



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

The following file is part of the Walter E. Heinrichs, Jr. Mining Collection

ACCESS STATEMENT

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

CONSTRAINTS STATEMENT

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

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

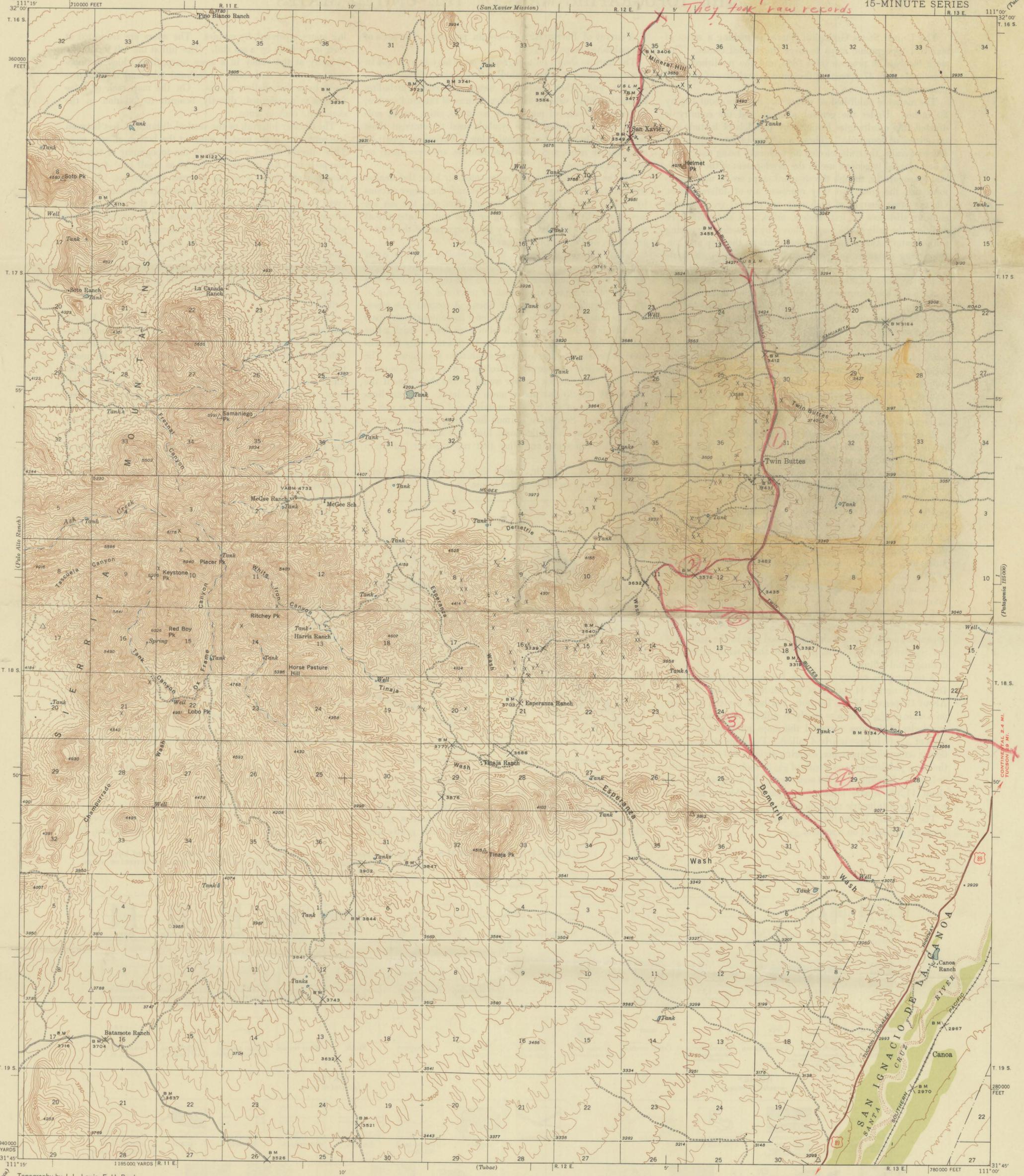
QUALITY STATEMENT

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

*Mog Mog traverses done for
American Metals - climaxes
late April - early May 1960.
They took raw records*

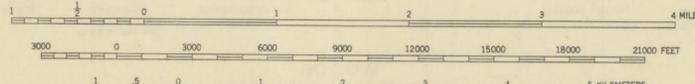
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

ARIZONA
(PIMA COUNTY)
TWIN BUTTES QUADRANGLE
15-MINUTE SERIES



Topography by J. L. Lewis, F. H. Purdy,
J. J. Hayes, S. M. Borrell, K. A. Bunker,
P. J. Frampton, and G. B. Woolley
Surveyed in 1938-1939

SCALE 1:62500



Contour interval 50 feet
Datum is mean sea level

ROAD CLASSIFICATION
 HARD-SURFACE ALL WEATHER ROADS DRY WEATHER ROADS
 Heavy-duty ——— LANE LANE Improved dirt
 Medium-duty ——— LANE LANE Unimproved dirt
 Loose-surface, graded, or narrow hard-surface — — —
 U. S. Route State Route

APPROXIMATE MEAN
DECLINATION, 1939

AMADO 2.5 MI.
NOGALES 31 MI.
 Polyconic projection. 1927 North American datum
 5000 yard grid based on U. S. zone system, F
 10000 foot grid based on Arizona (Central)
 rectangular coordinate system

TWIN BUTTES, ARIZ.
Edition of 1948

N3145-W11100/15

THE TOPOGRAPHIC MAPS OF THE UNITED STATES

The United States Geological Survey is making a series of standard topographic maps to cover the United States. This work has been in progress since 1882, and the published maps cover more than 47 percent of the country, exclusive of outlying possessions.

The maps are published on sheets that measure about 16½ by 20 inches. Under the general plan adopted the country is divided into quadrangles bounded by parallels of latitude and meridians of longitude. These quadrangles are mapped on different scales, the scale selected for each map being that which is best adapted to general use in the development of the country, and consequently, though the standard maps are of nearly uniform size, the areas that they represent are of different sizes. On the lower margin of each map are printed graphic scales showing distances in feet, meters, miles, and kilometers. In addition, the scale of the map is shown by a fraction expressing a fixed ratio between linear measurements on the map and corresponding distances on the ground. For example, the scale $\frac{1}{62,500}$ means that 1 unit on the map (such as 1 inch, 1 foot, or 1 meter) represents 62,500 of the same units on the earth's surface.

Although some areas are surveyed and some maps are compiled and published on special scales for special purposes, the standard topographic surveys and the resulting maps have for many years been of three types, differentiated as follows:

1. Surveys of areas in which there are problems of great public importance—relating, for example, to mineral development, irrigation, or reclamation of swamp areas—are made with sufficient detail to be used in the publication of maps on a scale of $\frac{1}{31,680}$ (1 inch = one-half mile) or $\frac{1}{24,000}$ (1 inch = 2,000 feet), with a contour interval of 1 to 100 feet, according to the relief of the particular area mapped.

2. Surveys of areas in which there are problems of average public importance, such as most of the basin of the Mississippi and its tributaries, are made with sufficient detail to be used in the publication of maps on a scale of $\frac{1}{62,500}$ (1 inch = nearly 1 mile), with a contour interval of 10 to 100 feet.

3. Surveys of areas in which the problems are of minor public importance, such as much of the mountain or desert region of Arizona or New Mexico, and the high mountain area of the northwest, are made with sufficient detail to be used in the publication of maps on a scale of $\frac{1}{125,000}$ (1 inch = nearly 2 miles) or $\frac{1}{250,000}$ (1 inch = nearly 4 miles), with a contour interval of 20 to 250 feet.

The aerial camera is now being used in mapping. From the information recorded on the photographs, planimetric maps, which show only drainage and culture, have been made for some areas in the United States. By the use of stereoscopic plotting apparatus, aerial photographs are utilized also in the making of the regular topographic maps, which show relief as well as drainage and culture.

A topographic survey of Alaska has been in progress since 1898, and nearly 44 percent of its area has now been mapped. About 15 percent of the Territory has been covered by maps on a scale of $\frac{1}{500,000}$ (1 inch = nearly 8 miles). For most of the remainder of the area surveyed the maps published are on a scale of $\frac{1}{250,000}$ (1 inch = nearly 4 miles). For some areas of particular economic importance, covering about 4,300 square miles, the maps published are on a scale of $\frac{1}{62,500}$ (1 inch = nearly 1 mile) or larger. In addition to the area covered by topographic maps, about 11,300 square miles of southeastern Alaska has been covered by planimetric maps on scales of $\frac{1}{125,000}$ and $\frac{1}{250,000}$.

The Hawaiian Islands have been surveyed, and the resulting maps are published on a scale of $\frac{1}{62,500}$.

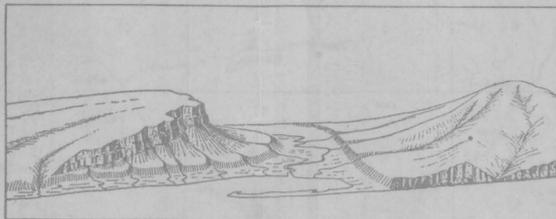
A survey of Puerto Rico is now in progress. The scale of the published maps is $\frac{1}{30,000}$.

The features shown on topographic maps may be arranged in three groups—(1) water, including seas, lakes, rivers, canals, swamps, and other bodies of water; (2) relief, including mountains, hills, valleys, and other features of the land surface; (3) culture (works of man), such as towns, cities, roads, railroads, and boundaries. The symbols used to represent these features are shown and explained below. Variations appear on some earlier maps, and additional features are represented on some special maps.

All the water features are represented in blue, the smaller streams and canals by single blue lines and the larger streams by double lines. The larger streams, lakes, and the sea are accentuated by blue water lining or blue tint. Intermittent streams—those whose beds are dry for a large part of the year—are shown by lines of blue dots and dashes.

Relief is shown by contour lines in brown, which on a few maps are supplemented by shading showing the effect of light thrown from the northwest across the area represented, for the purpose of giving the appearance of relief and thus aiding in the interpretation of the contour lines. A contour line represents an imaginary line on the ground (a contour) every part of which is at the same altitude above sea level. Such a line could be drawn at any altitude, but in practice only the contours at certain regular intervals of altitude are shown. The datum or zero of altitude of the Geological Survey maps is mean sea level. The 20-foot contour would be the shore line if the sea should rise 20 feet above mean sea level. Contour lines show the shape of the hills, mountains, and valleys, as well as their altitude. Successive contour lines that are far apart on the map indicate a gentle slope, lines that are close together indicate a steep slope, and lines that run together indicate a cliff.

The manner in which contour lines express altitude, form, and grade is shown in the figure below.



The sketch represents a river valley that lies between two hills. In the foreground is the sea, with a bay that is partly enclosed by a hooked sand bar. On each side of the valley is a terrace into which small streams have cut narrow gullies. The hill on the right has a rounded summit and gently sloping

spurs separated by ravines. The spurs are truncated at their lower ends by a sea cliff. The hill at the left terminates abruptly at the valley in a steep scarp, from which it slopes gradually away and forms an inclined tableland that is traversed by a few shallow gullies. On the map each of these features is represented, directly beneath its position in the sketch, by contour lines.

The contour interval, or the vertical distance in feet between one contour and the next, is stated at the bottom of each map. This interval differs according to the topography of the area mapped: in a flat country it may be as small as 1 foot; in a mountainous region it may be as great as 250 feet. In order that the contours may be read more easily certain contour lines, every fourth or fifth, are made heavier than the others and are accompanied by figures showing altitude. The heights of many points—such as road intersections, summits, surfaces of lakes, and benchmarks—are also given on the map in figures, which show altitudes to the nearest foot only. More precise figures for the altitudes of benchmarks are given in the Geological Survey's bulletins on spirit leveling. The geodetic coordinates of triangulation and transit-traverse stations are also published in bulletins.

Lettering and the works of man are shown in black. Boundaries, such as those of a State, county, city, land grant, township, or reservation, are shown by continuous or broken lines of different kinds and weights. Public roads suitable for motor travel the greater part of the year are shown by solid double lines; poor public roads and private roads by dashed double lines; trails by dashed single lines. Additional public road classification if available is shown by red overprint.

Each quadrangle is designated by the name of a city, town, or prominent natural feature within it, and on the margins of the map are printed the names of adjoining quadrangles of which maps have been published. More than 4,100 quadrangles in the United States have been surveyed, and maps of them similar to the one on the other side of this sheet have been published.

Geologic maps of some of the areas shown on the topographic maps have been published in the form of folios. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped, and several pages of descriptive text. The text explains the maps and describes the topographic and geologic features of the country and its mineral products. Two hundred twenty-five folios have been published.

Index maps of each State and of Alaska and Hawaii showing the areas covered by topographic maps and geologic folios published by the United States Geological Survey may be obtained free. Copies of the standard topographic maps may be obtained for 10 cents each; some special maps are sold at different prices. A discount of 40 percent is allowed on an order amounting to \$5 or more at the retail price. The discount is allowed on an order for maps alone, either of one kind or in any assortment, or for maps together with geologic folios. The geologic folios are sold for 25 cents or more each, the price depending on the size of the folio. A circular describing the folios will be sent on request.

Applications for maps or folios should be accompanied by cash, draft, or money order (not postage stamps) and should be addressed to

THE DIRECTOR,
United States Geological Survey,
Washington, D. C.

November 1937.

STANDARD SYMBOLS

NOTE:—Effective on and after October 1, 1946, the price of standard topographic quadrangle maps will be 20 cents each, with a discount of 20 percent on orders amounting to \$10 or more at the retail rate.

CULTURE (printed in black)

RELIEF (printed in brown)

WATER (printed in blue)

WOODS (when shown, printed in green)

--

2943 East Chula Vista Drive
Tucson 12, Arizona
27 March 1954

Mr. C. J. Abrams
Climax Molybdenum Company
Midland Savings Building
Denver 2, Colorado

Dear Jack:

I have your letter of the 12th and have wanted to get in touch with you before this, but have been completely snowed under since just before the New York AIME meeting. I tried to look you up Friday after the meeting, but you had already checked out. A call to your office was not definite but vaguely suggested you had returned to Denver. My return to Tucson lasted about one day before heading out again and I have just gotten back. During this trek I spent a few days in Grand Junction. I found out you were holding reservations at the La Court Hotel so I kept an eye out for you until I had to leave.

The scope of our ideas about the Pima Mine continue to expand successfully. This involves considerably more exploration, however production remains the same. I think we should get going on a mill and help finance expanded exploration via a DMEA loan, but so far have not been able to drum up much support for the idea. Unofficially, I still wonder if there is any chance of getting together with you people on some sort of joint effort? I personally feel we could do better working with an aggressively exploration minded mining company than we can as is. Along these lines we could offer considerable in addition to the Pima Mine, such as a going organization with a competent staff experienced in all phases of exploration both mining and oil, as well as extensive lab and research personnel and facilities. Your ideas relative to this would be appreciated.

Ira Wagdon relates that the Pinal Grande people became unreasonable when it came to getting something down on paper. I was afraid of this and am sorry to hear it. Enclosed is my bill on this work.

Best regards and wishes to you and Laura.

Sincerely,

Walter E. Heinrichs, Jr.

WEH/H
Encl.

CLIMAX MOLYBDENUM COMPANY

MIDLAND SAVINGS BUILDING
DENVER 2, COLORADO

NEW YORK OFFICE: 500 FIFTH AVENUE
MINE AND MILL: CLIMAX, COLORADO



August 31, 1954

Mr. Walter E. Heinrichs, Jr.,
2943 East Chula Vista Drive
Tucson, Arizona

Dear Walter:

I would like to obtain additional information relative to the Pima property, not too much in detail at this time, but you state that you have fair assurance of about 20,000,000 tons at 1.5%. Is this 1.5% copper all in sulfides, or oxides and carbonates, so that you have to have a combination flotation leaching plant? I would like to know about what the percentage of sulfides and carbonates are and I would also like to know the full name of the Union Oil Company. Is it the Union Oil Company of California, or what are they?

When I last saw you you said somebody in New York was going to represent and do all the negotiating for the Union Oil Company on this Pima property. Please give me the full name and address of this individual.

Please give me the name of all the different companies who have made an examination of the Pima property, particularly, I would like to know if the American Metal Company examined this property. Have all the companies examined this property for high grade sulfides, or for a low grade open pit operation?

I think we should be able to make some kind of a deal whereby we could take over the operation and make a mine out of it and I want to start New York working on this.

As far as the Pinal Grande is concerned, I am not worrying about the syndicate you mention, as it looks to me as if they are just out wasting money.

Mr. Walter E. Heinrichs, Jr.,
August 31, 1954
Page 2

Our Exploration Department, in spite of all the handicaps is making some progress and I hope from now on to speed things up.

I hope to be out in San Francisco at the convention and hope that I will have an opportunity to see you at that time.

Sincerely,

A handwritten signature in cursive script that reads "C. J. Abrams". The signature is written in dark ink and is positioned above the typed name.

C. J. Abrams

CJA MLM

September 9, 1954

Mr. C. J. Abrams
Climax Molybdenum Co.
Midland Savings Bldg.
Denver 2, Colorado

Dear Jack:

In reply to your letter of 31 August, I have delayed answering immediately while awaiting confirmation of Pima's present status. I still don't have it directly from the Company, but I believe it is safe to say that Cyprus now has an exclusive option. This is based on the fact that two interested parties, one American Metals, have suddenly terminated examination and negotiation on the receipt of the same information. If this is erroneous or should materially change in the near future, I will advise you immediately. In the meantime, I wouldn't advise wasting any time on it, unless you would care to inquire directly to the Union Oil Company of California, Los Angeles, California. Attn: Mr. Reese Taylor, President.

Will look for you in Frisco. Will be at the Hotel Plaza.

Sincere regards,

Walter E. Heinrichs, Jr.

PS The information is now definite.

ll

OCTOBER 14, 1954

CLIMAX MOLYBDENUM COMPANY
MIDLAND SAVINGS BUILDING
DENVER 2, COLORADO

ATTENTION: MR. FRED H. BROOKS, EXPLORATION DEPARTMENT

GENTLEMEN:

IN REPLY TO YOUR LETTER OF 12 OCTOBER, 1954, FROM MR. BROOKS,
I HAVE ANSWERED MR. ABRAMS LETTER OF 31 AUGUST IN A PERSONAL NOTE
DATED 9 SEPTEMBER, 1954.

AS STATED IN THAT LETTER, THE PIMA MINE IS NOW UNDER OPTION TO
CYPRUS MINES CORPORATION OF LOS ANGELES AND NEW YORK AND THEREFORE
THE MATTER IS CLOSED, AT LEAST FOR THE TIME BEING.

VERY TRULY YOURS,

WALTER E. HEINRICH, JR.

WEH:RW

Minerals Exploration Company

P. O. BOX 5671
TUCSON, ARIZONA

December 9, 1955

Mr. John J. Curzon
Director Exploration & Development
Climax Molybdenum Company
Mines Park
Golden, Colorado

Dear John:

In reply to your letter of 30 November, there are not many positive facts to relate about Duval's copper prospect in the Pima district. The reports are highly rumerous, and as such suggest some encouragement. Personally, I feel they do have a chance to make something economic though not necessarily very large. The area was origionally abandoned by Calumet and Arizona many years ago. More recently, the Coronado subsidiary of Cyprus Mines drilled near by with negative results.

Many thanks for the invitation to visit your new location in Golden. I will certainly take advantage of this at the first opportunity and hope to find you in.

Best personal regards,

Sincerely,

Walter E. Heinrichs, Jr.
Exploration Manager

WEH/j

May 10, 1960

S T A T E M E N T

To: American Metals-Climax
903 East 3rd Street
Tucson, Arizona

Re: Mobile Magnetometer traverses from Sec. 35, T16S,
R12E through Twin Buttes to Nogales Hwy. and detail
in South Pima District in T18S, R12E & R13E, Pima
County, Arizona. April 1960

Services:-----\$150.00
(1/2 day @ \$300.00/day)

TOTAL BILLING----\$150.00

March 3, 1961

Mr. William Shaw
American Metals Climax
25 Adelaide West
Toronto, Ontario, Canada

Dear Bill:

In regard to our conversation of March 1, 1961, our charges for induced polarization survey work are as follows:

Fees: \$250.00 per field day. This includes a three or four man field crew (depending on field conditions, terrain, etc.) The crew consists of a highly trained technicians who have operated as a unit for a considerable period of time. Also included in this fee are supervision, office computation, interpretation, maps and final report. No charges are made for non-productive days where non-production is due to malfunction of equipment or to the fault of our personnel. Liberal adjustments are made for days of only partial production or where inclement weather, telluric noise, or other unforeseeable events not due to the above limit production or provide for unreliable data.

Expenses: There is a standard charge of \$10.00 per day plus \$0.10 per mile for field vehicles used. Normally one, but sometimes two vehicles are necessary.

Other directly chargeable expenses such as personnel expenses on out of town operations, map reproductions, etc. are made at cost.

Costs per profile distance, unit are, ground evaluated, etc., are dependent upon such factors as terrain, dipole spacings, profile spacing and can only be estimated independently for each job proposal. Normally our costs have been ranging between \$250.00 and \$500.00 per data profile.

Incidentally our costs for mobile magnetic surveys is \$280.00 per field day including records and vehicle expenses, plus \$80.00 per day for desired interpretation and final report.

Mr. William Shaw

- 2 -

March 3, 1961

We also provide nearly all the other geological and geophysical services in use today including a completely equipped geochemical laboratory which I failed to show you on your visit to our offices.

I hope this information will satisfy your needs and that we will be hearing from you again soon.

Sincerely yours,

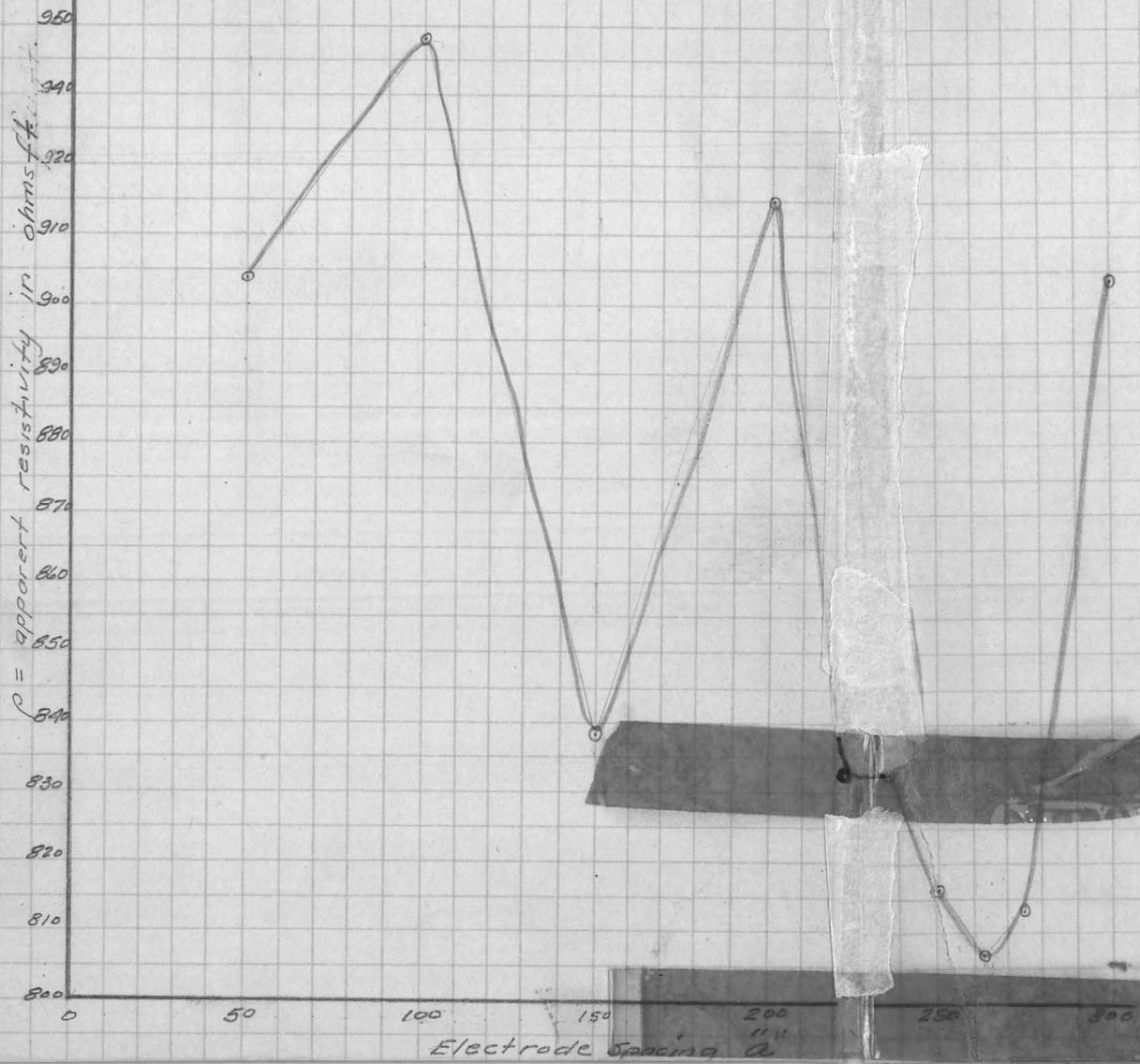
HEINRICHS GEOEXPLORATION COMPANY

Franklin A. Seward, Jr.
Geophysicist

FAS:jh

Resistance

R	V	I	Applied V
250' N	.046 ✓	90 m.a.	22½ V
250' R	.049 ✓	89 m.a.	22½ V
225' N	.035 ✓	54 m.a.	22½ V
225' R	.028 ✓	53 m.a.	22½ V
200' N	.021 ✓	28½ m.a.	22½ V
200' R	.019 ✓	28 m.a.	22½ V
200' N	.040 ✓	58 m.a.	45 V
200' R	.040 ✓	58 m.a.	45 V
262½' N	.028 ✓	75½ m.a.	22½ V
262½' R	.046 ✓	74 m.a.	22½ V
237½' N	.037½ V	61 m.a.	22½ V
237½' R	.031 V	62 m.a.	22½ V
50' N	.092 ✓	33 m.a.	22½ V
50' R	.105 ✓	34 m.a.	22½ V



Pot.

M.A.

BAT

S.D

Potential	($2\pi a$)	Spacing	$\frac{V}{I}$
+0.003	314	50'	3.20 2.50
-0.006	628	100'	1.27 1.70 1.68 1.61 1.40
-0.018	943	150'	0.23 1.68 0.27
-0.007	1256	200'	0.50 0.96
-0.003	1569	250'	0.49 0.49
+0.003	1883	300'	0.46 0.39
+0.005	1726	275'	0.55 0.39

J.P.

cont'd
from

Potential	(μV)	Spacing	$\frac{V}{I}$
-0.002	1569	250'	0.57 0.55
+0.004	1412	725'	0.65 0.53
+0.002	1256	200'	0.74 0.68
± 0.000	1256	200	0.69 0.69
-0.009	1648	262 $\frac{1}{2}$ '	0.37 0.62
+0.004	1490	237 $\frac{1}{2}$ '	0.62 0.50
-0.006	314	50'	2.79 3.09

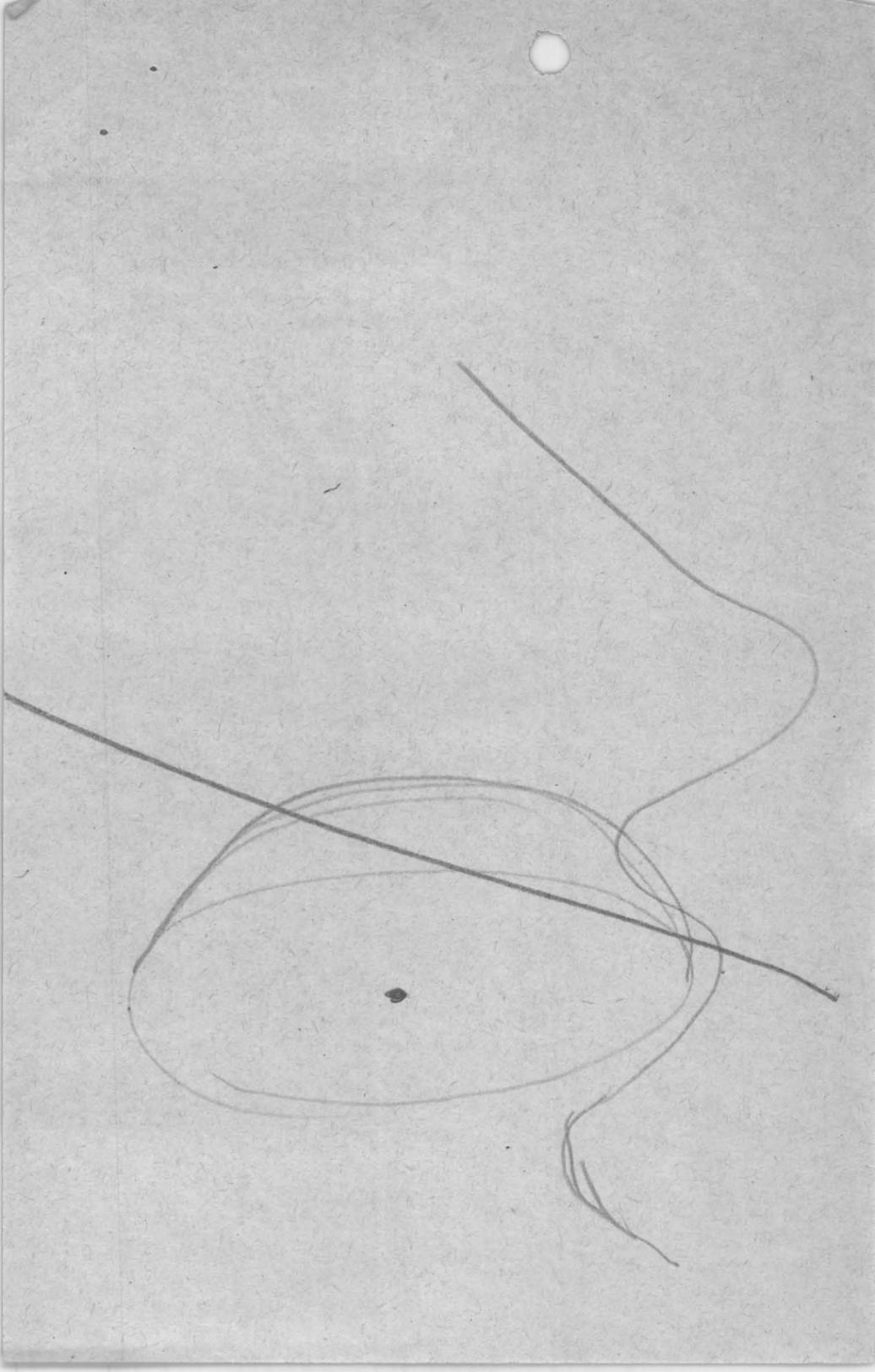
Climax Resistivity & SP.

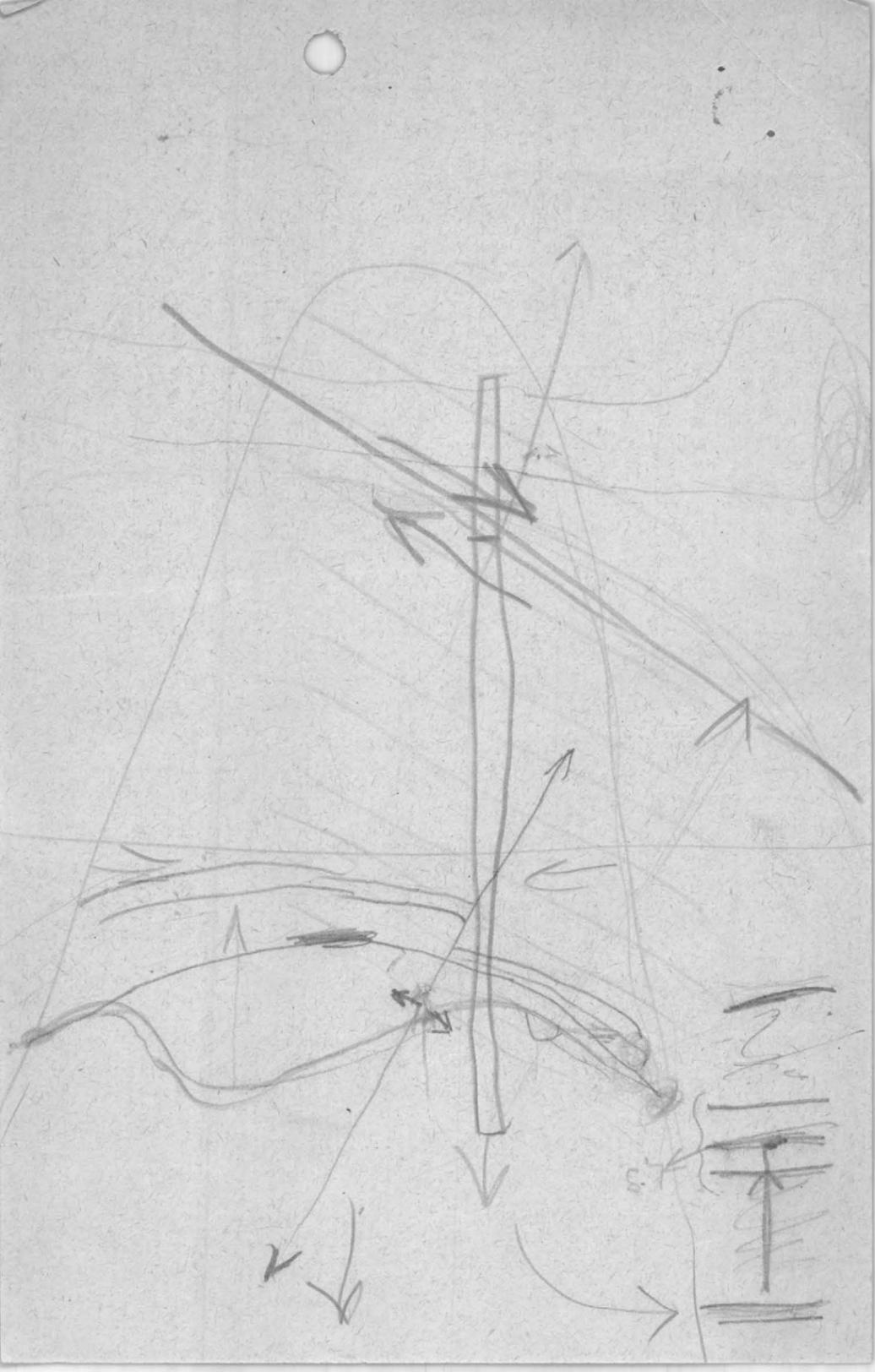
2 June 47

Koromo Colo -

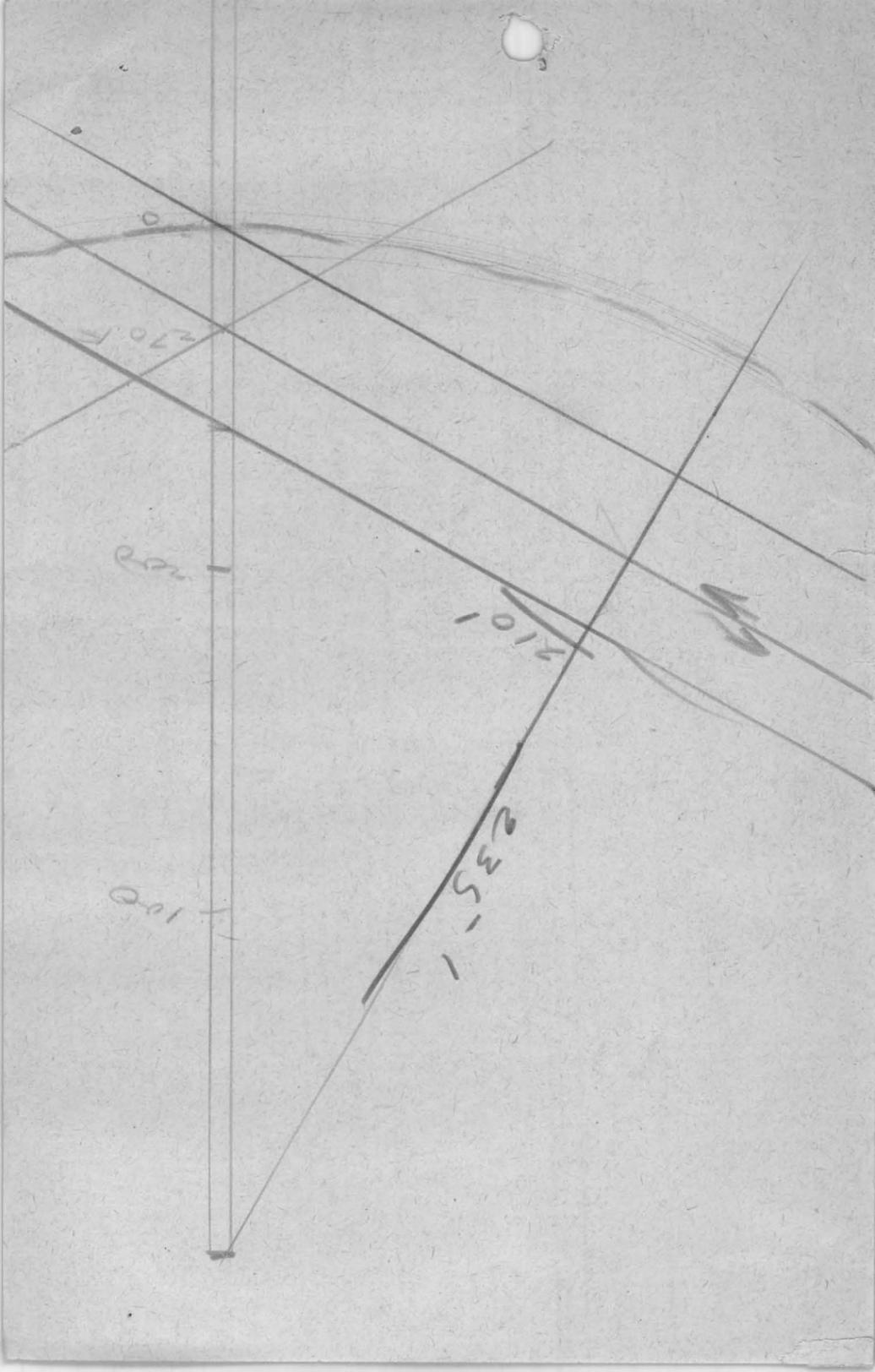
RESISTIVITY

<u>a</u>	<u>V</u>	<u>I</u>	<u>Applied V.</u>
50' N.	.032 V	10 m.a.	22½ V
50' R.	.020 V	8 m.a.	22½ V
100' N	.028 V	22 m.a.	22½ V
100' R	.039 V	23 m.a.	22½ V
100' R	.038 V	22 m.a.	22½ V
100' R	.071 V	44 m.a.	45 V
100' N	.063 V	45 m.a.	45 V
150' N	.005 V	22 m.a.	22½ V
150' R	.037 V	22 m.a.	22½ V
150' N	.066 V	22½ m.a.	22½ V
200' N	.013 V	26 m.a.	22½ V
200' R	.025 V	26 m.a.	22½ V
250' N	.050 V	102 m.a.	22½ V
250' R	.054 V	111 m.a.	22½ V
300' N	.035 V	76 m.a.	22½ V
300' R	.030 V	77 m.a.	22½ V
275' N	.033 V	60 ma.	22½ V
275' R	.023 V	59 ma.	22½ V





904	50	✓
1851	100	✓
2690	150	✓
3605	200	✓
4438	225	✓
5271	237½	✓
6087	250	✓✓
6893	262½	✓
7707	275	✓
8611	300	✓



~~V~~ ∇

~~V~~



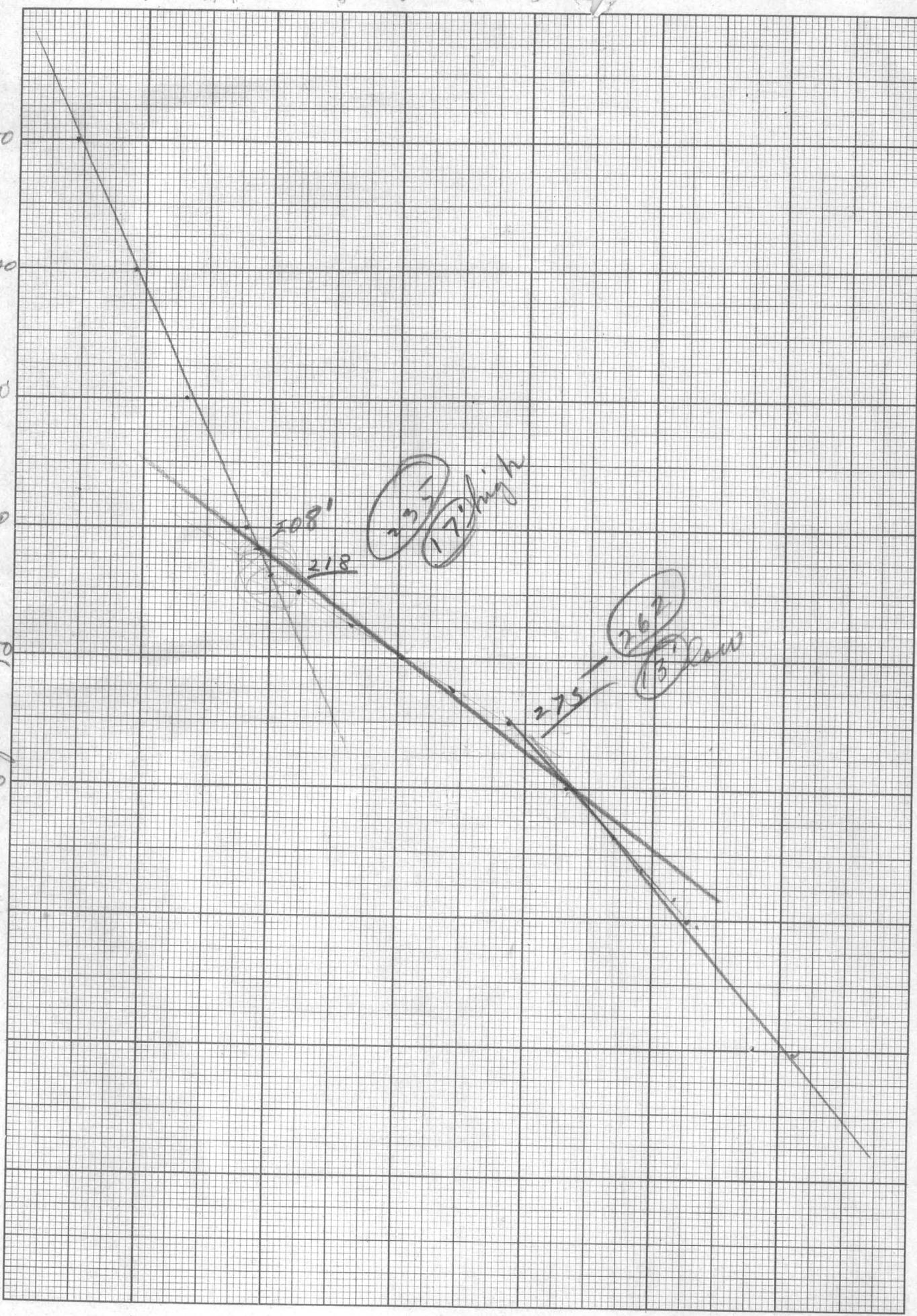


Heinrichs

at

x 583

B. P.



305 pressure

x

1000 2000 3000 4000 5000 6000 7000 8000

208'
218

232
17' high

262
13' low

275