1 -0.3	0.2 -0.6	0.9 1.0
CUR. (AMPS)	4.0	-1.3 2.1	-0.4 0.2	0.9	-0.9 -0.2	-1.0	4.0	-1.4 -0.3	0.6 0.4	1.2
POINT No.		-0.7 2.8	-0.8 1.0	0.1	-0.7 0.4	-1.0		-1.0 0.7	0.9 2.2	0.6
SEP. (n)		0.8 2.8	-1.7 1.1	-0.1	-0.5 0.4	-1.0		-1.1 2.0	1.0 3.2	0.6
H. F. MV		2.1 2.8	-2.8 0.6	0.0	-0.2 0.2	-1.1		-1.1 2.7	0.9 2.9	0.4
DRIFT		2.5 2.2	-1.9 0.3	0.4	-0.1 -0.3	-1.1		-1.3 2.2	0.6 1.4	1.1
1.0 PFE K_n/1000	1 -4.5	1.3 1.0	0.7 0.1		-0.2 -0.5	-1.1	-4.1	-1.4 1.4	0.1 0.0	1.5
0.3 PFE ρ_{CAL}	3 -15.4	0.0 0.0	1.8 0.0		-0.5 -0.6		-13.1	-0.7 0.6	-0.6 -0.7	1.8
0.1 PFE PFE_c	0.1 1.0	-0.8 -0.4	1.5 -0.6		-1.1 -0.9			1.1 -0.3	-0.2 -0.3	1.9
3.0 MV $\rho/2\pi$	33.5	-1.5 -0.4	1.2 -1.9		-1.3 -1.1		39.35	1.5 -0.4	0.8 0.4	1.6
DRIFT MCF		-1.7 -0.1	0.9 -3.2		-0.9 -1.2		—	1.0 0.1	1.3 1.3	0.5
S. P.		-1.7 0.4	0.1 -3.0		-0.3 -1.4			0.4 0.0	2.0 1.9	-0.7
NOISE		-1.3 0.5	-0.6 -3.0		0.1 -1.1			-0.1 -1.5	2.6 1.5	-1.2
POT RES.		0.5 0.6	0.0 -3.0		0.1 -0.6			0.0 -1.2	2.3 1.0	-0.8
CULT & CMTS		0.9 0.6	2.1 -1.1		0.1 -0.4			0.1 0.0	1.7 1.2	-0.3
		0.6 -0.3	0.4		-0.4 -0.5			0.0 0.6	1.8 0.9	0.4

I.P. RECEIVER NOTES, JOB NO. 1199, AREA Copper Creek

LINE 225, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE NO. _____, DATE 9/22

PAGE _____

HEINRICHS GEOEX

SEND											
RECEIVE											
MULTIPLIER											
PFE											
CUR. (AMPS)											
POINT NO.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	$K_n/1000$										
0.3 PFE	ρ_{CAL}										
0.1 PFE	PFE_c										
3.0 MV	$\rho/2\pi$										
DRIFT	MCF										
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

I. P. RECEIVER NOTES, JOB No. 1199, AREA Copper Creek

LINE Ex#5, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE No. _____, DATE 9/27/77

PAGE 2

HEINRICHS GEOEX

SEND		CAL	1-2	1-2 80Δ	5.5 3.1	1.7	1.0		1-2	1.1 35	CAL		
RECEIVE a		1-2	4000'	4000' 10Δ	4.7 2.1	1.2	1.2		3500'	5Δ	1-2		
MULTIPLIER		10	1	0.0 -0.4	3.0 1.5	1.0	1.1		1	1.0 1.0			
PFE				-0.6 -1.3	2.5 1.3	1.3	1.0			1.0 1.0			
CUR. (AMPS)		1.09	4.0	-0.6 -1.3	2.6 1.8	1.7	1.2		4.0	0.8 1.1	1.10		
POINT NO.				2.2 -2.2	2.6 2.1	1.4	0.8			0.4 1.2			
SEP. (n)				2.6 -0.7	2.6 1.7	0.8	1.1			0.6 0.8			
H. F. MV				2.8 1.7	2.6 1.5	0.9	1.0			1.2 0.3			
DRIFT				2.9 2.5	2.3 1.5	0.9	0.8			1.1 0.2			
1.0 PFE	K_n/1000	1 0.2	-2.8	3.0 2.1	1.5 1.2	0.7	1.0	-3.5	-3.4	0.5 0.6	0.2		
0.3 PFE	ρ_{CAL}	3 0.4	-12.5	3.0 1.9	1.2 1.0	1.0	1.0	-12.9	-12.1	0.4 0.8	0.4		
0.1 PFE	PFE_c	.1 -0.1	∅	2.6 1.9	1.4 0.8	1.3	1.0	1.0	0.9 ∅	1.1 1.2	0.0		
3.0 MV	$\rho/2\pi a$	101.5	27.4	2.0 1.8	1.9 1.0	1.6	1.2	27.9	31.8	1.4 1.6	104.5		
DRIFT	MCF		0.3 35Δ	1.5 0.8	2.5 1.4	1.5	1.4	0.0	-0.2	1.3 1.3	0.1		
S. P.		80Δ -0.2	0.2 80	1.3 -0.1	3.2 1.6	1.6	1.0	good		1.0 0.9	35Δ -0.1		
NOISE			2.5	1.5 0.7	3.2 1.7	1.7	0.6			0.8 0.8	80Δ -0.2		
POT RES.				1.8 2.1	3.4 1.8	1.4	0.7			0.7 0.7			
CULT & CMTS				1.0 2.5	3.7 1.7	1.3	1.0			0.7 0.9			
				0.1 2.7	3.3 1.7	1.7	1.0			0.8 0.8			
				0.4 4.1	3.4 2.0	1.9	1.0			1.0 0.8			

I.P RECEIVER NOTES, JOB NO. 1199, AREA Upper Creek

LINE _____, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE NO. _____, DATE 9/27/72

PAGE _____

HEINRICHS GEOEX

SEND											
RECEIVE											
MULTIPLIER											
PFE											
CUR. (AMPS)											
POINT NO.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE $K_n/1000$											
0.3 PFE ρ_{CAL}											
0.1 PFE PFE_c											
3.0 MV $\rho/2\pi$											
DRIFT MCF											
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

I.P. SENDER NOTES

JOB No. 1199 AREA COPPER CREAK

LINE _____, HALF _____, SP. _____, DATE 9-27-77

PAGE 1

HEINRICHS GEOEX

	#5				#6					
SEND	4000	3500	CAL		4000	3500	CAL			
RECEIVE										
RANGE										
VOLTAGE	640	640	160		540	540	160			
CURRENT	4.0	4.0	1.0		4.0	4.0	1.0			
SEND										
RECEIVE										
RANGE										
VOLTAGE										
CURRENT										

FREQUENCIES .1 .3 3.0 1.0

SENDER No. 6644-5 POWER UNIT ID

OPERATOR MS GUIRE

RECEIVER No. HOURS RUN

OPERATOR

COMMENTS:

I.P. SENDER NOTES

JOB No. 499 AREA COPPER CREEK

LINE _____, HALF _____, SP. _____, DATE 9-27-77

PAGE 1

HEINRICHS GEOEX

SEND	4000	3500	CAL		4000	3500	CAL			
RECEIVE										
RANGE										
VOLTAGE	640	640	160		940	540	160			
CURRENT										
SEND										
RECEIVE										
RANGE										
VOLTAGE										
CURRENT										

FREQUENCIES .1 .3 30.0

SENDER No. 6644-5	POWER UNIT ID
OPERATOR MCCURE	
RECEIVER No.	HOURS RUN
OPERATOR	

COMMENTS:

4.2 = P+C

I.P. RECEIVER NOTES, JOB No. 1199, AREA Copper Creek

LINE EX#4, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE No. _____, DATE 9/19/77 9/22/77

PAGE 1

HEINRICHS GEOEX

SEND		1-2	2-3	1-2	2-3	1-2	2-3	1-2	2-3	CAL	CAL
RECEIVE a		4000'	4000	3500	3500	4000'	4000	3500	3500	1-2	2-3
MULTIPLIER		1	1	1	1	1	1	1	1	10	10
PFE											
CUR. (AMPS)		4.5	4.3	4.3	4.3	4.8	4.8	4.8	4.7	1.04	1.04
POINT No.				1		-4.0	-4.7	-3.7	-4.1		
SEP. (n)				3		-18.8	-22.4	-15.7	-19.1		
H.F. MV				0.1		1.0	1.2	0.8	0.9		
DRIFT											
1.0 PFE	K_n/1000	1 -4.5	-5.2	-3.7	-4.7	-4.0	-4.5	-3.7	-4.3	0.0 0.0	0.0
0.3 PFE	ρ_{CAL}	3 -19	-23.0	-15.7	-19.5	-18.6	-22.0	-15.5	-19.1	0.1 0.2	0.2
0.1 PFE	PFE_c	.1 OVER 1.7 2.0 2.4	OVER	1 OVER -.8 -3.0		✗ 0.6 0.8	✗ 1.2	✗	✗	-0.3 -0.4	-0.2
3.0 MV	$\rho/2\pi$	.3 13.75	10.85	16.2	13.2	14.5	12.1	17.9	14.5	103.	103.
DRIFT	MCF	-0.2	-0.1	-0.1 0.0	0.0 ± .2	0.0	+0.2	0.0	-0.2	-0.1 0.0	0.0
S.P.											
NOISE						0.1 80 sec					
POT RES.						0.6 ± 0.3					
CULT & CMTS											

✗ See Sheet

-0.3 @ 80Ω

I.P. RECEIVER NOTES, JOB NO. 199, AREA Upper Creek

LINE _____, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE NO. _____, DATE 4/19/77

PAGE _____

HEINRICHS GEOEX

SEND											
RECEIVE											
MULTIPLIER											
PFE											
CUR. (AMPS)											
POINT NO.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	$K_n/1000$										
0.3 PFE	ρ_{CAL}										
0.1 PFE	PFE_c										
3.0 MV	$\rho/2\pi$										
DRIFT	MCF										
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

4000' 1-2			4000' 2-3 60s				3000' 1-2		3500' 2-3
1.4	60s								
1.5	2.1	2.3	0.4	1.3	1.8	2.1	2.7	0.2	0.7
1.8	2.3	2.2	1.8	2.3	1.6	-0.9	0.2	0.4	0.1
2.3	2.3	1.1	2.4	2.7	1.4	-1.3	-1.1	0.1	-0.3
1.6	2.0	1.4	2.0	2.5	1.6	0.3	-0.1	-0.1	-0.4
0.2	0.5	2.9	1.8	1.3	1.6	1.9	0.5	0.5	-0.8
-0.5	-0.9	3.0	1.9	-0.4	1.1	3.5	0.5	2.5	-1.3
0.0	-0.5	1.5	2.0	-0.9	1.6	4.3	0.9	3.3	2.1
0.6	0.0	1.1	0.3	0.6	1.3	4.3	0.9	3.3	1.2
1.7	0.7		-1.7	0.9	1.6	3.0	0.9	3.5	0.5
2.9	0.4		-1.7	1.3	1.7	0.9	1.0	3.3	0.8
3.3	-0.7		-1.1	0.7	2.4	-1.7	0.5	2.8	1.7
3.3	-2.2		-1.3	0.7	2.7	-0.9	0.5	3.6	2.1
3.3	-3.2		-2.0	1.4	3.1	0.3	0.9	2.9	2.9
2.9	-3.5		-1.2	1.7	3.8	1.1	0.5	0.1	3.6
2.5	-2.9		-0.4	2.4		0.1	0.1	-0.2	2.5
2.5	-1.4		-0.2	2.2	1.6	0.4	-0.1		
2.1	-0.1		-0.6	2.8	1.4	2.2	0.1		
	1.4		-1.6	2.0	0.5	4.1	0.5		
			-1.0	0.9	-0.5	6.3	0.9		
			0.2	0.4		6.1	0.9		
			0.7	0.4		5.9	0.8		
			0.9	1.0		6.3	0.3		
						5.4			

1.1

1.0

1.1

1.1?

I. P. RECEIVER NOTES, JOB NO._____, AREA_____

LINE_____, HALF_____, SP._____, a = _____, BEARING_____

SENDER STA._____ = ELECTRODE NO._____, DATE_____

PAGE_____

HEINRICH'S GEOEX

SEND										
RECEIVE										
MULTIPLIER										
PFE										
CUR. (AMPS)										
POINT NO.										
SEP. (n)										
H. F. MV										
DRIFT										
1.0 PFE	$K_n/1000$									
0.3 PFE	ρ_{CAL}									
0.1 PFE	PFE_c									
3.0 MV	$\rho/2\pi$									
DRIFT	MCF									
S. P.										
NOISE										
POT RES.										
CULT. & CMTS										

I. P. RECEIVER NOTES, JOB NO._____, AREA_____

LINE_____, HALF_____, SP._____, a = _____, BEARING_____

SENDER STA._____ = ELECTRODE NO._____, DATE_____

PAGE_____

HEINRICHS GEOEX

SEND											
RECEIVE											
MULTIPLIER											
PFE											
CUR. (AMPS)											
POINT NO.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	$K_n/1000$										
0.3 PFE	ρ_{CAL}										
0.1 PFE	PFE_c										
3.0 MV	$\rho/2\pi$										
DRIFT	MCF										
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

1-2 9/22/77 0.7

4000'

35 sec		52 ∆	2-3	1.5
1.7	1.3	1.6	0.8	2.4
0.8	1.6	0.8	0.7	3.9
0.6	2.2	-0.5	1.1	3.3
1.1			1.7	
1.1	1.3	-1.4	1.7	2.1
0.2	0.5	-2.0	1.6	1.6
-0.3	0.4	-1.3	1.6	1.9
-0.2	0.6	-0.2	1.1	1.3
0.3	0.6	0.5	0.9	0.7
0.7	0.6	0.8	1.8	0.7
0.5	0.6	1.0	2.1	1.4
0.1	0.6	1.3	0.6	2.0
0.4	0.6	2.4	-0.4	2.3
1.1	0.6	3.0	0.3	1.6
1.1	0.6	2.9	1.2	1.0
0.7		2.7	1.5	1.1
0.6	41 34.1	2.6	1.3	1.3
1.0	0.8	2.0	0.9	0.5
1.4		1.0	1.0	-0.1
1.1		0.6	2.4	0.8
0.7		0.6	5.0	1.7
0.5		0.9	5.8	1.1
0.6		2.1	4.4	0.5
0.9		2.1	1.9	0.4
1.1		0.3	1.6	0.4
1.1		-0.3	2.1	-0.2
1.7		0.8	3.0	-1.0
2.0		1.6	3.7	0.1 1.2
		1.1	3.5 1.5	1.8 1.2
		1.4 0.95	2.3 1.3	10 1.1

3500'

1-2		2-3	
1.6	1.0	1.0	1.1
0.9	-0.4	1.0	1.1
0.9	-0.2	1.3	1.0
1.2	0.2	1.5	0.9
1.6	0.4	1.2	0.9
1.5	0.3	1.1	1.0
1.2	0.2	0.8	1.0
1.0	0.5	0.9	0.7
1.0	0.8	1.0	0.6
1.0	0.6	0.8	0.8
0.8	0.2	0.0	
0.7	0.2	-0.2	1.0
0.5	40 18.9	-0.2	0.9
-0.2	0.5	-0.1	0.4
-0.4		0.4	0.0
-0.2		0.4	0.1
0.2		0.0	0.6
0.4		-0.2	0.7
0.6		-0.1	0.7
0.7		0.1	0.6
0.5		-0.2	
0.1		-0.6	47 19.7
0.2		-1.2	0.4
0.4		-1.0	0.6
0.5		-1.7	
0.3		-0.7	
0.1		0.2	
0.3		0.7	
0.4		1.1	
-0.1		1.3	

I. P. SENDER NOTES

JOB No. 1199 AREA Copper Creek Area

LINE 2X 4, HALF _____, SP. _____, DATE Sep. 19, 1977

PAGE 1

HEINRICHS GEOEX

SEND	1-2	2-3	1-2	2-3						
RECEIVE	4000	4000	3500	3500						
RANGE	LOW	LOW	LOW	LOW						
VOLTAGE	530	560	500	560						
CURRENT	4.5	4.3	4.3	4.3						
SEND										
RECEIVE										
RANGE										
VOLTAGE										
CURRENT										

FREQUENCIES	
SENDER No. 6644	POWER UNIT ID
OPERATOR Hollett	66444
RECEIVER No.	HOURS RUN
OPERATOR	

COMMENTS: STOPPED TRANSMITTER PREMATURALLY DUE to LOSS OF IDLE VALVE. PWR UNIT DOWN.

I. P. SENDER NOTES

JOB NO. 177 AREA Upper Creek Area

LINE 3X4, HALF _____, SP. _____, DATE Sep 17 1977

PAGE 1

HEINRICHS GEOEX

SEND	1-2	2-3	1-2	2-3						
RECEIVE	4000	4000	3500	3500						
RANGE	Low	Low	Low	Low						
VOLTAGE	530	560	500	560						
CURRENT	4.5	4.3	4.3	4.3						
SEND										
RECEIVE										
RANGE										
VOLTAGE										
CURRENT										

FREQUENCIES	
SENDER NO. 6644	POWER UNIT ID
OPERATOR Hollett	6644
RECEIVER NO.	HOURS RUN
OPERATOR	

COMMENTS: Stopped Transmitter prematurely due to loss of Tube Valve. Pwr unit down

I. P. SENDER NOTES

JOB NO. _____ AREA COPPER CREAK

LINE _____, HALF _____, SP. _____, DATE 9-22-7

PAGE 1

HEINRICHS GEOEX

SEND	1-2	2-3	1-2	2-3	1-2	2-3	1-2	2-3	1-2	2-3
RECEIVE	4000	4000	3500	3500						
RANGE										
VOLTAGE	580	640	560	620						
CURRENT	4.8	4.8	4.7	4.7						
SEND										
RECEIVE										
RANGE										
VOLTAGE										
CURRENT										

FREQUENCIES	0.1 0.3 1.0 3.0		COMMENTS:
SENDER NO.	26721-S	POWER UNIT ID	
OPERATOR	McGuire		
RECEIVER NO.		HOURS RUN	
OPERATOR			

I. P. SENDER NOTES

JOB NO. _____ AREA COPPER CREAK

LINE _____, HALF _____, SP. _____, DATE 9-22-7

PAGE 1

HEINRICHS GEOEX

SEND	1-2	2-3	1-2	2-3	1-2	2-3	1-2	2-3	1-2	2-3
RECEIVE	4000	4000	3500	3500						
RANGE										
VOLTAGE	580	640	560	620						
CURRENT										
SEND										
RECEIVE										
RANGE										
VOLTAGE										
CURRENT										

FREQUENCIES	0.1 0.3 1.0 8.0	COMMENTS:
SENDER NO.	26721-5	POWER UNIT ID
OPERATOR	Mc Guire	
RECEIVER NO.		HOURS RUN
OPERATOR		

E#1 = Collar (S) E#2 = ∞ (R) E#3 = 1200' Buried DH (D)

I. P. RECEIVER NOTES, JOB No. 1199, AREA Copper Creek

LINE E#3, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE No. _____, DATE 9/16/77 New SIN = 6644 →

PAGE 1

HEINRICHS GEOEX

SEND		1-2	2-3	1-2	2-3	1-2	2-3	1-2	2-3	CAL	CAL
RECEIVE α		300	300	500	500	750	750	1000	1000	1-2	2-3
MULTIPLIER		10	1	10	1	10	1	10	1	10	10
PFE											
CUR. (AMPS)		4.3	4.3	4.2	4.2	4.3	4.3	4.2	4.2		
POINT No.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	K_n/1000	1 -0.5	-2.0	-0.7	-2.1	-0.9	-2.0	-1.0 -1.2	-2.2	0.1	0.0
0.3 PFE	ρ_{CAL}	3 -1.4	-6.7	-1.2	-6.6	-2.6	-6.3	-3.3	-5.8	0.2	0.0
0.1 PFE	PFE_c	0.1 0.5	1.1	0.5	0.7 ±.3	0.7	1.0	0.7 0.7	0.9 ±.3	0.1	0.1
3.0 MV	$\rho/2\pi$	0.3 351.	52.0	201.	48.6	141.	46.2	97.9	40.7	101.	101.
DRIFT	MCF	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

α 1.1/3.3 0.8 1.3 1.2 0.9 1.1 1.4 0.9/1.2 1.7

I. P. RECEIVER NOTES, JOB NO. 1129, AREA Copper Creek

LINE _____, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE NO. _____, DATE 8/16/77

PAGE _____

HEINRICHS GEOEX

SEND											
RECEIVE											
MULTIPLIER											
PFE											
CUR. (AMPS)											
POINT NO.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	$K_n/1000$										
0.3 PFE	ρ_{CAL}										
0.1 PFE	PFE_c										
3.0 MV	$\rho/2\pi$										
DRIFT	MCF										
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

I. P. RECEIVER NOTES, JOB No. 1199, AREA Copper Creek

LINE Ex#3, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE No. _____, DATE 9/16/77

PAGE 2

HEINRICHS GEOEX

SEND	1-2	2-3	1-2	2-3	1-2	2-3	1-2	2-3	1-2	2-3
RECEIVE	1500	1500	2000	2000	2500	2500	3000	3000	3500	3500
MULTIPLIER	1	1	1	1	1	1	1	1	1	1
PFE										
CUR. (AMPS)	4.2	4.2	4.3	4.3	4.3	4.3	4.2	4.2	4.4	4.4
POINT NO.										
SEP. (n)										
H. F. MV										
DRIFT										
1.0 PFE K_n/1000	1 -1.6	-2.1	-1.7	-2.5	-1.8	-2.2	-1.9	-2.0	-1.6	-1.8
0.3 PFE ρ_{CAL}	3 -4.0	-5.0	-4.0	-4.0	-3.4	-1.5	-2.1	+1.4	+0.3	+4.9
0.1 PFE PFE_c	0.1 1.0±.2	1.0±.2	0.9±.2	1.0 0.0 1.6	1.1	0.9	1.1 0.6 1.5	1.0±.2	1.2±.3	0.9
3.0 MV $\rho/2\pi$	0.3 65.9	35.4	46.9	30.6	35.1	25.8	28.1	22.0	24.1	19.8
DRIFT MCF	0.0	0.0	0.0	0.0±.5	0.0±.2	0.0±.4	0.0±.1	0.0	~~0.2~~	0.0
S. P.										
NOISE										
POT RES.										
CULT & CMTS										
	1.9	2.1	1.9	3.2	2.6	3.9	3.5	5.2	4.4	6.5

I. P. RECEIVER NOTES, JOB NO. 199, AREA Copper Creek

LINE _____, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE NO. _____, DATE 9/6/77

PAGE _____

HEINRICHS GEOEX

SEND											
RECEIVE											
MULTIPLIER											
PFE											
CUR. (AMPS)											
POINT NO.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	$K_n/1000$										
0.3 PFE	ρ_{CAL}										
0.1 PFE	PFE_c										
3.0 MV	$\rho/2\pi$										
DRIFT	MCF										
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

I. P. RECEIVER NOTES, JOB NO. 1199, AREA Copper Creek

LINE Ex #3, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE NO. _____, DATE 9/16/77

PAGE 3

HEINRICHS GEOEX

SEND		1-2	2-3								
RECEIVE a		4000	4000								
MULTIPLIER		1	1								
PFE											
CUR. (AMPS)		4.4	4.4								
POINT NO.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	K_n/1000	1 -1.7	-1.4								
0.3 PFE	P_{CAL}	3 +2.8	+8.9								
0.1 PFE	PFE_c	.1 0.9	0.7								
3.0 MV	$P/2\pi$	3 20.65	17.5								
DRIFT	MCF	?	-0.2								
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

5.3 7.4

I. P RECEIVER NOTES, JOB NO. _____, AREA _____

LINE _____, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE NO. _____, DATE _____

PAGE _____

HEINRICHS GEOEX

SEND											
RECEIVE											
MULTIPLIER											
PFE											
CUR. (AMPS)											
POINT NO.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	$K_n/1000$										
0.3 PFE	ρ_{CAL}										
0.1 PFE	PFE_c										
3.0 MV	$\rho/2\pi$										
DRIFT	MCF										
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

I.P. SENDER NOTES

JOB NO. _____ AREA COPPER CREAK

LINE 1149, HALF _____, SP. _____, DATE 9-16-77

PAGE 1

HEINRICHS GEOEX

SEND	CAL	300	500	750	1000	1500	2000	2500	3000	3500
RECEIVE	—	—	—	—	—	—	—	—	—	—
RANGE	2-3	400	380	400	560	560	560	580	560	580
VOLTAGE	120	380	360	360	480	500	500	600	480	520
CURRENT	1.0	4.3	4.2	4.3	4.2	4.2	4.3	4.3	4.2	4.4
SEND	4000									
RECEIVE										
RANGE	580									
VOLTAGE	500									
CURRENT	4.4									

FREQUENCIES 3.0 1.0 0.1 0.3

SENDER NO. 66445 POWER UNIT ID

OPERATOR McGUIRE

RECEIVER NO. HOURS RUN

OPERATOR

COMMENTS: ON THE RANGE READING I WROTE THE VOLTAGE AS 2-3.

I. P. SENDER NOTES

JOB NO. _____ AREA COPPER CREEK

LINE 22, HALF _____, SP. _____, DATE 7-14-77

PAGE _____

HEINRICHS GEOEX

SEND	100	300	500	750	1000	1500	2000	2500	3000	3500
RECEIVE	—	—	—	—	—	—	—	—	—	—
RANGE	2	460	580	400	560	560	560	580	560	580
VOLTAGE	120	180	360	360	480	500	500	500	480	520
CURRENT										
SEND	4000									
RECEIVE										
RANGE	580									
VOLTAGE	500									
CURRENT										

FREQUENCIES	
SENDER NO.	POWER UNIT ID
OPERATOR	
RECEIVER NO.	HOURS RUN
OPERATOR	

COMMENTS:

ON THE RANGE [illegible]

WRITE THE VOLTAGE FOR 2-3

6.9 mv @ 3 -0.5 -1.1 2.7

I. P. RECEIVER NOTES, JOB No. 1199, AREA Copper Creek

LINE Ex#2, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE No. _____, DATE 9/9/77 9/10/77

PAGE 1

HEINRICHS GEOEX

SEND	1-2 →										CAL
RECEIVE a/2	150'	250	375	500	750	1000	1250	1500	1750	2000	1-2
MULTIPLIER	10	10	10	10	1	1	1	1	1	1	10 1
PFE											
CUR. (AMPS)	3.8	3.7	4.0	4.4	4.5	4.3	4.5	4.3	4.5 -3.5	4.8	1.1 amps
POINT NO.									-11.9 OVER		
SEP. (n)											
H. F. MV									310		
DRIFT									0.0		
1.0 PFE K_n/1000	1. -0.6	-0.9	-1.8	-1.5	-1.8	-2.7		-4.2	-4.4 ~		-0.1 0.0
3.3 PFE P_{CAL}	3. -1.6	-2.6	~ -.4 → -8.6	~ -4.8	~ +.6 -13.9	-8.7		-11.4	-11.5 ~		0.1 0.0
0.1 PFE PFE_c	.1 0.3	0.3	0.3	0.4 ± .4	0.6 ± .5	0.8 ± .8		OVER 1.1?	OVER		-0.1 0.0
3.0 MV $\rho/2\pi$	.3 372.	218.	141.	124	79.3	54.5	44.8	35.6	28.8		108.5
DRIFT MCF	0.0	0.0	0.0	0.0	0.0 ± .3			-0.4 ?	~ ?		-0.1 0.0
S. P.								35.2			
NOISE											
POT RES.											
CULT & CMTS											
α	0.6	0.5	0.9	0.5	0.3	0.9		0.3	-0.1	1.1	

I. P. RECEIVER NOTES, JOB No._____, AREA_____

LINE_____, HALF_____, SP._____, a = _____, BEARING_____

SENDER STA._____ = ELECTRODE No._____, DATE_____

PAGE_____

HEINRICHS GEOEX

SEND											
RECEIVE											
MULTIPLIER											
PFE											
CUR. (AMPS)											
POINT NO.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	$K_n/1000$										
0.3 PFE	ρ_{CAL}										
0.1 PFE	PFE_c										
3.0 MV	$\rho/2\pi$										
DRIFT	MCF										
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

2000'

0.1
1205

1.2	1.3	-2.8
.8	0.6	-1.8
.6	-0.2	-0.3
1.0	-0.4	1.8
1.2	0.0	4.6
.6	0.9	6.0
.1	1.3	4.7
.3	0.9	2.0
.6	0.3	
.9	-0.3	0.7
1.9	-0.6	
3.1	-1.4	
3.4	-2.0	
3.3	-3.0	
3.1	-4.2	
2.9	-4.3	
2.2	-2.4	

1750'

0.1
1205

3.5		-0.9
2.9		
1.8	1.0	
1.1	0.5	-2.2
0.6	-0.1	-2.1
0.4	-0.6	-1.7
0.2	-0.7	-0.3
0.4	-1.0	0.15
0.6	-1.5	1.5
1.0	-1.8	0.9≈
1.2	-2.0	
1.4	-1.9	
1.8	-1.8	
2.7	-2.1	
1.9	-2.0	
1.2	-1.7	
1.6	-1.2	
2.1	-0.8	

1500'

0.1
1205

0.4	0.3
0.2	0.9
0.4	1.0
0.4	0.9
1.0	0.6
1.4	0.3
1.6	0.0
1.5	0.1
1.0	0.0
0.7	0.0
0.3	0.0
0.2	0.2
-0.2	0.2
-0.6	0.0
-0.8	-0.1
-0.6	0.0
-0.6	
-0.4	0.3
-0.2	

I.P. RECEIVER NOTES, JOB No. 1199, AREA Copper Creek

LINE Ex#2, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE No. _____, DATE 9/10/77

PAGE 2

HEINRICHS GEOEX

SEND		1-2 →									
RECEIVE a/2		1500'	1250	1000							
MULTIPLIER		1	1	1							
PFE											
CUR. (AMPS)		4.3	4.3	4.2							
POINT No.											
SEP. (n)											
H. F. Mv											
DRIFT											
1.0 PFE	K_n/1000	-2.1	-1.5	-1.5							
0.3 PFE	P_{CAL}	-7.8	-6.8	-5.4							
0.1 PFE	PFE_c	0.7	1.0	0.8 ± .2							
3.0 MV	$\rho/2\pi$	23.9	31.0	41.7							
DRIFT	MCF	0.0	-0.2	-0.2 → 0.0							
S. P.											
NOISE											
POT RES.											
CULT & CMTS		Shorter Pot Wire									

0.3 ∞ 0.4 0.7

I.P. RECEIVER NOTES, JOB No. 1192, AREA Copper Creek

LINE 22, HALF _____, SP. _____, a = _____, BEARING _____

SENDER STA. _____ = ELECTRODE No. _____, DATE 9/10/77

PAGE 2

HEINRICHS GEOEX

SEND		1/2									
RECEIVE		1500	1254	1000							
MULTIPLIER		1	1	1							
PFE											
CUR. (AMPS)		4.3	4.3	4.2							
POINT No.											
SEP. (n)											
H. F. MV											
DRIFT											
1.0 PFE	$K_n/1000$	-2.1	-1.5	-.05							
0.3 PFE	ρ_{CAL}	-7.8	-0.8	-5.13							
0.1 PFE	PFE_c	1.7	1.0	3.7							
3.0 MV	$\rho/2\pi$	3.9	3.10	4.1							
DRIFT	MCF	0.3	0.2	0.2							
S. P.											
NOISE											
POT RES.											
CULT & CMTS											

I. P. SENDER NOTES

PAGE 1

HEINRICHS GEOEX

JOB No. _____ AREA COPPER CREEK

LINE _____, HALF _____, SP. _____, DATE 9-9-77

YESTERDAY

SEND	CAL	150	250	375	500	750	1000	1250	1500	1750
RECEIVE										
RANGE										
VOLTAGE	160	700	760	720	760	660	700	540	640	580
CURRENT	1.0	3.8	3.7	4.0	4.4	4.5	4.3	4.3	4.3	4.5
SEND			2000				1000			
RECEIVE										
RANGE										
VOLTAGE	200		600				660			
CURRENT	1.1		4.8				4.2			

FREQUENCIES 1.3 1.3

SENDER No. 6644-5 POWER UNIT ID

OPERATOR McGUIRE

RECEIVER No. HOURS RUN

OPERATOR

COMMENTS:

Today

I. P. SENDER NOTES

PAGE _____

HEINRICHS GEOEX

JOB NO. _____ AREA _____

LINE _____, HALF _____, SP. _____, DATE _____

SEND	CAL	150	250	375	500	750			1500	
RECEIVE										
RANGE										
VOLTAGE	160	200	76	720	760	660	700	540	610	680
CURRENT										
SEND			2000				1000			
RECEIVE										
RANGE										
VOLTAGE	200		600				66			
CURRENT										

FREQUENCIES	
SENDER NO.	POWER UNIT ID
OPERATOR	
RECEIVER NO.	HOURS RUN
OPERATOR	

COMMENTS:

HEINRICHS GEOEXPLORATION COMPANY

P.O. BOX 5964, TUCSON, ARIZONA 85703, 806 WEST GRANT ROAD, PHONE: (602) 623-0578

August 18, 1977

Mr. Kirby Coryell
Canus, Ltd. and Beth Properties, Ltd.
5140 E. Burns
Tucson, AZ 85711

Re: IP Survey
Miami & Copper Creek Areas
Arizona
GEOEX Job #1199

Dear Mr. Coyyell:

This will confirm your recent discussions with Chris Ludwig and Walter E. Heinrichs, Jr.

Starting on or about Monday, August 22, 1977, GEOEX will furnish a three, four or five man crew, one or two vehicles and customary GEOEX MK 4 IP, or equivalent, equipment to conduct induced polarization pole-pole expanders on the Miami property of Canus, Ltd. and the Copper Creek property of Beth Properties, Ltd., in Gila and Pinal Counties, Arizona respectively.

Rough field plots and preliminary field interpretation of results are available periodically as work progresses. Final interpretation and report commonly follows appropriate study, analysis and compilation done by our Tucson staff.

GEOEX assumes all Workmen's compensation liability, public liability, and property damage liability incurred by GEOEX employees. All property permits, brushing and trespass liability and related costs incurred by GEOEX on behalf of our clients, is charged at GEOEX cost plus 15%.

Our charge rates for the basic three man IP crew and equipment are $300.00 per eight hour field day plus expenses; for a four man crew and equipment $375.00; for a five man crew and equipment $450.00. Expenses include vehicles at $17.50 per day and $0.21 per mile plus living at $25.00 per day for the crew chief and $20.00 per day for crew members. Direct job expenses such as supplies and communications are billed at our cost plus 15 percent.

Our normal work schedule is based on a five day week and an eight hour work day. Overtime in excess of this schedule is charged at $45.00 per three man IP crew hour; $56.25 per four man IP crew hour; $67.50 per five man IP crew hour. Standby time due to client request or inclement weather and mobilization time from Tucson to crew base and return are charged at one-half the respective crew base rates with expenses as above.

Final data computations, compilation and drafting are charged at $12.50 per hour. Interpretation and report are charged at $21.88 per hour. Professional job related consulting and supervision would be charged at $175.00 per day plus expenses as above.

It is understood that the Miami field work will be started first and about a one field week project is anticipated. And, the Copper Creek area field work will be initiated by the 30th of Aggeat, 1977 and two weeks work or more, depending on degree of encouragement obtained, is anticipated. In both areas, the geophysical work will be used as a partial fulfillment of the annual Federal mining claim assessment requirements.

An advance of $5000.00 is requested to defray our mobilization, start-up and initial operating expenses. Receipt of same, together with your executed extra copy of this letter as provided below, will serve as our authorization to proceed in your behalf. Our statement for this advance on account, to be balanced against subsequent detailed billings,is enclosed.

Sincerely,

Heinrichs GEOEXploration Co.

Chris S. Ludwig

Chris S. Ludwig
Chief Geophysicist

CSL:mt

Approved: August 19, 1977 Date

Canus, Ltd. and Beth Properties, Ltd.

by: Kirby C. Coryell

Title: General Partner

HEINRICHS GEOEXPLORATION COMPANY

P.O. BOX 5964, TUCSON, ARIZONA 85703. 806 WEST GRANT ROAD. PHONE: (602) 623-0578

STATEMENT

August 18, 1977

Mr. Kirby Coryell
Canus, Ltd. and Beth Properties, Ltd.
5140 E. Burns
Tucson, AZ 85711

Re: IP Survey
Miami & Copper Creek Areas
Arizona
GEOEX Job #1199

PROFESSIONAL FEES & SERVICES

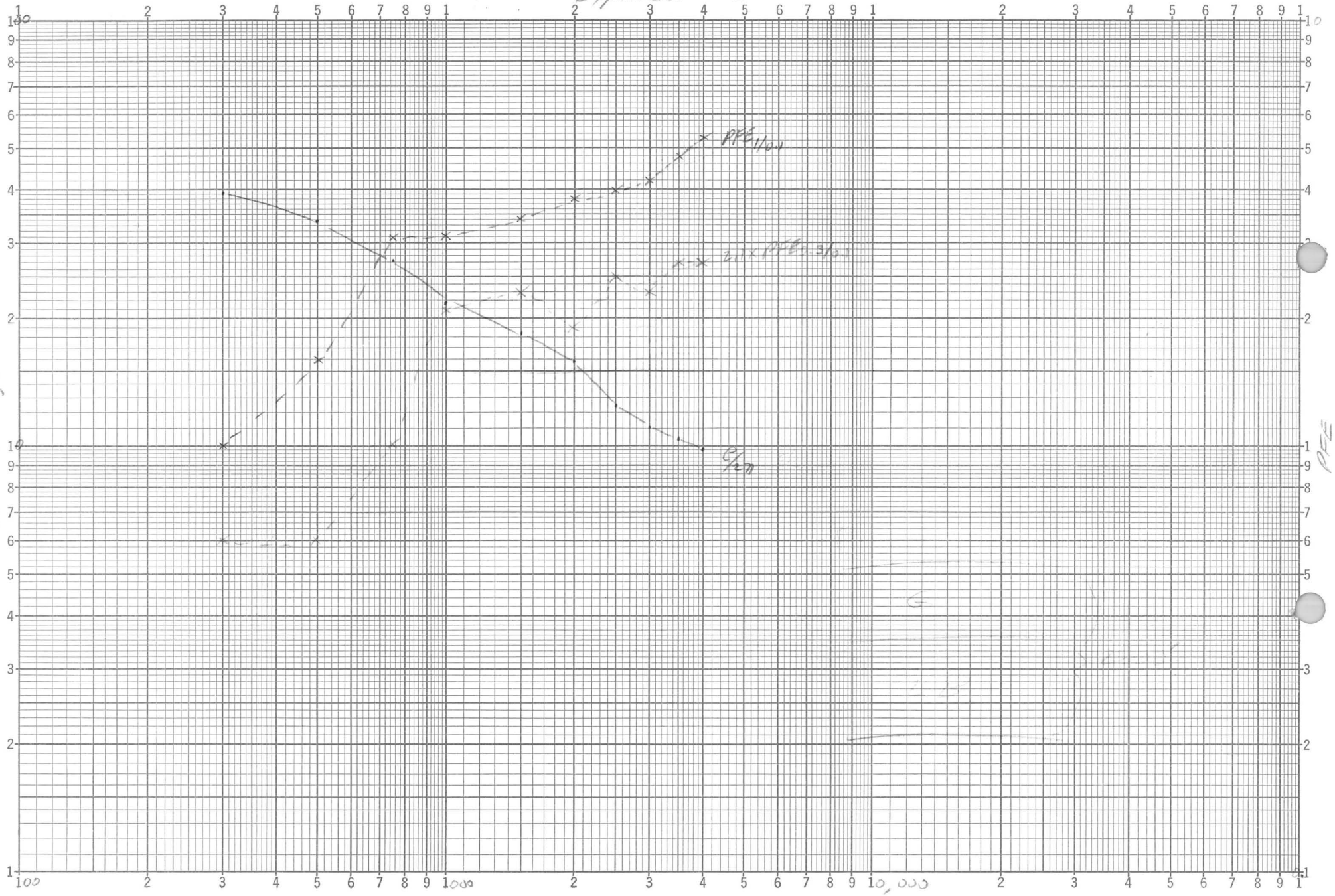
Advance on account to be allocated against future
itemized billings ----------$5,000.00

(301)

STRATHMORE ONION SKIN
25% COTTON FIBER USA

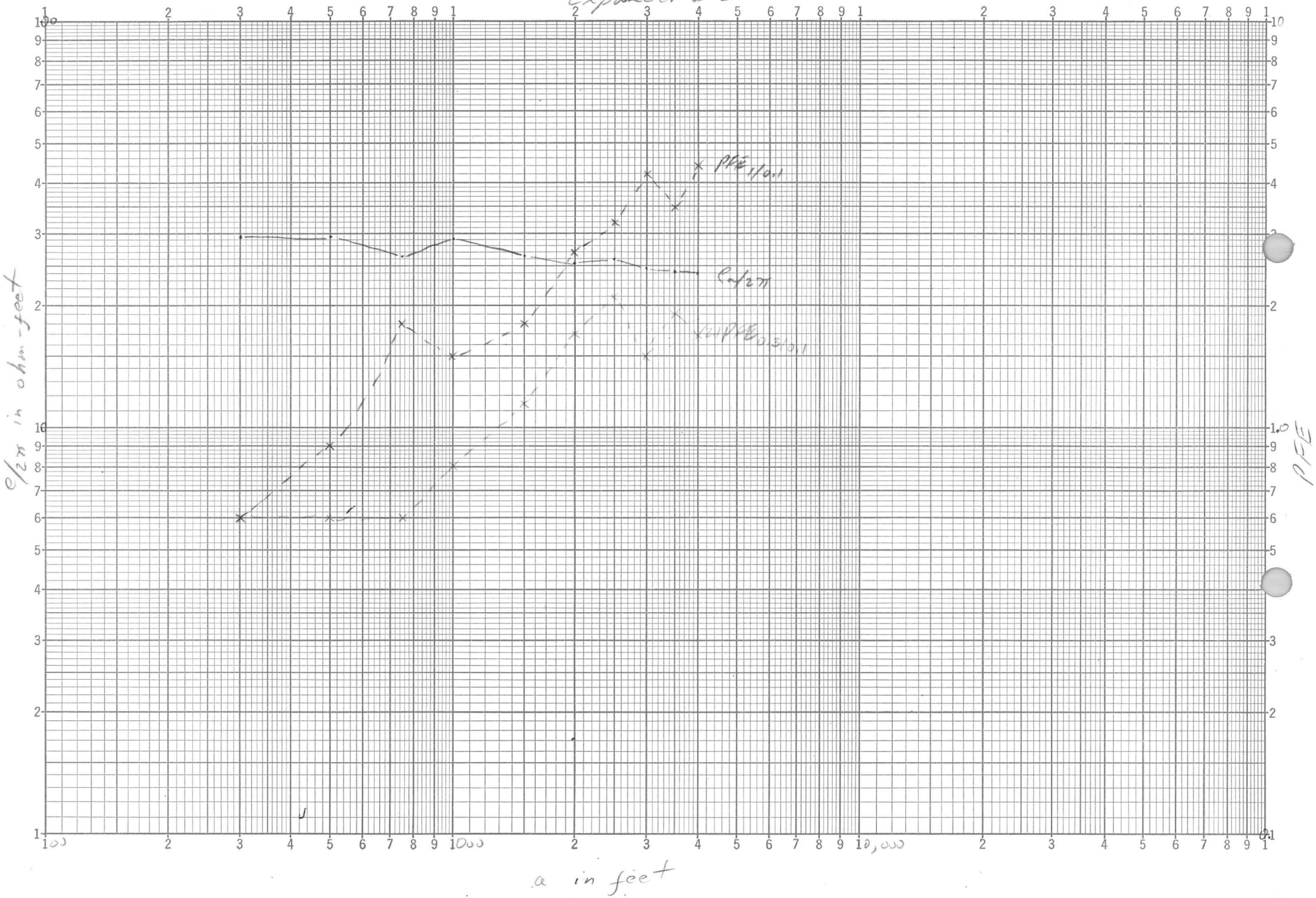
K+E LOGARITHMIC 2 X 3 CYCLES 46 7320 MADE IN U.S.A.
KEUFFEL & ESSER CO.

Copper Creek
Expander #1



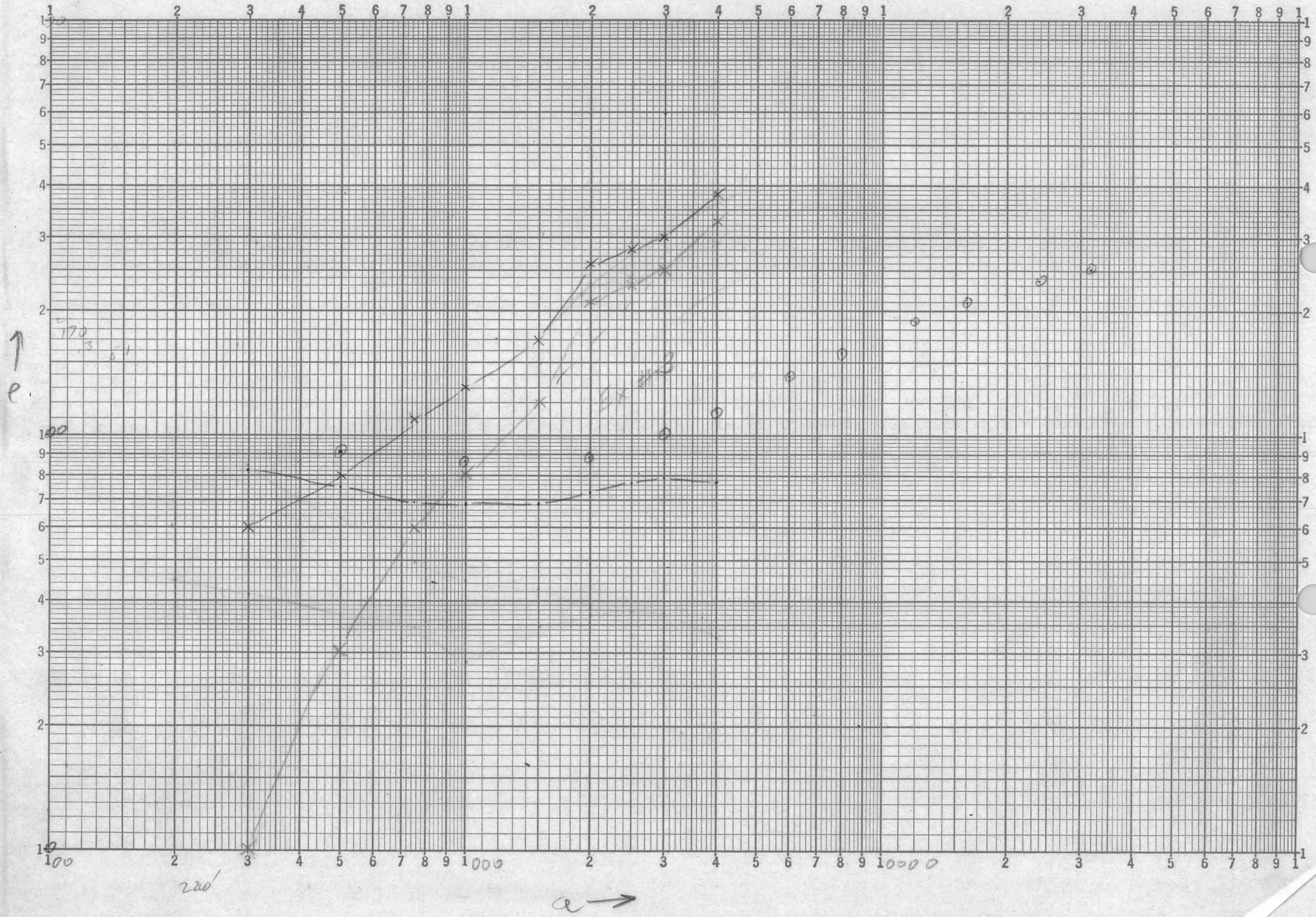
K+E LOGARITHMIC 2 X 3 CYCLES 46 7320 MADE IN U.S.A.
KEUFFEL & ESSER CO.

Copper Creek
Expander #2



K+E LOGARITHMIC 2 X 3 CYCLES 46 7323 MADE IN U.S.A.
KEUFFEL & ESSER CO.

1400' to 4 PSE Bz
5200' to 10 PSE Bz
not l continued
4000' to 8 PSE Bz



Kirby Conyell
745-1322

Aug 29th, 30th
Van. BC
604-685-5825 day

206-567-4554 Mother's house
near Seattle

206-LA3-3446 brother's

Use High Voltage signs

~~OZOEX~~
Job
#1199

9/16/77

Kirby called:

1 Wk - "~~Struggling~~" w/ noise
could San Manuel have
any quiet ~~time~~ windows?,
possibly only briefly &/or
very random & unpredictable.

2 CALLS - 1 Return Collect to GEOEX

INTER-OFFICE MEMO

WRITE IT – DON'T SAY IT

To: Job # 1199

Subject: San Manuel Noise

XQ10 – Gen. Foreman

12 Noon – 12:30 PM

3:00 – 3:30 PM

11:00 – 11:30 PM

Shift changes. No diff on Sunday except Thanksgiving & Xmas 2 days one day.

4:47 4:37

4:39 4:34

3 3

4:52

4:51

1 Minute

Date: 9/26/77

☐ Reply requested

☐ No reply necessary

Dwight. Branscum

Dudley 5-2201

385-4183 5:32 5:25

Floyd Thomas 7 Minutes

Audya. on a consultant basis only.

From: [illegible]

"PAPSCO" NO. 85-01 – NOT IMPRINTED

let $\ell_1/2\pi = \ell_2/2\pi = 30$ ft or $\ell_1 = \ell_2 = 60$ n-m

$$\ell = 2\pi a n(n+1)\frac{V}{I}$$

$$V = \frac{I(\ell/2\pi)}{a n(n+1)}$$

$$\ell/2\pi = \frac{a n(n+1)(n+2)}{2}\frac{V}{I}$$

$$V = \frac{2I(\ell/2\pi)}{a n(n+1)(n+2)}$$

$$\frac{2\times 5000\times 30}{1000\times 13\times 14\times 15} = 0.11\,MV$$

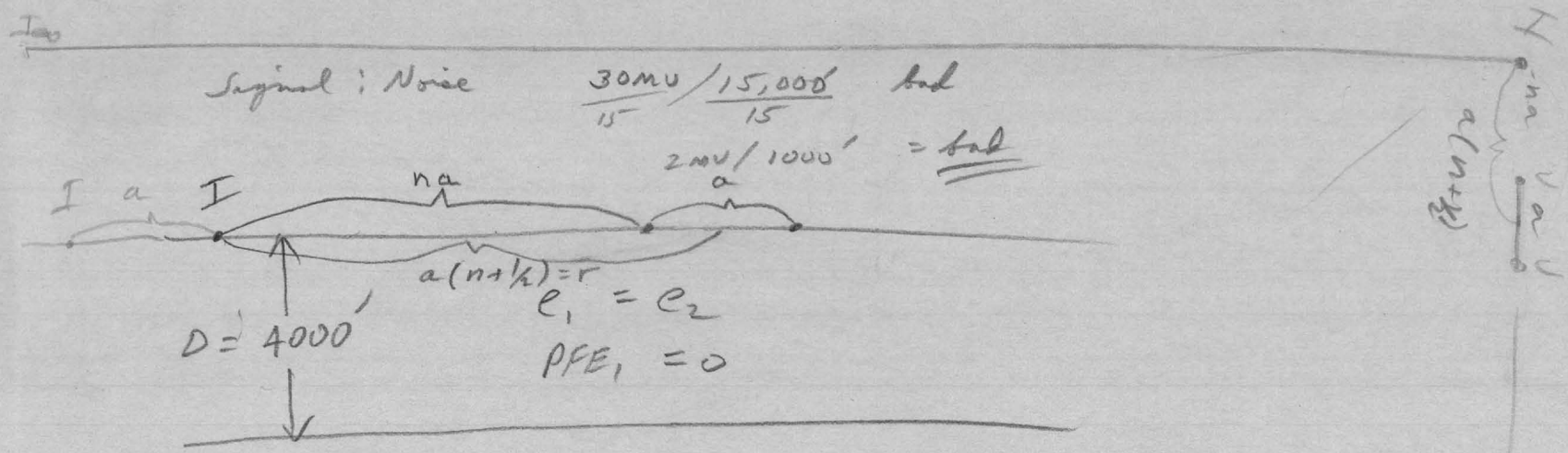
assume $I = 5000$ ma

$\ell/2\pi = 30$

$a = 1000'$

$n = 8$

$$V = \frac{5000\times 30}{1000\times 8\times 9} = \frac{150}{72} \sim 2\,mv$$



$$V = \frac{5000\times 30}{2000\times 4\times 5} = \frac{15}{4} \approx 4\,MV/2000'$$

ℓ_2

$PFE_2 = 10$

let $a = 1000'$ $\quad a/D = 0.25$, $\quad n = 8.3$ & $r = 8800'$ $\quad V = 1.9\,MV$

$n = 12.8$ $\quad r = 13{,}800'$ $\quad V = 0.11\,MV$

what is n for 40% PFE_2

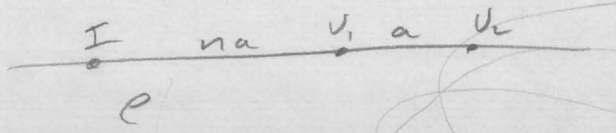
$a = 2000'$ $\quad a/D = 0.50$, $\quad n = 3.9$ & $r = 8800'$ $\quad V = 3.9\,MV$

$n = 6.0$ $\quad r = 14{,}000'$ $\quad V = 0.45\,MV$

4.4×2000

$a = 3000'$ $\quad a/D = 0.75$, $\quad n = 2.45$ & $r = 2.95\times 3000 = 8850$ $\quad V = 5.9\,MV$

$n = 3.7$ $\quad r = 14{,}100'$ $\quad V = 1.0\,MV$



$$V = V_1 - V_2 = \frac{I\ell}{2\pi na} - \frac{I\ell}{2\pi(n+1)a} = \frac{I\ell}{2\pi a}\left[\frac{1}{n} - \frac{1}{n+1}\right]$$

$$V = \frac{I\ell}{2\pi a}\left[\frac{n+1-n}{n(n+1)}\right] = \frac{I\ell}{2\pi an(n+1)}$$

$$\ell = 2\pi an(n+1)\frac{V}{I}$$

$$V = \frac{I\left(\ell/2\pi\right)}{an(n+1)}$$

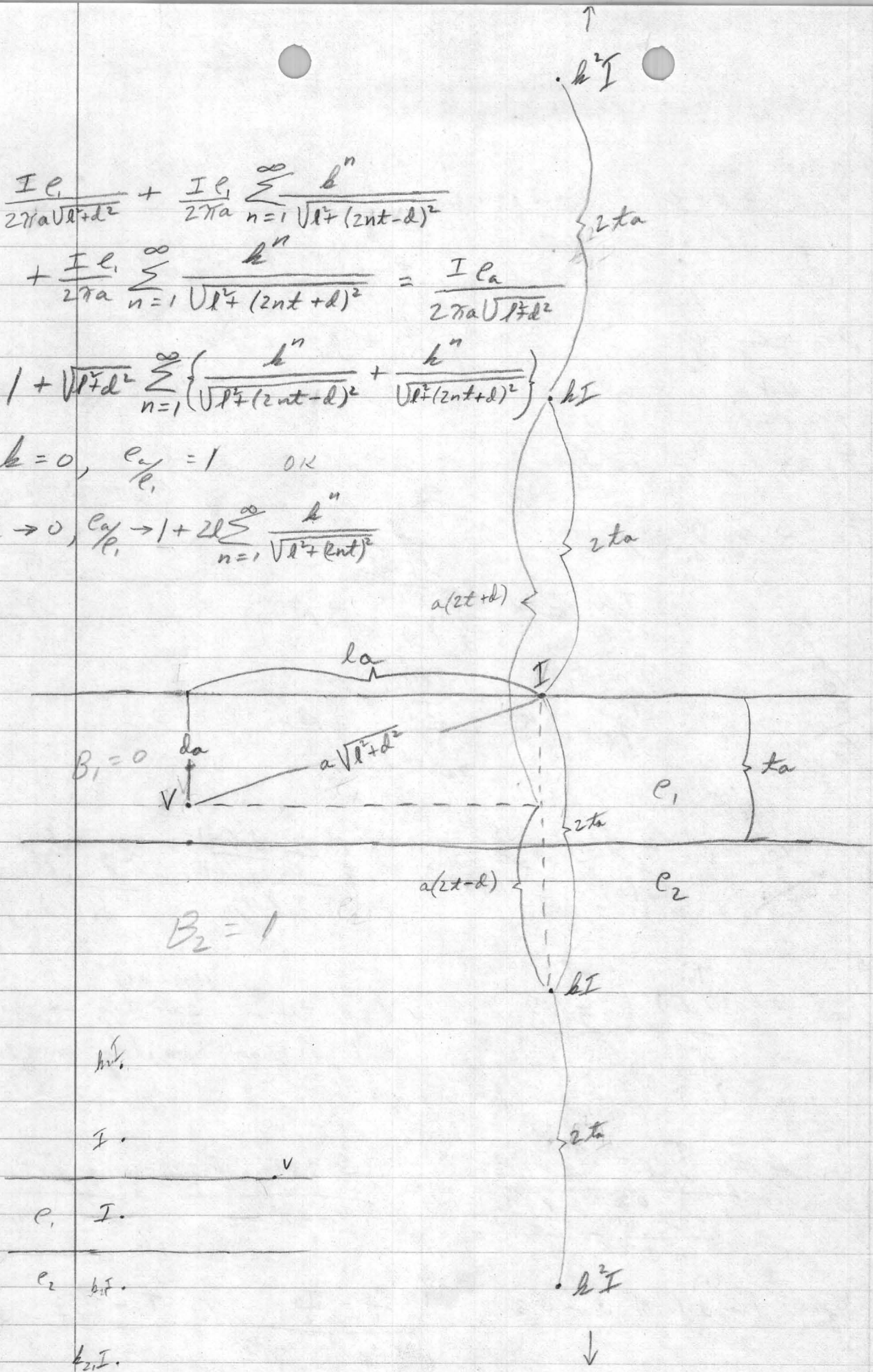
$$V = \frac{I e_1}{2\pi a\sqrt{l^2+d^2}} + \frac{I e_1}{2\pi a}\sum_{n=1}^{\infty}\frac{k^n}{\sqrt{l^2+(2nt-d)^2}}$$

$$+ \frac{I e_1}{2\pi a}\sum_{n=1}^{\infty}\frac{k^n}{\sqrt{l^2+(2nt+d)^2}} = \frac{I e_a}{2\pi a\sqrt{l^2+d^2}}$$

$$\therefore \frac{e_a}{e_1} = 1 + \sqrt{l^2+d^2}\sum_{n=1}^{\infty}\left\{\frac{k^n}{\sqrt{l^2+(2nt-d)^2}} + \frac{k^n}{\sqrt{l^2+(2nt+d)^2}}\right\}$$

& if $k=0$, $e_a/e_1 = 1$ OK

& if $d \to 0$, $e_a/e_1 \to 1 + 2l\sum_{n=1}^{\infty}\frac{k^n}{\sqrt{l^2+(2nt)^2}}$



0.9 (1)
2.6 (2)

$\frac{3-2.6}{.59} = \frac{0.4}{0.6} = .7$

$\Sigma_1 = P + C \qquad (.3 \to .1) \times 2.1$

$\Sigma_2 = P + 3C \qquad 1 \to .1$

$P \propto \log \frac{f_H}{f_L} = \alpha P$

$C \propto f_H = \beta C$

$P = \alpha \log f_H / f_L$

$C = \beta f$

$T = P + C$

$T_1 = \alpha \log \frac{f_{1H}}{f_{1L}} + \beta f_1(H)$

$T_2 = \alpha \log \frac{f_{2H}}{f_{2L}} + \beta f_2(H)$

$\frac{10}{10}$
$\frac{6}{}$

$\frac{10}{4}$

$\frac{T_1}{f_1(H)} = \alpha \frac{\log \frac{f_1(H)}{f_1(L)}}{f_1(H)} + \beta$

$\frac{T_2}{f_2(H)} = \alpha \frac{\log \frac{f_2(H)}{f_2(L)}}{f_2(H)} + \beta$

$\frac{10}{10}$
$\frac{6}{10}$
$\frac{8}{44}$

!!!!!!!!

$\frac{10}{10}$
$\frac{6}{10}$
$\frac{8}{44}$

$\frac{T_1}{f_1(H)} - \frac{T_2}{f_2(H)} = \alpha \left\{ \frac{\log \frac{f_1(H)}{f_1(L)}}{f_1(H)} - \frac{\log \frac{f_2(H)}{f_2(L)}}{f_2(H)} \right\}$

$\alpha = \frac{\frac{T_1}{f_1(H)} - \frac{T_2}{f_2(H)}}{\{\quad\}}$

$f(H)$ vs $f(L)$

If (1) is .3 vs .1 hz $\to f_1(H) = 0.3$

If (2) is 1 vs .1 hz $\to f_2(H) = 1$

$\frac{4.09T_1 - T_2}{1.90}$

or $\alpha = \frac{T_1/0.3 - T_2}{\frac{\log \frac{0.3}{0.1}}{0.3} - \frac{\log \frac{1}{0.1}}{1}} = \frac{3.33T_1 - T_2}{\frac{\log 3}{0.3} - 1} = \frac{3.33T_1 - T_2}{0.59}$

@ $f^{5/4}$ $\frac{4.50T_1 - T_2}{1.15}$

for (1) 1 vs 0.1 & (2) 3 vs 0.3

$\frac{\frac{T_1}{1} - \frac{T_2}{3}}{\frac{\log 1/1}{1} - \frac{\log 3/3}{3}} = \frac{T_1 - T_2/3}{1 - 1/3} = \frac{3}{2}(T_1 - T_2/3)$

$= 1.5T_1 - 0.5T_2$

@ $f^{3/2} \to 1.29 (T_1 - 0.192T_2)$

0.7, 0.4, 1.1, 0.6
0.6, 0.7, 0.2, 0.3

2.1
1
$\frac{3.33 - 2.10}{.59}$

$.59 \overline{)1.23}$ = 2.1
11 8
50

let $l = 2$, $t = 1$ & $d = 0$

$k = -0.5$

$$e_a/e_1 = 1 + 4\sum_{n=1}^{\infty} \frac{(-0.5)^n}{\sqrt{4+4n^2}} = 1 + 2\sum_{n=1}^{\infty} \frac{(-1)^n}{2^n\sqrt{1+n^2}}$$

$$= 1 + 2\left[-\frac{1}{2\sqrt{2}} + \frac{1}{4\sqrt{5}} - \frac{1}{8\sqrt{10}} + \frac{1}{16\sqrt{17}} - \frac{1}{32\sqrt{26}} + \frac{1}{64\sqrt{37}} - \frac{1}{128\sqrt{50}} + \frac{1}{256\sqrt{65}} - \frac{1}{512\sqrt{82}} + \frac{1}{1024\sqrt{101}} - \dots + \dots\right]$$

$\simeq 0.459$

low	high	
1	1	e_1
1.1	1	e_2

$k = 0.0476$

1	1
1	.90909

$k = -0.04762$

$\Downarrow$

$PFE_2 = 10$

let $d = 0$, $l = 1$ & $t = 1$ $\quad k_{low} = 0$, $k_{high} = -0.04762$

then $d = .25$ " "

$d = .50$ " "

$d = .75$ " "

$d = 1.00$ " "

$$e_a/e_1 = 1 + \sqrt{l^2+d^2}\sum_{n=1}^{\infty}\left(\frac{-0.04762^n}{\sqrt{l^2+(2n-d)^2}} + \frac{-0.04762^n}{\sqrt{l^2+(2n+d)^2}}\right)$$

$d = 0$ $\quad e_a/e_1 = 1 + 2\sum_{n=1}^{\infty} \frac{-0.04762^n}{\sqrt{1+4n^2}} \simeq 1 + 2(-.021296 + .000550 - .000018 + .00000 -$

$\simeq 0.95847 \Rightarrow 4.33$ PFE_a i.e. 43.3% PFE_2

18 $\quad d = .25$ $\quad e_a/e_1 = 1 + \sqrt{1.0625}\sum \begin{matrix} -.023626 \\ +.000584 \\ -.000019 \end{matrix} \rightarrow -0.0230597 + \begin{matrix} -0.019340 \\ +.000519 \\ -.000017 \end{matrix} \rightarrow -0.0188374$

36

$\simeq 0.95681 \Rightarrow 4.51$ PFE_a

54

56

$d = .50$ $\quad e_a/e_1 = 1 + \sqrt{1.25}\sum \begin{matrix} -.026415 \\ .000623 \\ -.000019 \end{matrix} \rightarrow -0.0258105 + \begin{matrix} -0.017656 \\ +.000492 \\ -.000016 \end{matrix} \rightarrow -0.0172095$

$\simeq 0.95190 \Rightarrow 5.05$ PFE_a

90

$d = 0.75$, $e_a/e_1 = 1 + \sqrt{1.5625}\sum \begin{matrix} -0.029748 \\ +.000667 \\ -20 \end{matrix} \rightarrow -0.0291006 + \begin{matrix} -0.016274 \\ +467 \\ -16 \end{matrix} \rightarrow -0.0158219$

$\simeq 0.94385 \Rightarrow 5.95$ PFE_a

7.21 guess

3605'

$d = 1.00 \quad e/e_1 = 1 + \sqrt{2}\,\Sigma \begin{matrix} -0.033672 \\ + \quad 717 \\ - \quad 21 \end{matrix} \rightarrow -0.0329758 + \begin{matrix} -0.015059 \\ 445 \\ 15 \end{matrix} \rightarrow -0.0146287$

$\simeq 0.93268 \Rightarrow 7.22 \; PFE_a$

STO 1 → R0
STO t → R3 set t → 1
STO l → R1
STO d → R2

key n ↑ reset!
↑ < RCL 0
2 RCL 3
× ×
× STO 0
RCL 2 ↓
GTO 13 — n +
↑
×
RCL 1
↑
× ·
+ $\sqrt{l^2+d^2}$
1 +
÷
√x
1/x
RCL 0
× ×
GTO 00
2
×
RCL 2
—
↑
×
RCL 1
↑
×
+
÷
√x
1/x
+
RCL 0
×

Now do $d = 0.5$, $l = 0.5$ & $t = 1$

$d = 0.5$ $\quad \Sigma = -0.0430201$

	PFE_a
$l = 1$	5.05
$l = 0.5$	3.49

$\Sigma = -0.0476583$

$d = 0.0$	PFE_a
$l = 1$	4.33
$l = 0.5$	2.31

$d = 0.75$, $l = 0.5$ & $t = 1$

4.84

$d = 0$

~~3.50~~ ?

$d = 1$, $l = 0.5$ & $t = 1$

6.82 $\quad$ 2.31 $d = 0$, $l = 0.5$

$d = 0, 0.5, 0.75$ & 1.0

for $l = 0.25$ & $t = 1$

PFE_a 1.17, 2.83, 4.41, 6.69

$d = 0, 0.5, 0.75$ & 1.0

$l = 0.1$ & $t = 1$

PFE_a 0.47, 2.59, 4.27, 6.65

$d = 0, 0.5, 0.75$ & 1.0

$l = 2$ & $t = 1$

PFE_a 7.00, 7.28, 7.63, 8.09

$\rho_a = 2\pi a \frac{V}{I} = 2\pi a(ft) \times \frac{1m}{3.2808 ft} \frac{V}{I} =$

$\rho/2\pi = a\frac{V}{I}$ $\rho(\Omega\text{-}m) = 1.915\, a(ft) \frac{V}{I}$

Miami

Apt. cor. Ex # 1

a	"a"	V (mv)	I (ma)	ρ Ω-m			PFE 1/0.1	PFE x2.1 0.3/0.1	PFE 3/0.3
200	205	450	2000	88.3	45.0	86.2	1.0		0.6
300	311	484	3500	82.4	41.5	79.4	1.1		0.6
500	532	111	1500	75.4	37.0	70.9	1.5		1.0
750	824	127	2750	72.9	34.6	66.3	1.5		1.2
1000	1136	100.4	3500	62.4	28.7	54.9	1.4		1.0
1500	1826	81.6	3500	81.5	35.0	67.0	1.4		?
2000	2627	65.3	3500	93.9	37.3	71.5	1.4	1.9	1.4
2500	3554	68.2	4500	103	37.9	72.6	1.4	1.9	2.7
3000	4641	43.6	3500	111	37.4	71.6	1.2	1.0	2.1
4000	7479	40.8/36.7	5000/4500	117/117	32.6/32.6	62.5	0.4?	~	1.7

Poor data indicates not accumulation

Ex # 2

	"a"						PFE 1/0.1	PFE x2.1 0.3/0.1	PFE 3/0.3	α
300	312	763	2700	169	84.8	162	1.0	1.0	1.0	1.1
500	535	356	2800	130	63.6	122	1.1	1.0	1.4	1.0
750	831	185	2800	105	49.6	94.9	1.3	0.8	2.0	0.1
1000	1147	107.1	2400	98.0	44.6	85.5	1.7	1.9	2.4	2.2
1500	1851	93.8/101.1	3300/3500	101/102	42.6	81.6/83.0	1.9	1.3	3.2	0.2
2000	2661	66.9/78.3	3500/3500	114/114	38.2	85.4/85.7	2.1	1.7	3.6	1.0
2500	3607	60.9	3300	127		88.4	2.3	1.7	4.0	0.6
3000	4683	60.7	3800	143		91.8	2.7	2.1	4.4	1.1
4000	7448	42.75/41.9	3500/3400	174/174	48.9	93.6/94.4	3.1	2.1	5.2	0.4

Inductive accumulation ?

coupling ?

Miami Ex. #3

"a"	a (ft)	"a"	U (mv)	I (ma)	ρ	ρ-m	$PFE_{1/1}$	α	$PFE_{0.3/0.1}$	× 2.1	PFE 3/0.3
314	300	311	545	3800	86.2	82.4	0.6	0.1	0.5	0.4	0.6 0.9
540	500	531	298	3800	81.1	75.1	0.8	0.3	0.6	0.6	0.7 1.2
843	750	822	194	4000	78.3	69.6	1.1	0.6	0.8	0.4	1.0 1.8
1172	1000	1140	160	4500	79.8	68.1	1.3	0.8	0.8	0.4	1.4 2.4
1918	1500	1830	106.9	4500	87.3	68.2	1.7	1.2	0.9	0.6	1.8 3.3
2806	2000	2660	76.0	4000	102	72.8	2.6	2.1	2.1 0.3	2.1 ?	1.5 3.5
3883	2500	3660	72.05	4500	119	76.7	2.8	2.3	2.1 2.0	1.9	1.7 4.2
5194	3000	4900	61.9	4500	137	79.0	3.0	2.5	2.1 2.5	2.1	1.8 4.8
8832	4000	8620	50.2	5000	170	76.9	3.8	3.3	3.2 0.6	3.4	1.0 5.0

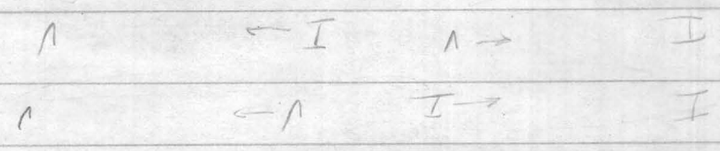
some coupling but likely a = 4000' has α 3.0 → 3.2 PFE true ∴ weakly anomalous

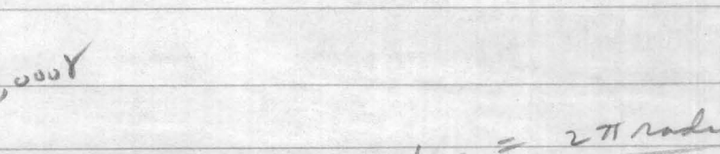
& compatible with a 4000' → 5000' buried body 8 – 10 PFE_2

10.6 = P + 3.3C
3.4 = P + C

7.2 7.4 = P + 3.3C
3.6 = P + C
3.8 = 2.3C
C = 1.7
.3 – 1.0 5.6 1.9
.3 – .1 1.7

P = 1.9
P = 0.3
2.2/2 = 1.1





0.5 gauss = 50,000 γ

$$1 = \frac{2\pi \text{ radians}/\text{sec}}{1 \text{ hz}}$$

2000 hz ×

$$\frac{2.67513 \times 10^4 \text{ radians}}{\text{gauss sec}} \times 0.5 \text{ gauss} \times \frac{1 \text{ sec hz}}{2\pi \text{ radians}}$$

$$2129 \text{ hz} / 50{,}000\gamma \quad \therefore \quad 20{,}000$$

852 → 3832

$I_\infty V_\infty = 26{,}600$

$e/2\pi = a \frac{V}{I}$

nachlaufen! x parameter

Copper Creek

9/12/77

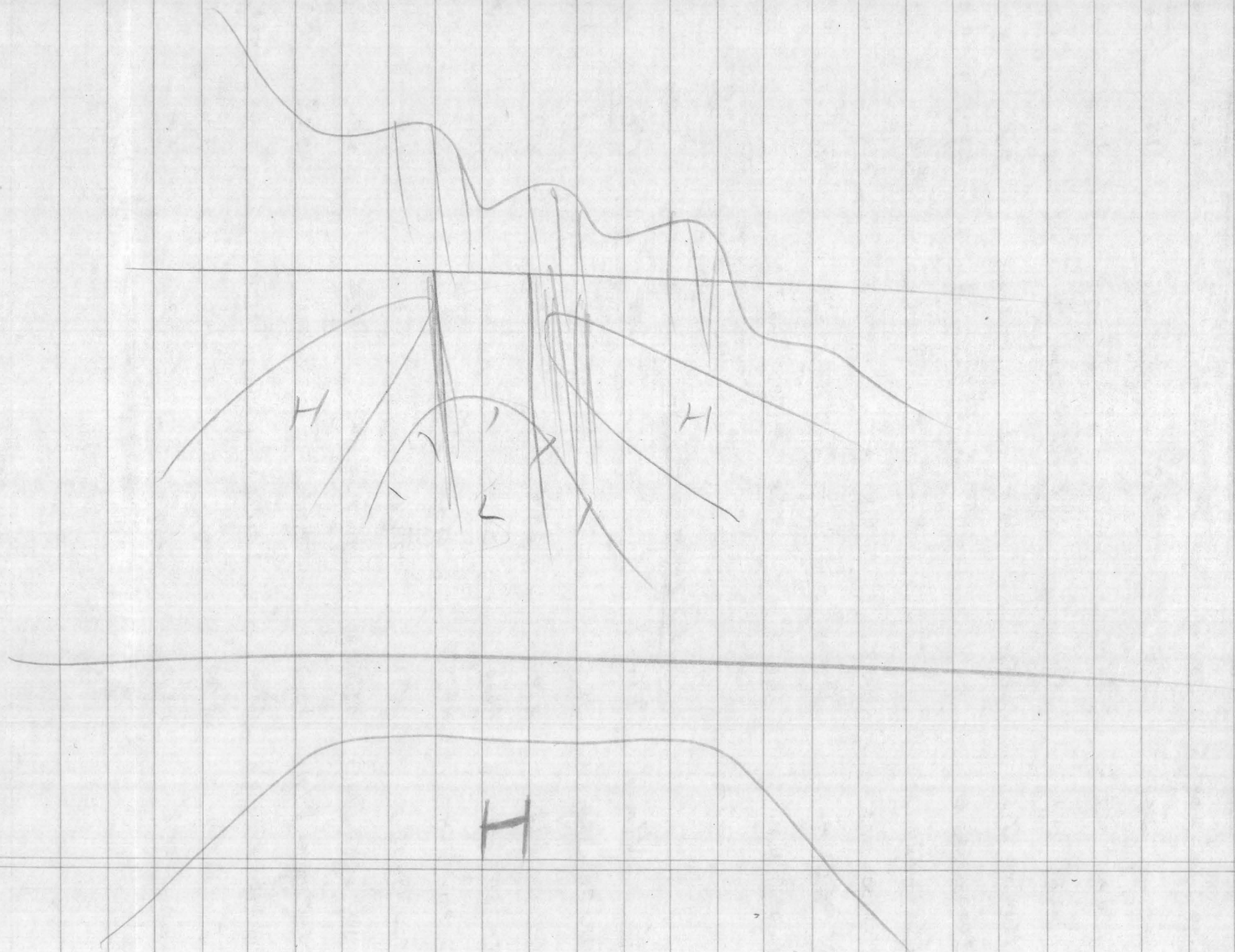
Expander #1

a'	"a"	V (mv)	I (ma)	e/2π in ohm-ft		PFE 0.3/0.1 ×2.1	PFE 1/0.1	α
300	310	459	3500	39.3	~~40.8~~ 40.7	0.6	1.0	0.0
500	530	258	3800	33.9	~~36.1~~ 36.0	0.6	1.6	-1.0
750	818	127	3500	27.2	~~29.8~~ 29.7	1.0	3.1	-2.4
1000	1120	85.1	3900	21.8	~~24.9~~ 24.4	2.1	3.1	0.4
1500	1790	55.3	4500	18.4	~~22.5~~ 22.0	2.3	3.4	0.5
2000	2530	33.4	4200	15.9	~~21.2~~ 20.1	1.9	2.8 ~~4.8~~ 3.8	0.3 ?
2500	3700	20.0	4000	12.5	~~18.3~~ 16.9	2.5	4.0	0.0
3000	4310	15.95	4300	11.1	~~18.2~~ 16.0	2.3	4.2	-0.9
3500	5330	13.4	~~43~~ 4500	10.4	~~19.5~~ 15.9	2.7	4.8	-0.8
4000	6540	11.8	4800	9.83	~~21.2~~ 16.1	2.7	5.3	-1.6

2.7 = P + C
5.3 = P + 3.3C ∴ 1.6 ≃ P
2.6 = 2.3C

Expander #2

a'	V (mv)	I (ma)	e/2π in ohm-ft		PFE 0.3/0.1 ×2.1	PFE 1/0.1	α
300 311	372	3800	29.4	30.4	0.6	0.6	0.7
500 530	218	3700	29.5	31.2	0.6	0.9	0.2
750 818	141	4000	26.4	28.8	0.6	1.8	-1.4
1000 1120	124	4400	28.2	31.6	0.8	1.5	-0.3
1500 1790	79.3	4500	26.4	31.5	1.3	1.8	0.3
2000 2530	54.5/41.7	4300/4200	25.3/19.9	32.1 ~~27.1~~	1.7	2.7	-0.1
2500 ~~3300~~ 2730 3700	44.8/31.0	4300 –	26.0/18.0	34.9 ~~26.7~~	2.1	3.2 ?	0.2
3000 4280 4820	35.6/23.9	4300 –	24.8/16.7	35.4 ~~26.8~~	1.5/1.5	4.2	-3.1
3500 5330	31.0	4500	24.1	36.7	1.9	3.5	-0.8
4000 6470	28.8	4800	24.0	38.8	1.7 ~	4.4	-2.9


H
L
H
H

$I_s V_{oo} = 10,500$
$I_D V_{oo} = 10,568$
$I_{oo} V_{oo} = 23,100$

Copper Creek

Expander # 3

SR

a'(ft)	a(ft)	V(mv)	I(ma)	C/2π in n-ft		2.1×PFE 0.3/0.1	PFE 1/0.1	α
311	3.7 300	351	4300	24.5	25.4	1.0	1.0	1.1
531	6.2 500	201	4200	23.9	25.4	1.0	1.2	0.8
819	9.2 750	141	4300	24.6	26.9	1.5	1.6	1.2
1130	13.0 1000	97.9	4200	23.3	26.3	1.5	1.8	0.9
1800	20.0 1500	65.9	4200	23.5	28.2	2.1	2.6	1.2
2570	28.5 2000	46.9	4300	21.8	28.0	1.9	2.6	0.7
3440	37.6 2500	35.1	4300	20.4	28.1	2.3	2.9	1.3
4430	47.8 3000	28.1	4200	20.1	29.6	2.3	3.0	1.1
5580	59.5 3500	24.1	4400	19.2	30.6	2.1	2.7	1.1
6920	72.9 4000	20.65	4400	18.8	32.5	1.9	2.6	0.7

$l_a = 1200'$ DR $C/2\pi = a\sqrt{l^2+d^2}\,\frac{V}{I}$ $\frac{l_a}{d_a}\sqrt{\frac{V}{I}}$

l_a(ft)		V(mv)	I(ma)	C/2π in n-ft		2.1×PFE 0.2/0.1	PFE 1/0.1	
1990	300	52.0	4300	15.0	17.4	2.3	3.1	1.0
1530	500	48.6	4200	15.0	17.7	1.5	2.8	−0.8
1690	750	46.2	4300	15.2	18.2	2.1	3.0	0.6
1900	1000	40.7	4200	15.1	18.4	2.0	3.1	0.1
2440	1500	35.4	4200	16.2	20.6	2.1	3.1	0.4
3140	2000	30.6	4300	16.6	22.3	2.1	3.5	−0.3
3970	2500	25.8	4300	16.6	23.8	1.9	3.1	−0.2
4950	3000	22.0	4200	16.9	25.9	2.1	3.0	0.6
6100	3500	19.8	4400	16.7	27.5	1.9	2.7	0.5
7430	4000	17.5	4400	16.6	29.6	1.7	2.1	1.0

Expander # 4

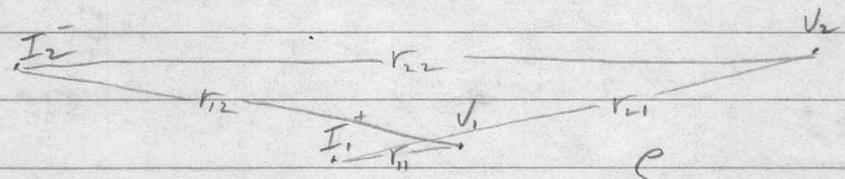
7100	4000	14.5	4800		21.4	2.1	5.0
SR 5700	3500	17.9	4800		21.3	1.7	4.5
DR 7700	4000	12.1	4800		19.4	2.5	5.9
6260	3500	14.5	4700		19.3	1.9	5.0

Copper Creek

a' (ft)		Expander # 5 V	I	e	2.1 × PFE 6.30.1	PFE 1/0.1
6340	4100'	33.5	4000	53.1	2.0	5.0
5270	3600'	39.35	4000	51.8	1.6	4.9

Expander # 6

6280	4000'	27.9	4000	43.8	2.3	4.8
5200	3500'	31.8	4000	41.3	2.1	4.5



$$V_1 = \frac{Ie}{2\pi}\left(\frac{1}{r_{11}} - \frac{1}{r_{12}}\right) \quad \& \quad V_2 = \frac{Ie}{2\pi}\left(\frac{1}{r_{21}} - \frac{1}{r_{22}}\right)$$

$$V = V_1 - V_2 = \frac{Ie}{2\pi}\left(\frac{1}{r_{11}} - \frac{1}{r_{12}} - \frac{1}{r_{21}} + \frac{1}{r_{22}}\right)$$

$$e = \frac{2\pi V}{I}\left\{\frac{1}{r_{11}} - \frac{1}{r_{12}} - \frac{1}{r_{21}} + \frac{1}{r_{22}}\right\}^{-1} = \frac{1.915V}{I}\left\{\quad\right\}^{-1} \text{ (if } r_{ij} \text{ in ft)}$$

n-m

$$e/2\pi = \frac{V}{I}\left\{\quad\right\}^{-1} \text{ (if in ohm ft \& } r_{ij} \text{ in ft)}$$

r_{11} ↑
r_{12} ↑
r_{21} ↑
r_{22} hoy

$1/x$ evaluates $\left\{\begin{matrix} 1/r_{11} - 1/r_{12} \\ -1/r_{21} + 1/r_{22} \end{matrix}\right\}^{-1}$ for "a"

$1/x$ ⇄
$1/x$ − ⇄
$1/x$ − ⇄
$1/x$ +
$1/x$ GTO 00

$k^2 I$ $\quad$ $2k^2 I$

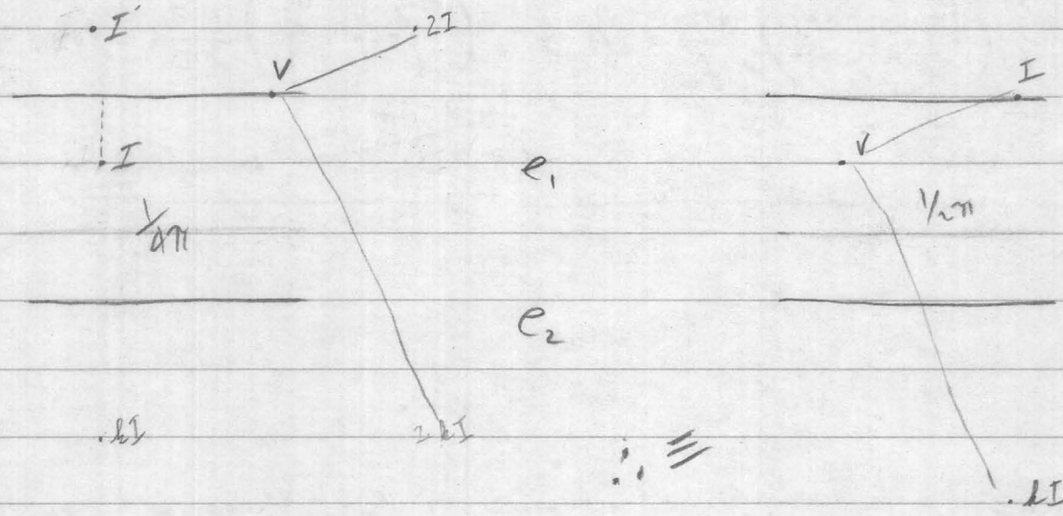
$k^2 I$

$k^2 I$

kI $\quad$ $2kI$

kI

kI



kI $\quad$ $2kI$ $\quad$ $\therefore \equiv$

kI

$k^2 I$ $\quad$ $2k^2 I$

$k^2 I$

$k^2 I$