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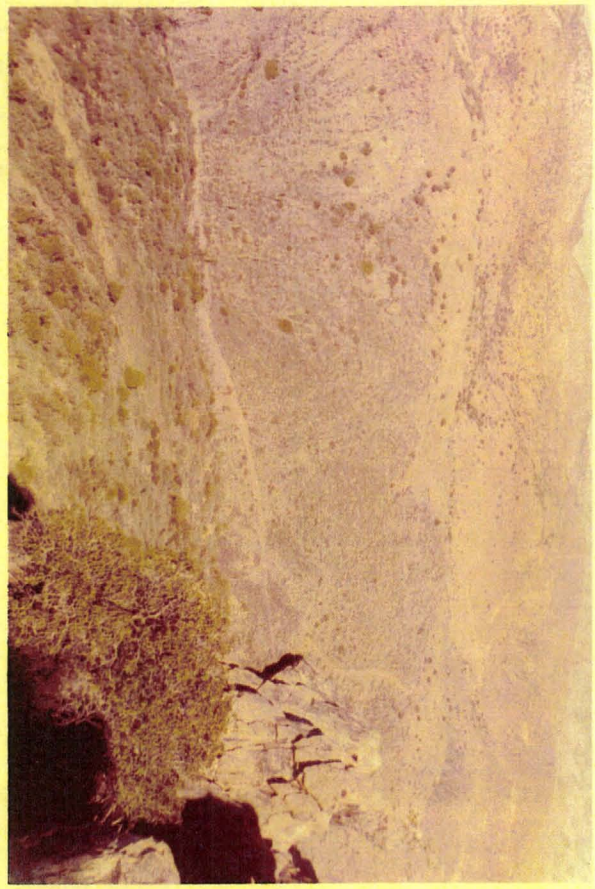
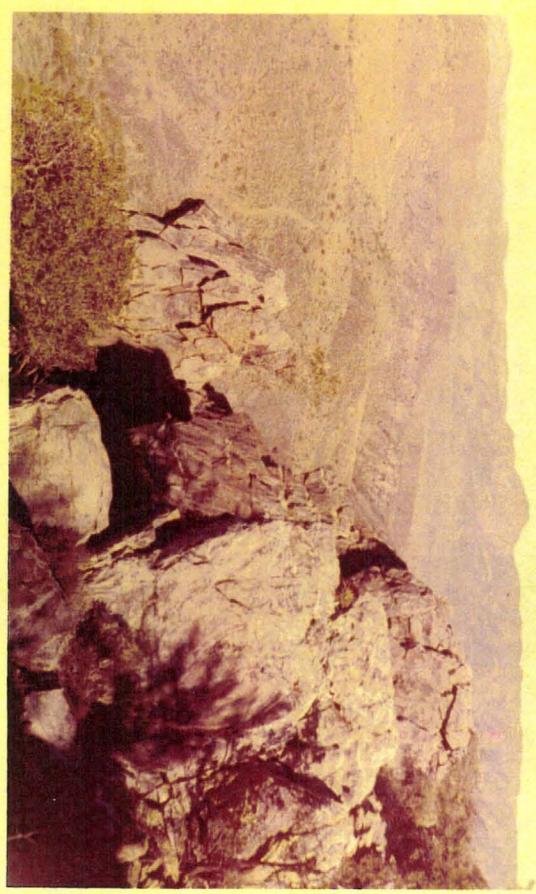
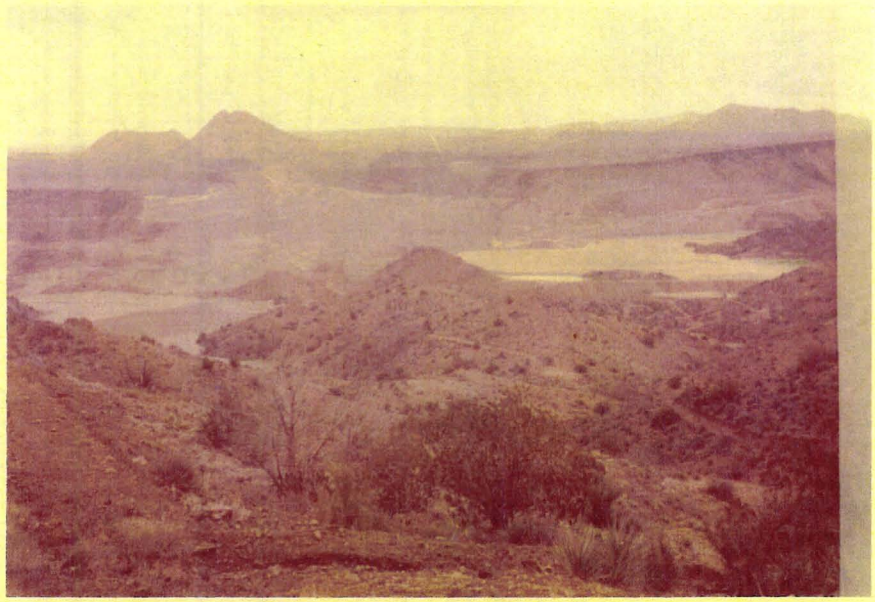
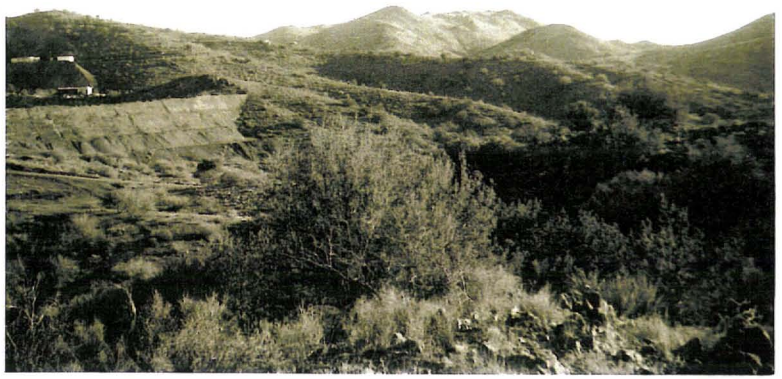






JAN • 62 •



JAN • 62

JAN • 62

CALIFORNIA INSTITUTE OF TECHNOLOGY
Pasadena

1953+

COPY

Mr. K. K. Welker
Cyprus Mines Corporation
1206 Pacific Mutual Building
Los Angeles 14, California

Dear Mr. Welker:

The following is a summary of the results obtained in the course of magnetometer reconnaissance work carried on for your company under my supervision in the Bagdad Mining District, Yavapai County, Arizona.

The recommendations made are to be found at the end of the summary.

The results obtained in the Copper King mine area, in my opinion, are conclusive enough to warrant an exploratory drilling, north of the mine shaft, as outlined in the recommendations.

The results obtained in other areas require some more geophysical work to be carried on, as suggested, before any conclusion can be drawn about them.

Yours truly,

G. Potapenko
Associate Professor of Geophysics

Enclosed: Blueprints of the index map, of 6 maps which show the location of magnetic traverses run in the areas surveyed, and of magnetic and topographic profiles.

COPY

Magnetic reconnaissance work has been carried on in the Bagdad Mining District, Arizona, with two purposes in mind:

(a) to determine a possible occurrence of bodies of magnetite, which are of importance in view of their known association with sulfide ore in the Copper King mine area; and

(b) to provide a basis for selecting some other geophysical method suitable for future prospecting in the District.

The work consisted in measuring the vertical component of the magnetic field of the Earth along a number of traverses selected on the basis of detailed geological maps supplied by Mr. K. Welker, and supplemented by the published data available, including the aero-magnetic map of the northern part of the District. This map accompanies the Memoir 47 of the G.S.A. by V. Vazquier et al.

The measurements in the field have been made during the time from August 3 to August 29, 1953, by Mr. D. O. Emerson, assisted from time to time by the employees of the Cyprus Mines Corporation. A vertical magnetometer of the Schmidt type was used. It was calibrated before being taken to the field.

The traverses selected were run on the 20-~~feet~~ interval between the ~~stations along~~ them. Shorter intervals ~~were~~ used in a few places where magnetic gradients turned

The traverses selected were run on the 20-feet interval between the stations along them. Shorter intervals were used in a few places where magnetic gradients turned out to be large. The readings obtained in the field were used to compute the vertical component of the magnetic field, and the results of computations were plotted as magnetic profiles. The blueprints of profiles are enclosed at the end of this summary together with six maps which show the location of traverses (maps 2 - 7) and an index map (map 1).

The stations along the traverses were given even numbers west of, and odd numbers east of the selected "zero station." These numbers are marked on each profile. Topographic profiles are drawn below each magnetic profile, and the types of rocks encountered along each traverse are indicated on topographic profiles to facilitate the interpretation. The nomenclature of rock types corresponds to that found on the geologic maps received from Mr. Welker.

The following is a short description of traverses run in the seven areas of the District. Some remarks pertaining to the type of anomalies found are included in this description.

Copper Queen area

Four traverses from 600 to 1400 feet long were run in the Copper Queen area. They were supplemented by a few additional short traverses run where the anomalies were found. These traverses are marked MV, MX, MZ on map 2. Four strong anomalies were located by these traverses.

They may be seen on the corresponding profiles.

One anomaly is a magnetic high of from 2,000 to 3,000 gammas. It occurs over the andesite belt, and it is probably due to bedded fragmental andesite. It should be noted that this anomaly is not in a set position in relation to the andesite boundaries. On the traverse MZ it is near station 30, i.e., near the north-west edge of the andesite belt. On the MX it is between stations 20 and 30, i.e., it lies closer to the center of the same belt. On the MV it is near station 12, i.e., it lies over the center of the belt. The small 700 gammas high at the station MV32 may be over andesite. This would indicate that the No. 1 fault indicated on the geologic map is located a few feet too far west at that location.

A second anomaly, a magnetic high, occurs over the basic intrusion at the NW end of the MX-traverse. A faint high appears over the NW end of the MV-traverse and this may be due to a buried portion of the same basic intrusion.

A third magnetic high was found on the extreme SE end of the MZ- traverse. The detail on this shows it to be an elongated and a rather localized anomaly. Outcropping on the surface is a heavy, magnetite-rich rock that is also high in silica.

The fourth anomaly is a magnetic low located near station 6 on the MV-traverse, adjacent to the high bound, near station 12. Magnetic lows, otherwise called

"negative anomalies," are known in association with magnetite bodies. Three additional short traverses, Va, Vb, Vc were run over this low. They show that the anomaly is very strong and localized. This last means that the disturbing body, responsible for it, must be rather shallow.

Copper King area

The six traverses were run in the Copper King area. They are marked MA, MB, MD, ME-MF, MH and MN on map 3.

Each of the traverses north of the shaft indicates either a single or a double magnetic high, up to about 4000-5000 gammas in magnitude. These highs indicate a trend. The presence of double highs makes an estimate of the trend rather difficult, but its general direction is towards the NE.

The traverse south of the shaft, i.e., MN-traverse, reveals no anomaly.

Pison area

Two traverses, marked PI and PII on map 4, were run in this area in an attempt to check the magnetic high shown on Vacquier's areomagnetic map. The profiles indicate that the area possesses a large number of sharp magnetic highs, each of a rather small areal extent. These highs are due to patches of magnetite in banded schist stringers that are included in the quartz monzonite porphyry intrusive. Some of the basic rocks that band the area also produce highs.

Mountain Spring Fault area

Three traverses, marked MSF-I, II, III were run across the fault, and one, marked MSF-IV, was run along the

fault. They are shown on map 4.

None of the traverses indicated any magnetic anomaly. Some mineralization was observed in the outcrop in the fault zone, but all the magnetic readings were on the level of about 1000 gammas, which means the concentration of magnetite in rocks is generally low.

Old Dick mine area

A short traverse, marked OD-1 on maps 4 and 5, was run across the contact on which the ore at the Old Dick mine is located. The traverse was about 300 feet south of the known ore body.

The readings were below 1000 gammas level, and without any indication of an anomaly. The rocks of the area are therefore of a low magnetite content.

Copper Queen (Bird Eye) area

One traverse 720 feet long was run in this area across the northern part of that andesite belt within which the Copper Queen mine is located. This traverse is marked MT, and it is shown on map 6.

The profile shows that the readings are on the level of 1000 gammas. They indicate no anomaly.

Red Cloud area, Skunk Canyon

One traverse 1060 long was run in this area across the andesite belt and across one of the branches of the Mountain Spring Fault. The traverse is marked RC-1, and it is shown on map 7. The readings are below 1000 gammas level. They are remarkably uniform, and indicate no anomaly.

Conclusions

It should be borne in mind that the present magnetic survey, on account of a limited time allocated for field work, covered only a fraction of a rather large District (see index map 1). In spite of this limitation, it is possible to draw some conclusions applicable, in a general way, to the whole District. This possibility is due to the fact that detailed geologic maps of a large part of the District were made available before the survey began. These maps allowed us to select the magnetic traverses, i.e., to determine their number, direction, and length in such a way that it is believed they cover the most vital points of the whole District. The results obtained are considered, therefore, representative enough to be applicable to at least that part of the area which is covered by the geologic maps. The conclusions are:

(A) -- The District can be easily subdivided into several areas, according to the average content, and type of magnetite in them.

In the areas of Copper King mine, of Pison, and of Copper Queen mine, the average magnetite content is much higher than in the larger area between the Pison and the Copper Queen mine. The rocks south of the Copper Queen mine area are very poor in magnetite.

In the Copper King mine area the magnetite is massive and closely related to sulfide minerals. Contrary to this, in the Pison and in the Copper Queen mine areas the magnetite occurs in patches, on the andesite belt, in

each of which it forms euhedral primary crystals evenly distributed and showing no relation to any ore. In the Copper Queen mine are a the magnetite occurs also in a banded rock and it appears to be sedimentary, or redistributed sedimentary in origin.

The difference in type of magnetite allows one to conclude that the mineralization of different areas of the District is genetically different. This conclusion has an important practical meaning. It refers to that "rule of thumb," according to which 50% of the sulfide bodies in the Copper King mine area have a close relationship to a concentrated magnetite body. Our results indicate that this "rule" should not be applied to either the Pison area, or to the area south of the Pison.

(B) -- The geology at the Pison area, as far as our data show, is quite similar to that of the Copper Queen mine. There is rhyolite in contact with schist, and a shear zone with meager traces of copper where it crops out.

Our profiles PI and PII show clearly that the strong single magnetic high, which Vacquier's aeromagnetic map indicates in the Pison area, is due to several anomalies of small areal extent. Such anomalies must merge into one strong one at the altitude of 1000 feet at which the plane has been flown in the course of aeromagnetic survey. In other words, the large magnetic high of Vacquier's map does not signify any magnetic body of a large extent.

(C) -- The trend of magnetic anomalies discovered north of the Copper King mine is very impressive. It is

assumed to be due to some bodies of magnetite close to the ore-bearing zones worked by the mine.

The western boundary of the trend may be located at point (k) on the MA-traverse. From there it runs in the general direction of the shear zone, up to the point (l) on the fault line FlmF; see map 3.

Close to the mine, the mineralization is known to be confined to the narrow shear zone. Magnetic profiles, on the other hand, indicate that north of the mine there exist a number of magnetic highs spread over a large area. The presence of these highs may well mean that the whole area in which they occur is mineralized.

The profiles show that the area of probable mineralization is split into two parts by the fault FlmF. The part which lies south of the fault is within the limits klmn, as marked on map 3. The extent of the part which lies north of the fault cannot be determined at this time on account of the scarcity of magnetic data. Its western boundary seems to correspond roughly to the m'm'-line shown. This means that the northern part seems to be shifted eastward relative to the southern part by about 150 to 200 feet. The movements along the FlmF-fault line offer an obvious explanation to both the shift and the broadening of the zone of mineralization, but this problem must be left to geologists.

No indication has been found on any extension of the trend of anomalies discussed to the south of the shaft of the Copper King mine. This is inspite of the fact that the location of the MN-traverse has been chosen in such a

way that it would reveal the trend if such were present.

Recommendations

1. In the Copper Queen mine area, a detailed survey employing the electrical Self-Potential method is recommended. This method is considered to be more promising than other electrical methods in surveying for sulfides in this area.

2. The Copper King mine area, north of the main shaft, is considered to be unfavorable for the application of the Self-Potential method, on account of numerous heavy concentrations of magnetite, the presence of which makes the interpretation of self-potentials of sulfides very uncertain.

1/9/62 Why? Wash.

3. An exploratory core-drilling is recommended in the Copper King mine area. Two holes, marked X and Y on map 3, are suggested. They correspond to:

X - 27,680 N and 5,245 E approximately
Y - 27,775 N " 5,275 E "

See that each hole is spudded a couple of feet east of the western boundary line of the shear zone which is shown on the geologic map of the mine area. Each hole should be 150-200 feet deep; and each should dip 55° toward N 80° W approximately.

4. An additional, third drill-hole is recommended at the point marked Z on map 3, located as follows:

Z - 27,770 N and 5,420 E.

This hole should be vertical, about 100-150 feet deep. The purpose of drilling this hole, in addition to a search

for sulfides, is to ascertain the type of magnetite segregation in place, to see if this magnetite is of the same genetic type as that in the shear zone. Should this be proved, a detailed magnetic survey of the area north of the 27,600 N and east of the shear zone is recommended.

30,000N

Copper King (see map 3)

27,000 N

Prison (see map 4)

24,000

24,000 N

100'=1" Geol. Topo not Available

MSF II

21,000 N

MSF I

Mountain Spring Area (see map 4)

MSF IV

MSF III

Old Dick (see map 5)

18,000

18,000 N

Bird Eye (see map 6)

Copper Queen (see map 2

15,000 N

12,000

12,000 N

9,000 N

000

6,000E

9,000 E

12,000E

6,000

6,000 N

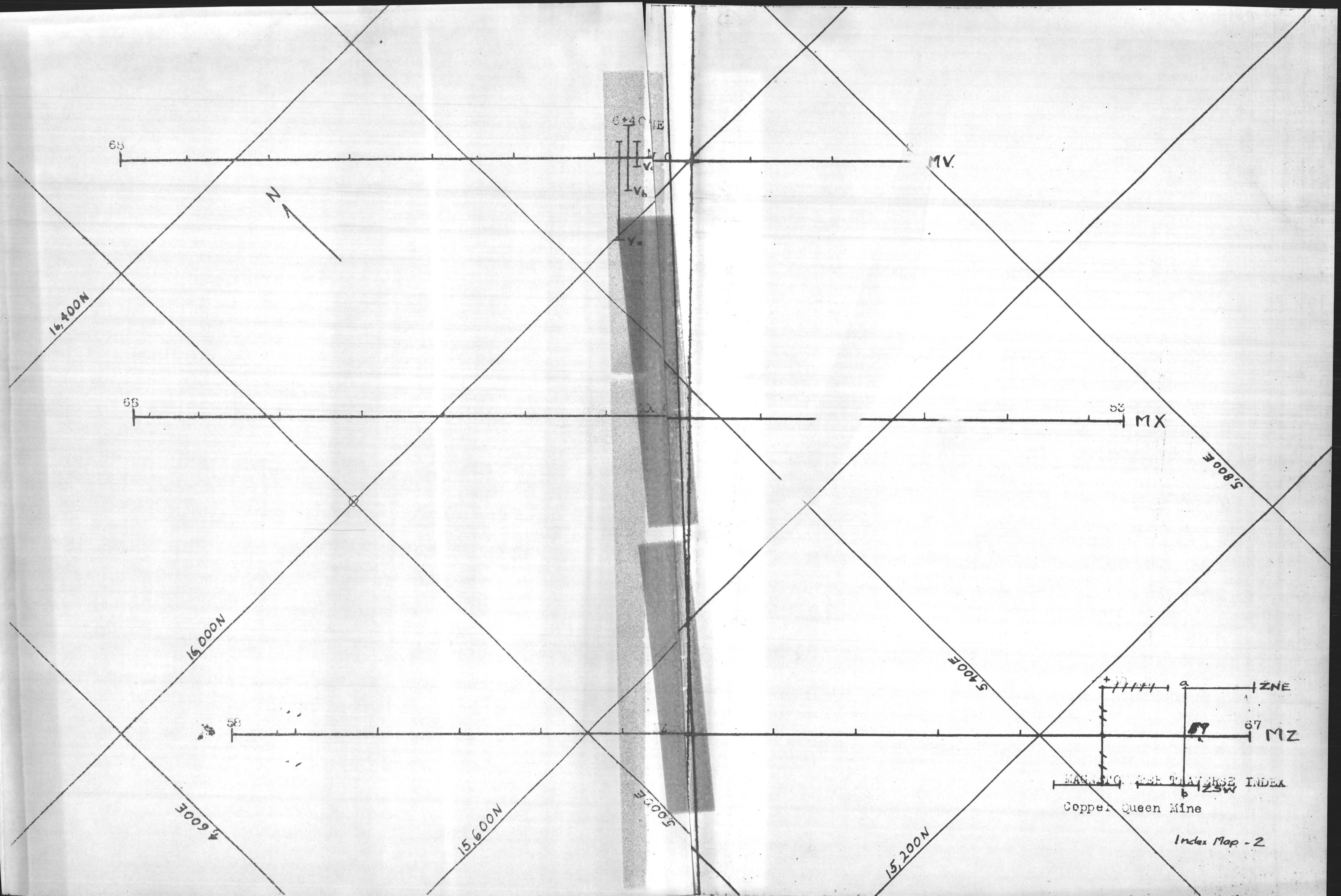
Red Cloud (see map 7)

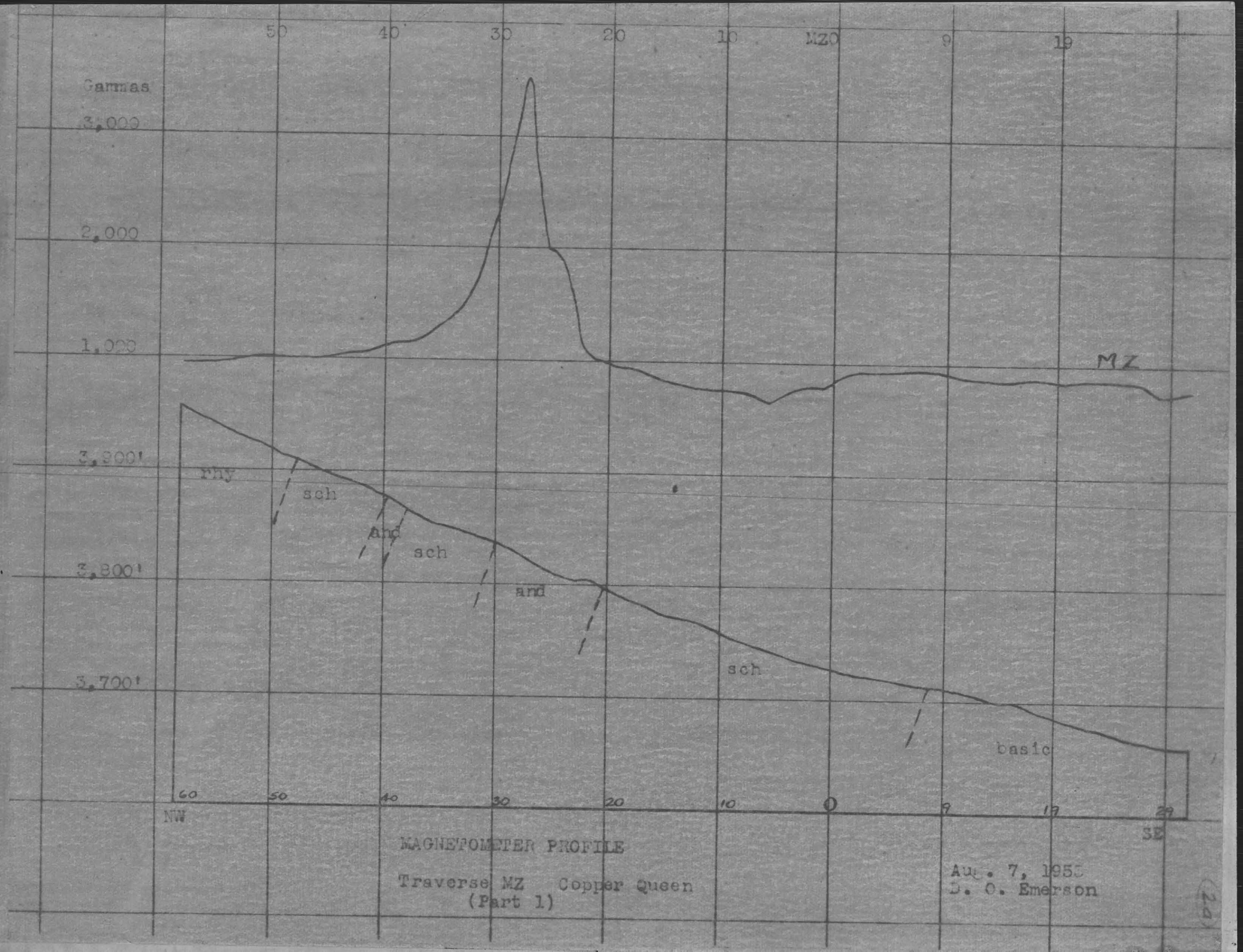
MAGNETOMETER INDEX MAP

Traverses south of Bagdad, Arizona

3,000

SCALE- 1"=3000'

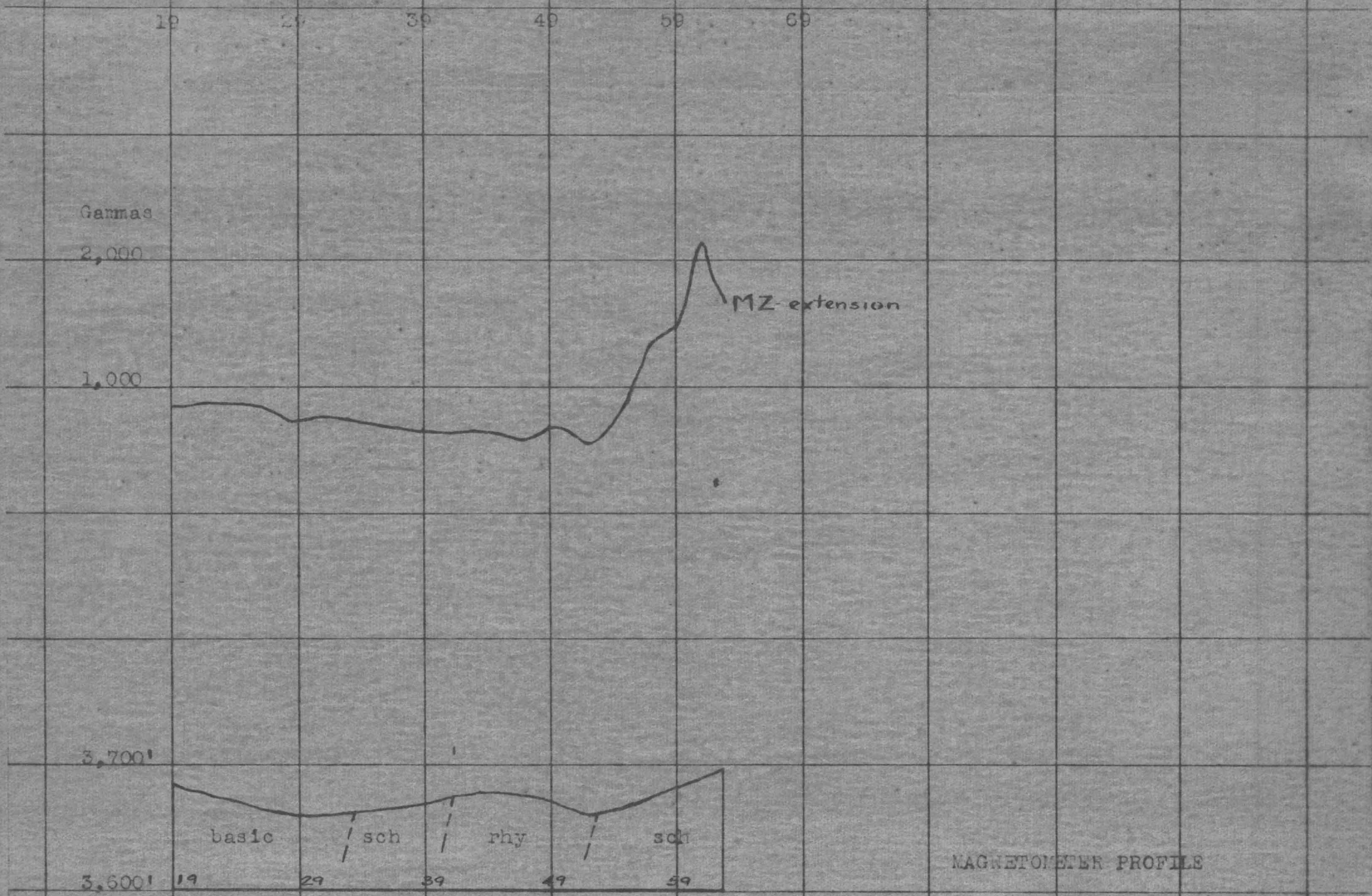

6+40E
MV.
MX
MZ
ZNE
25W
15,400N
16,000N
15,600N
15,200N
5800E
5400E
5000E
3000E
N
Va
Vb
Vc
Copper Queen Mine
Index Map - 2



MAGNETOMETER PROFILE

Traverse MZ Copper Queen
(Part 1)

Aug. 7, 1955
D. O. Emerson

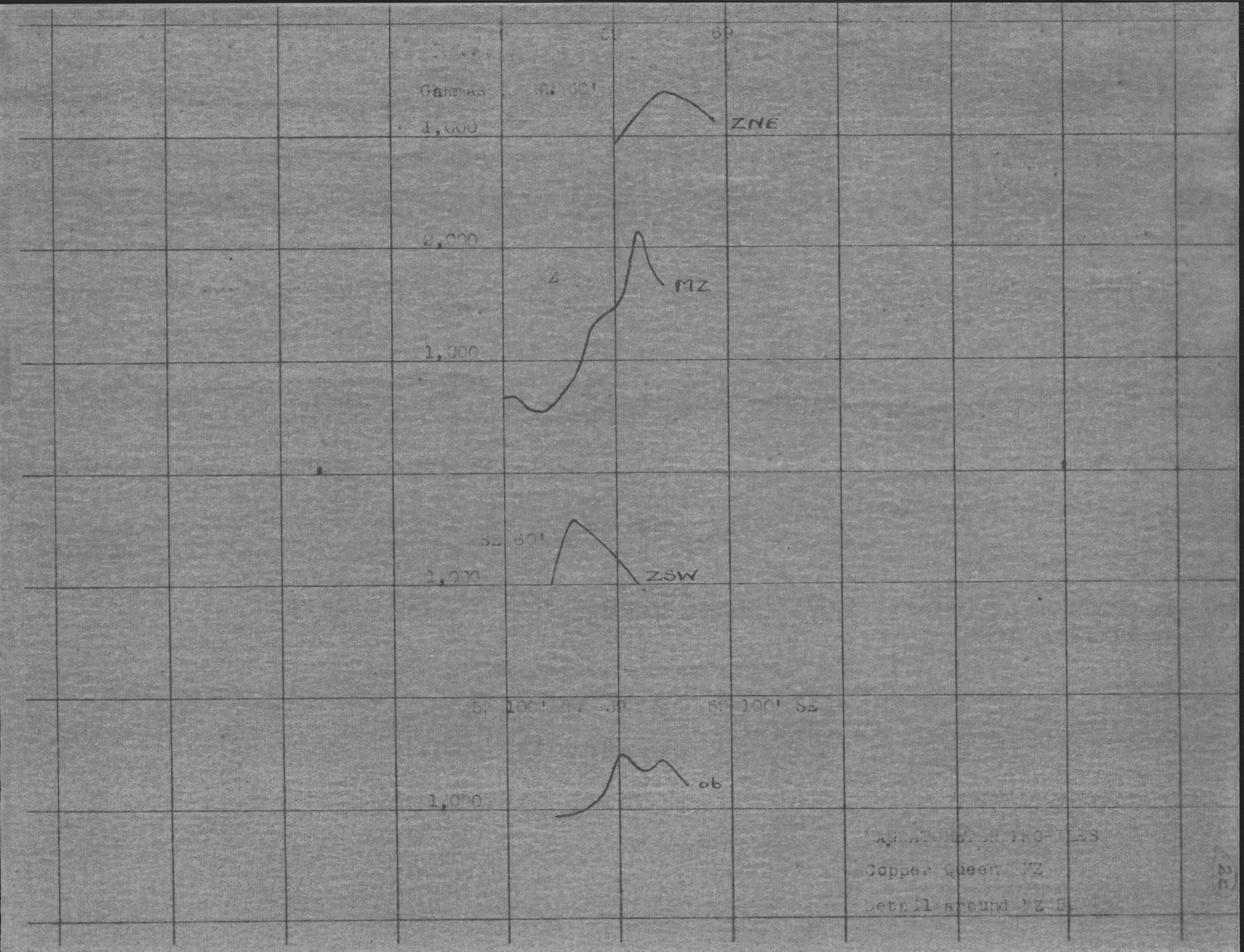


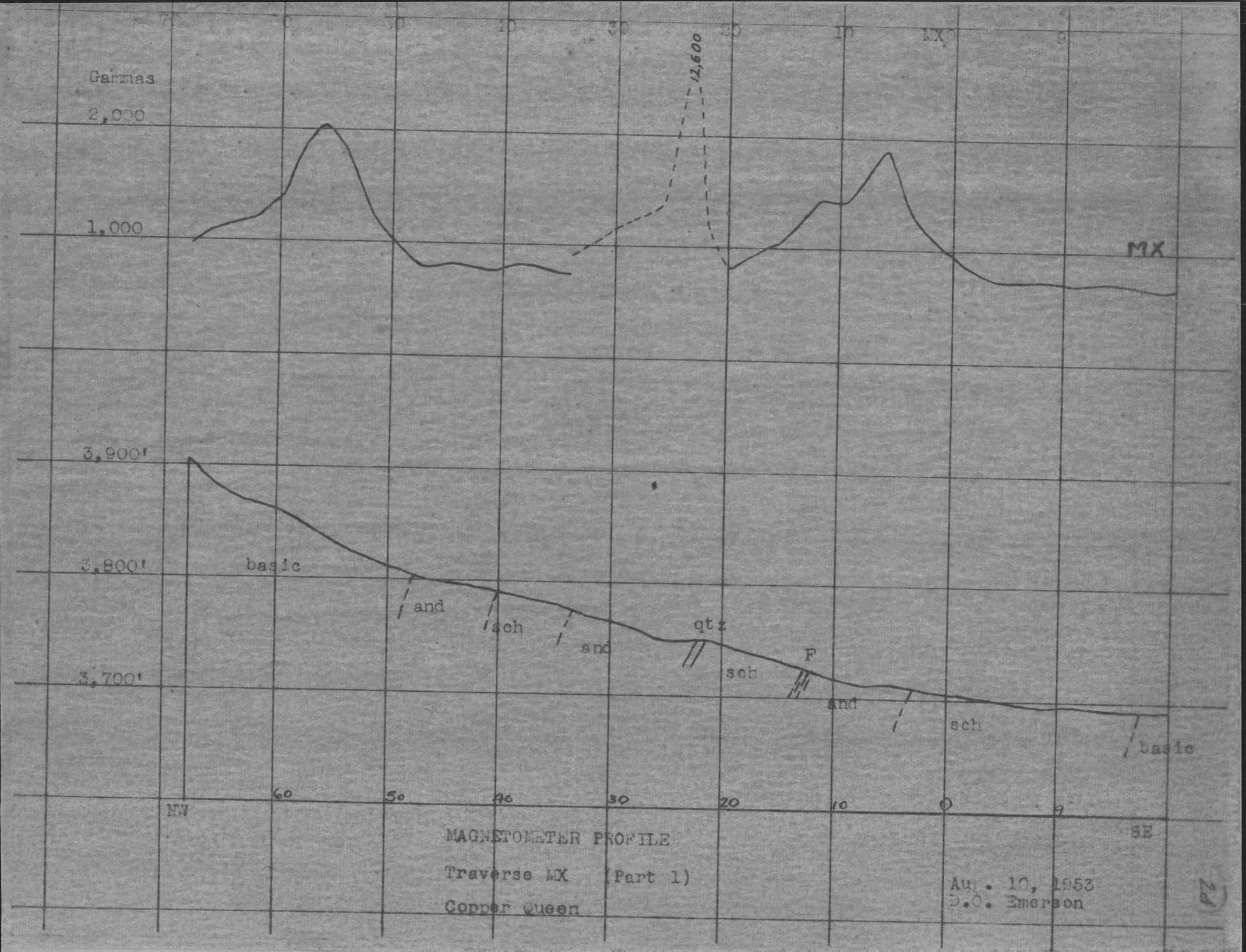
MAGNETOMETER PROFILE

Traverse MZ (Part 2)

Copper Queen

Aug. 7, 1953
D.O. Emerson


Gamma
1,000
ZNE
2,000
1,000
MZ
1,000
ZSW
1,000
ob
Copper Queen MZ
Detail around MZ 8

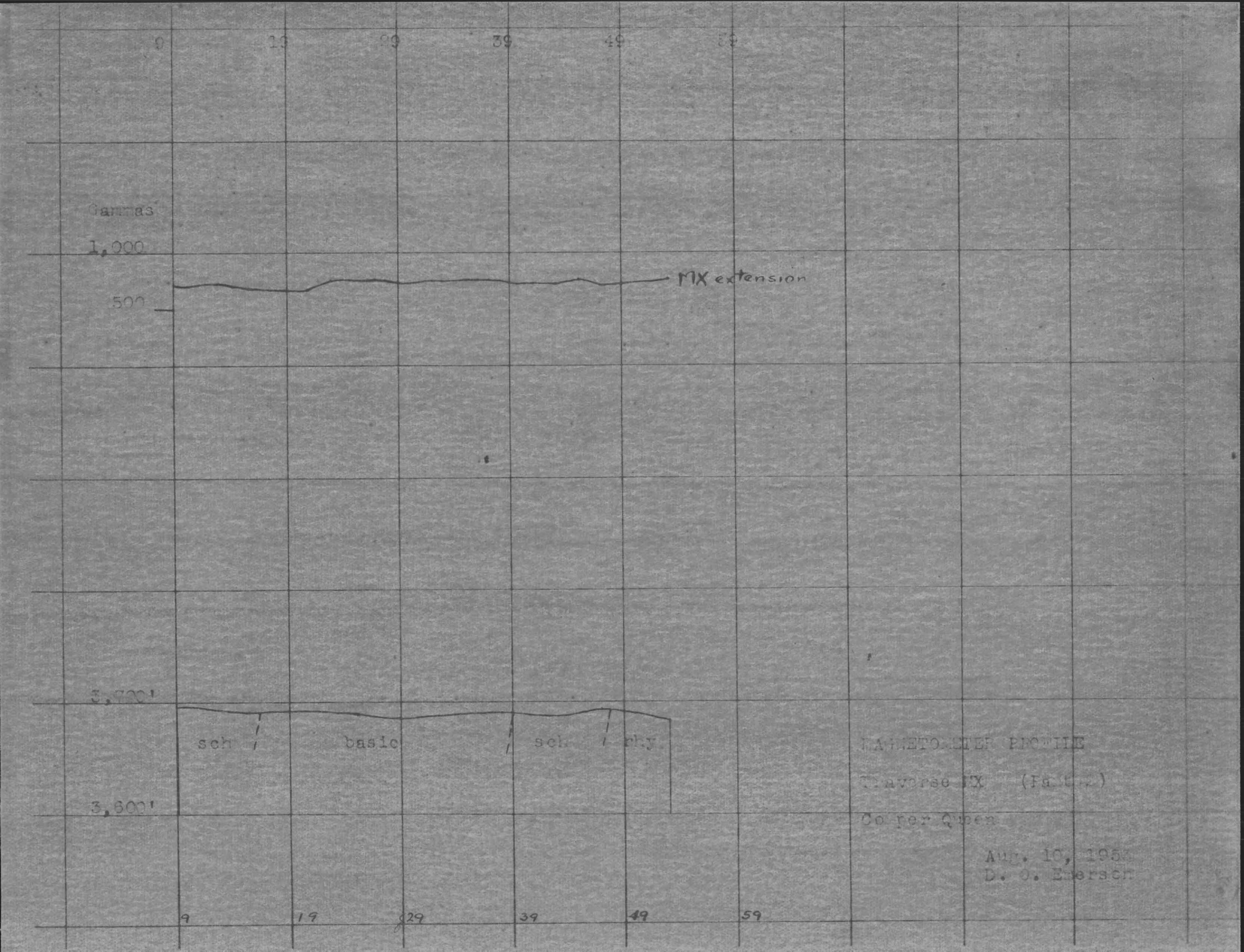


MAGNETOMETER PROFILE

Traverse MX (Part 1)

Copper Queen

Aug. 10, 1953
D.C. Emerson



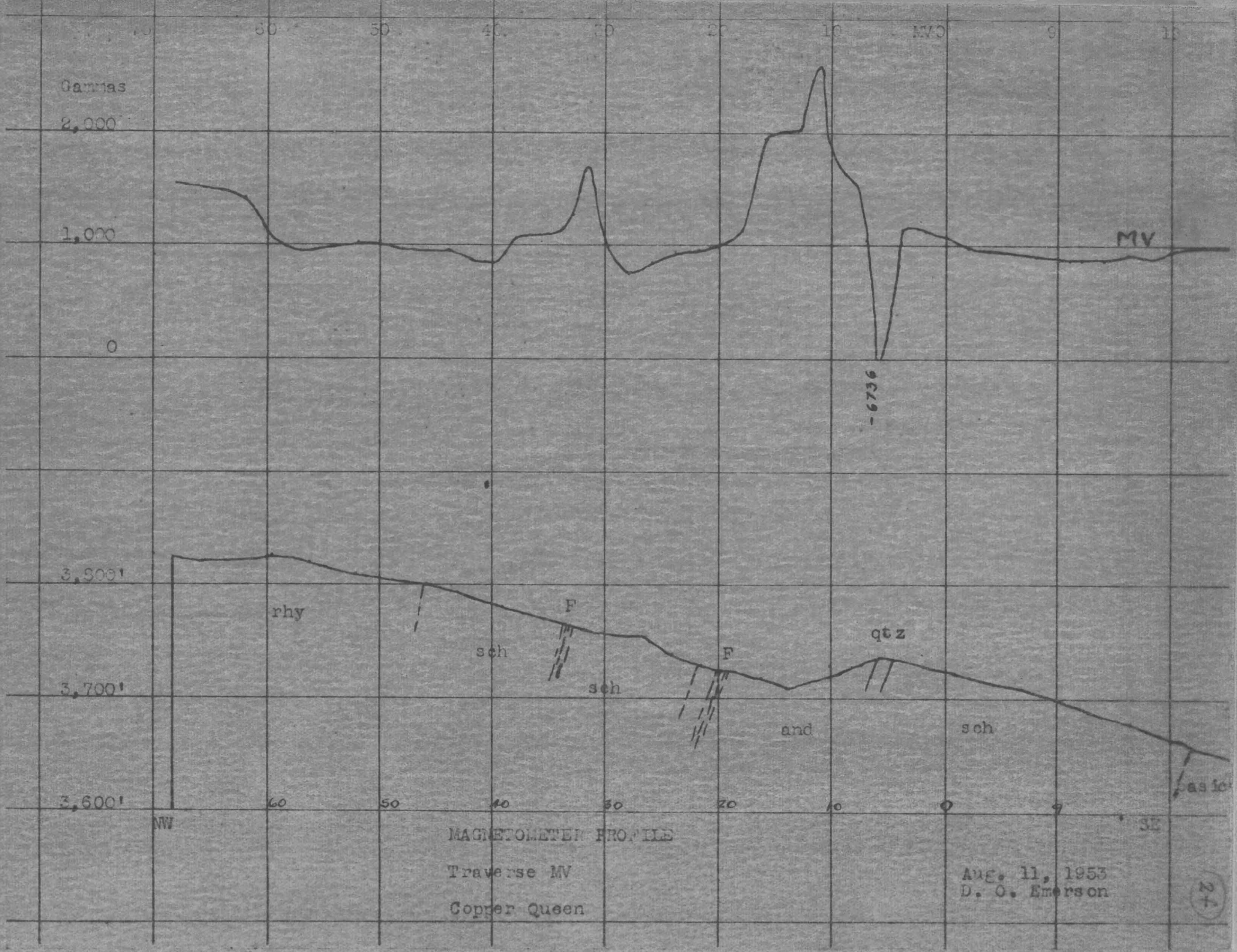
MAGNETOMETER PROFILE

Traverse MX (Fa[illegible])

Co[illegible]er Queen

Aug. 10, 195[illegible]

D. O. Eberson

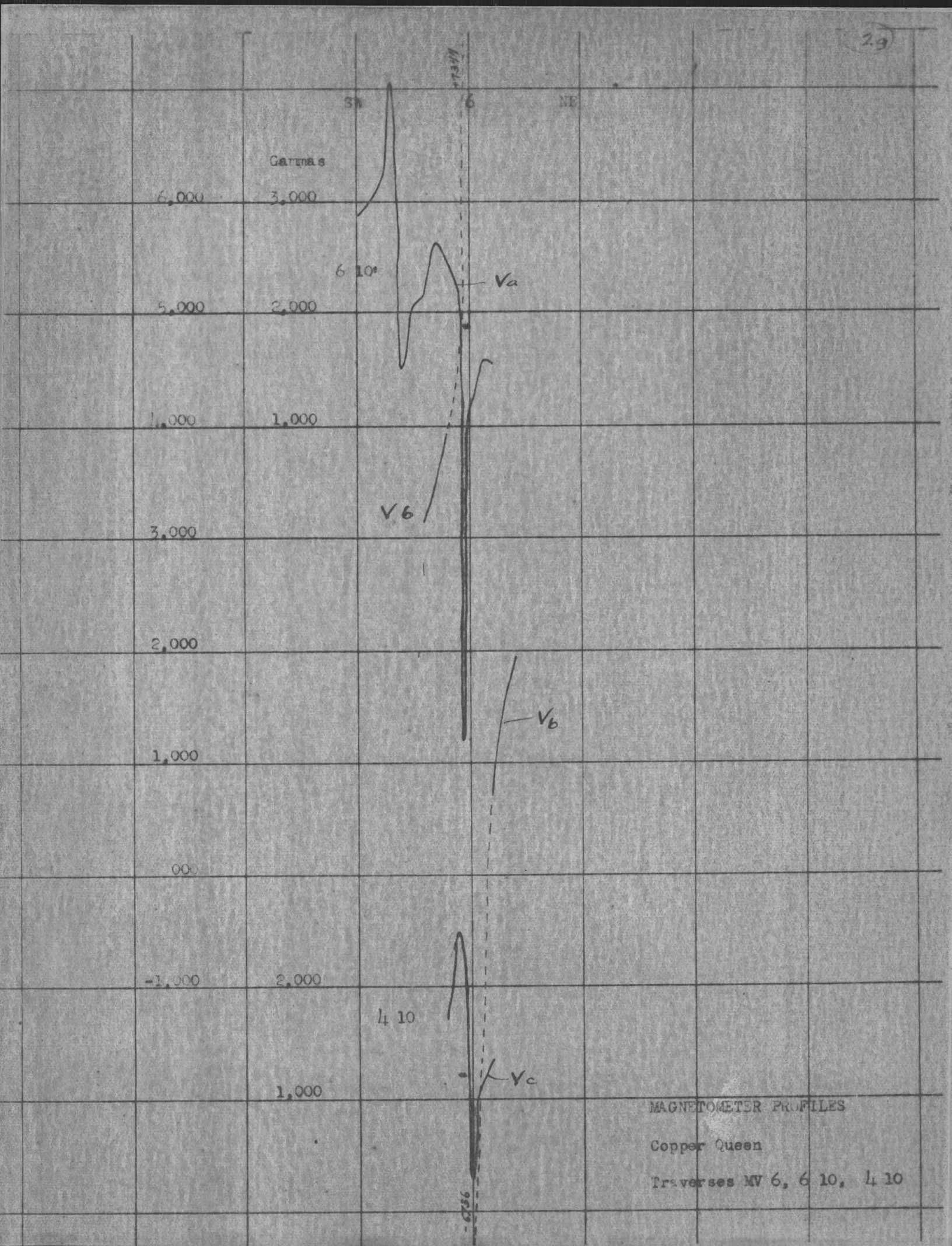


MAGNETOMETER PROFILE

Traverse MV

Copper Queen

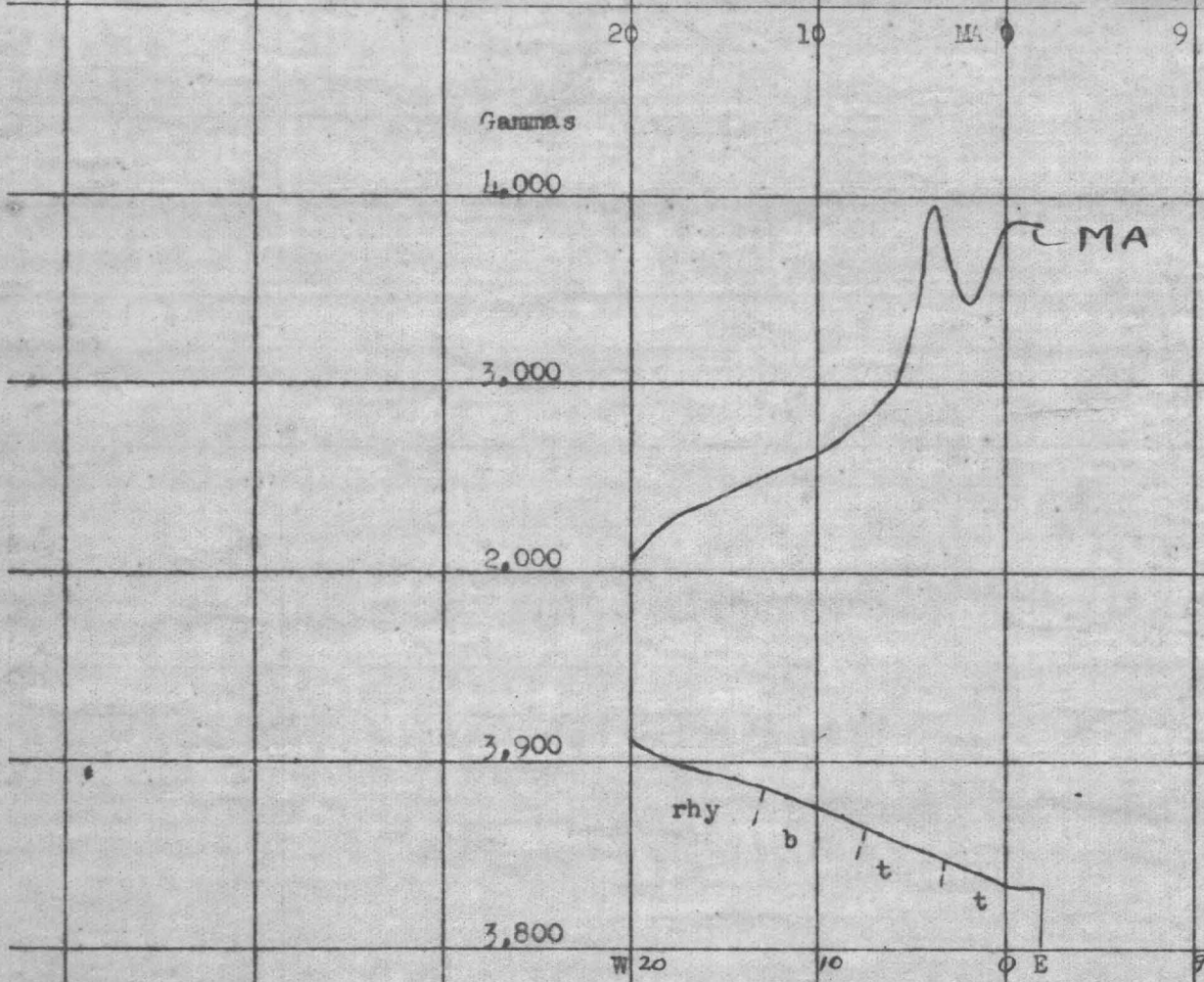
Aug. 11, 1953
D. O. Emerson



MAGNETOMETER PROFILES

Copper Queen

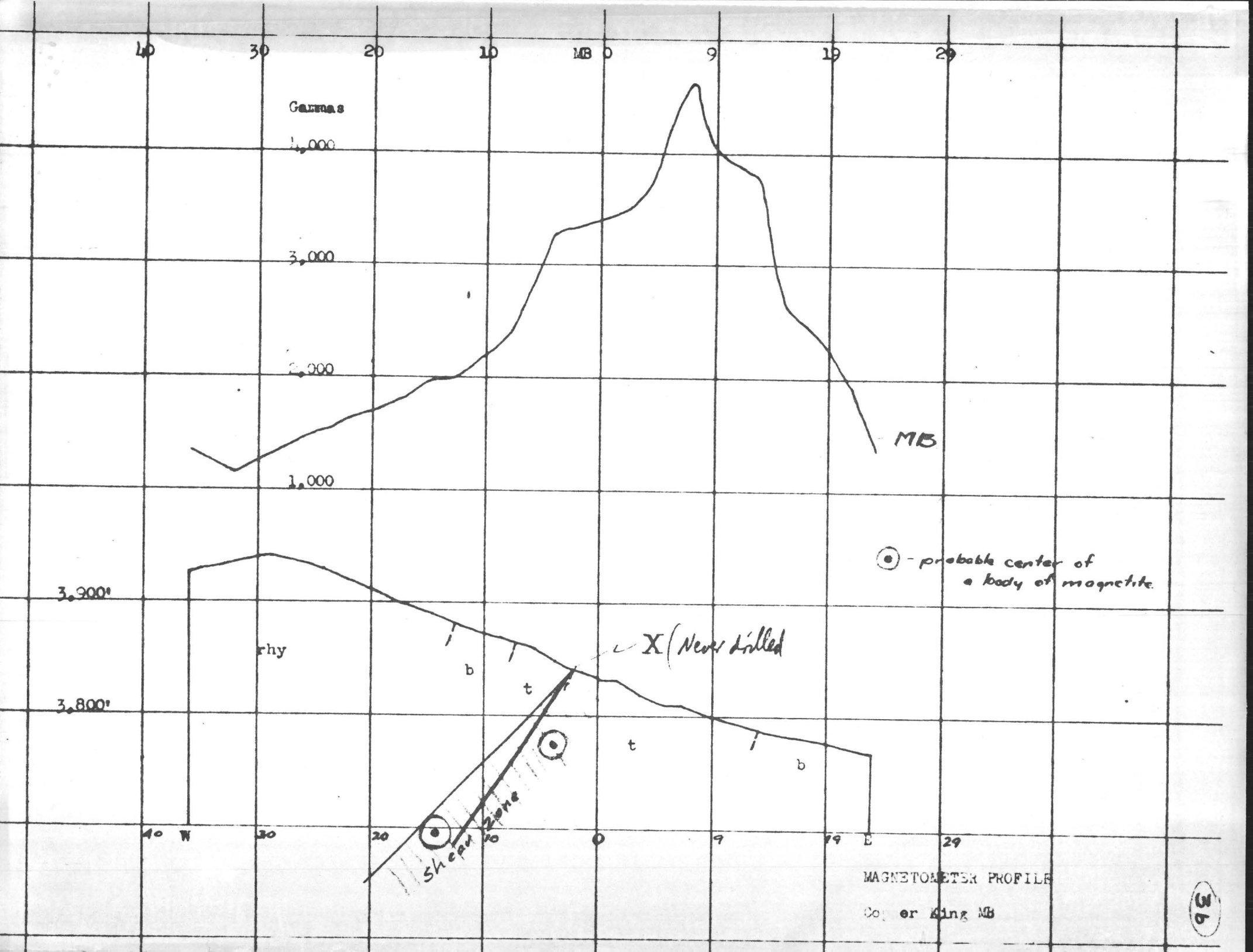
Traverses MV 6, 6 10, 4 10

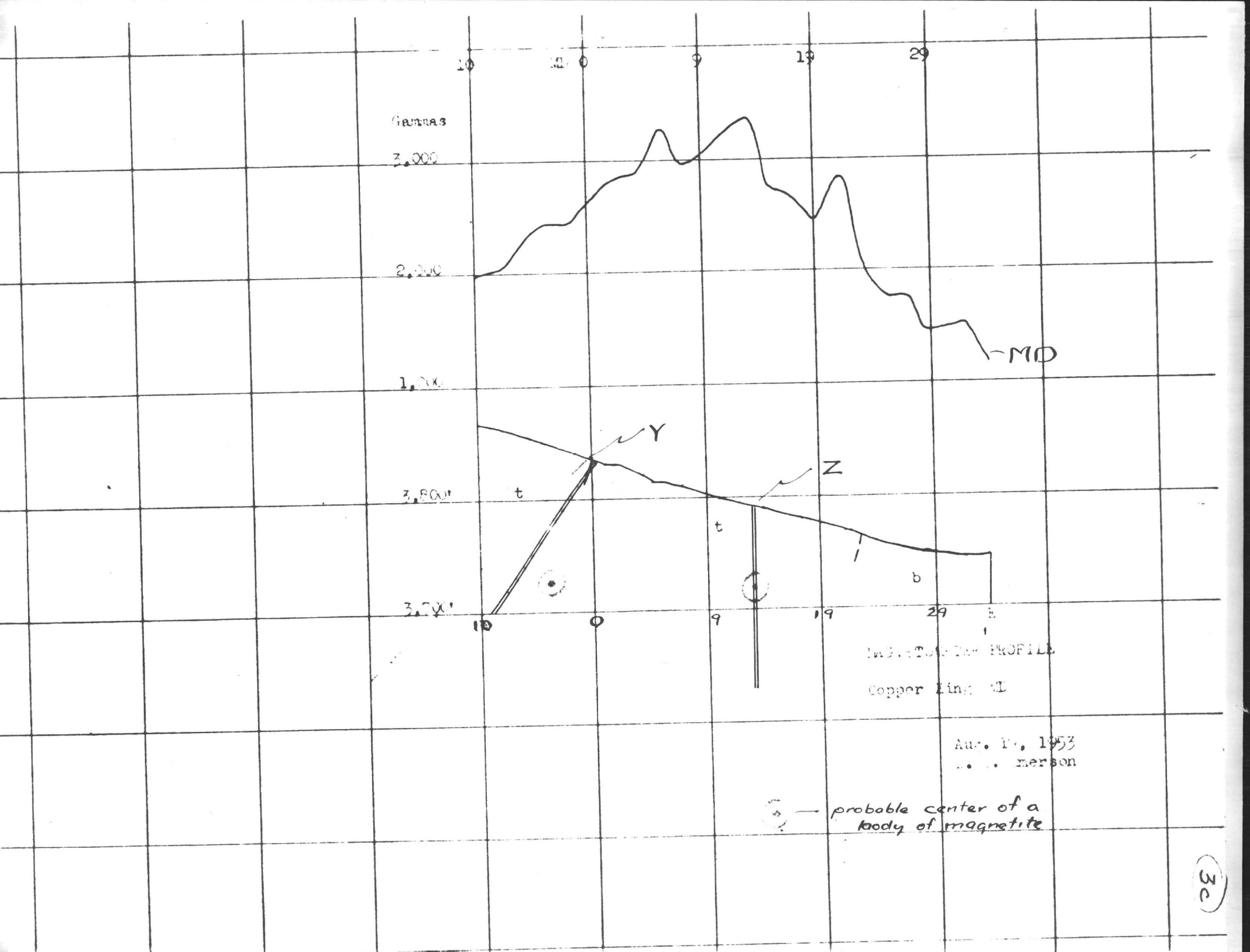


MAGNETOMETER PROFILE

Copper King MA

Aug. 14, 1953
D. O. Emerson


40
30
20
10
MB
0
9
19
29
Gammas
4,000
3,000
2,000
1,000
MB
⊙ - probable center of a body of magnetite
3,900'
3,800'
rhy
b
t
X (Never drilled
t
b
Shear Zone
40 W
30
20
10
0
9
19 E
29
MAGNETOMETER PROFILE
Copper King MB

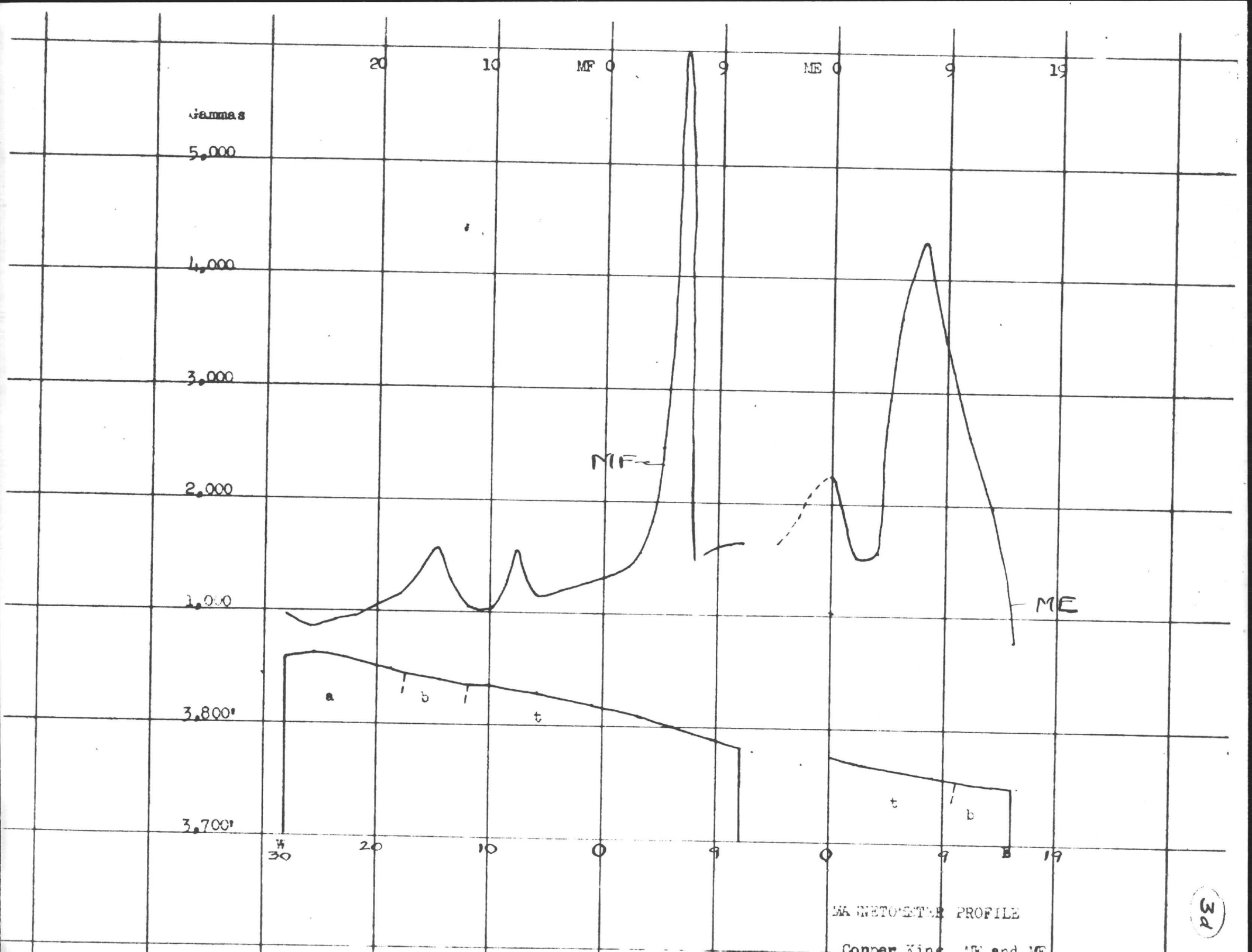


Copper Line

Aug. [illegible], 1953
[illegible] merson

— probable center of a body of magnetite

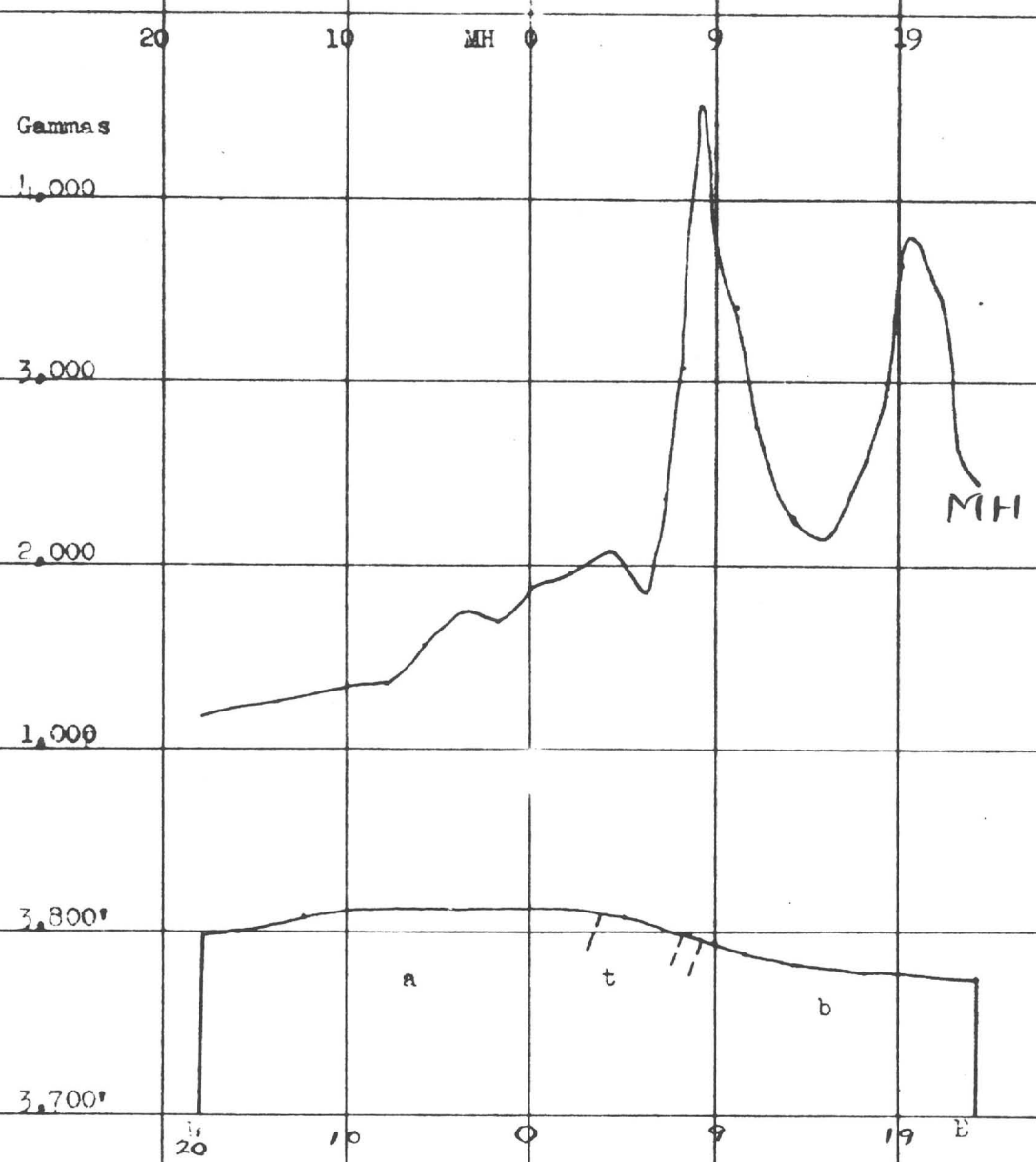
3c



LA NETOSENTER PROFILE

Copper King "E" and "F"

3d

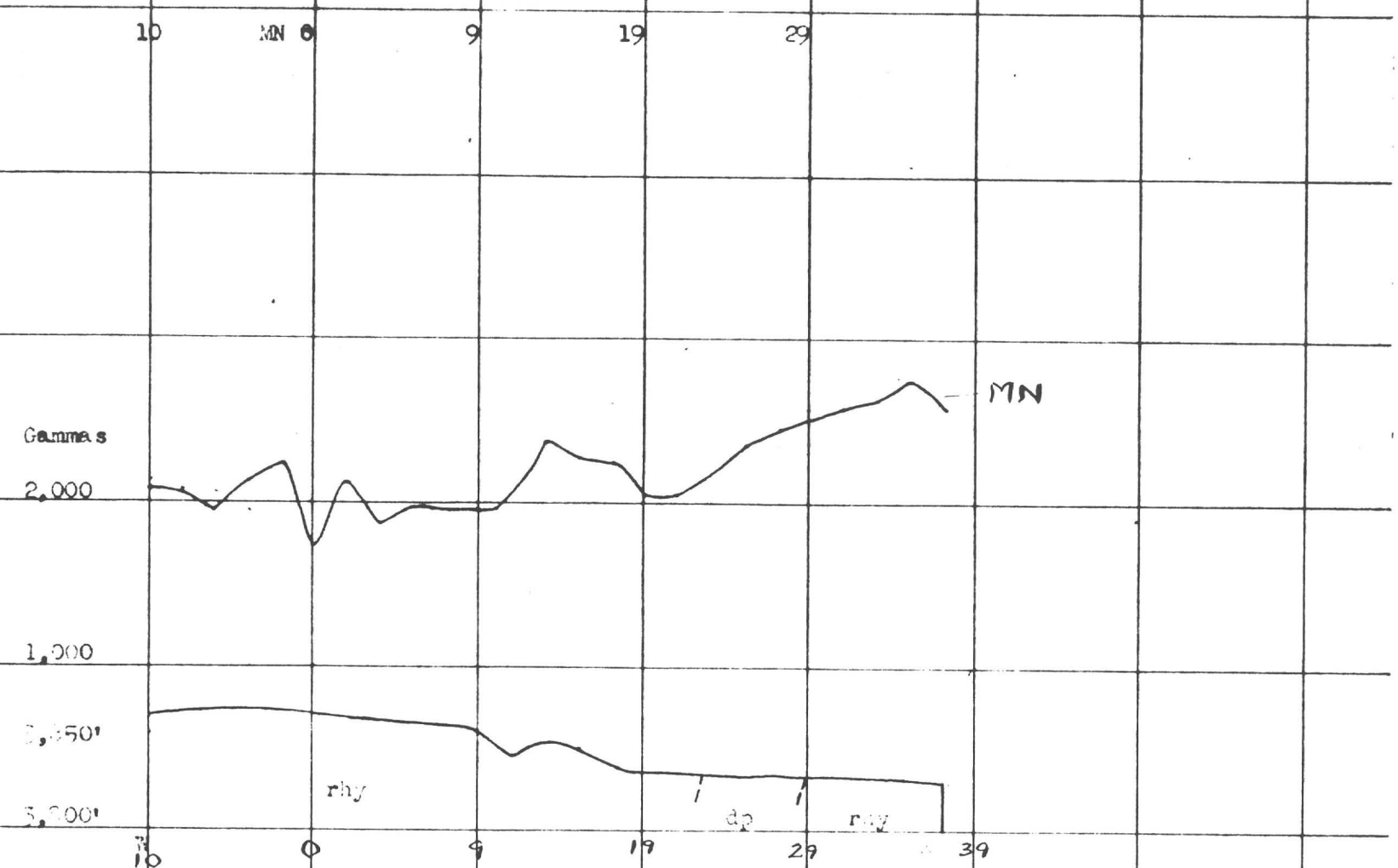


MAGNETOMETER PROFILE

Copper King MH

Aug. 25, 1953
D. C. Emerson

(2)



Copper King MN

Aug. 25, 1953
L. . . merson

(34)

~~2,000N~~

23,000

Q

+Copper King

P

27,000 N

5,000E

10,000E

PI

PII

N

O

~~2,500N~~

25,000

25000 N

M

J

K

L

23,000 N

F

MSF II

H

E

21,000 N

MSF I

MSF IV

~~3,000N~~

30,000

B

A

G

MSF III

+Mnt. Spring

D

C

19,000 N

+Old Dick

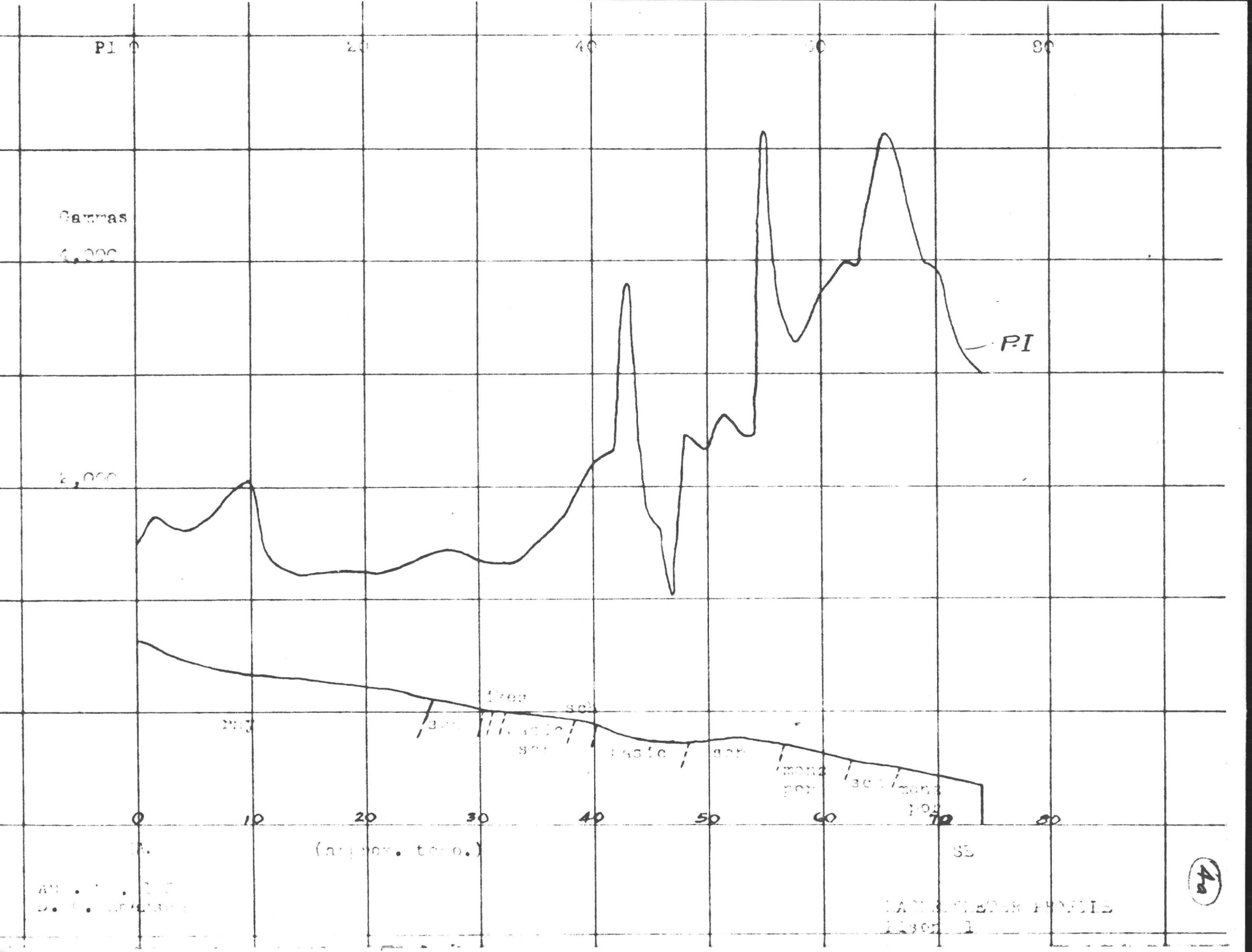
OD I

MAGNETOMETER TRAVERSE INDEX

Mountain Spring Fault

Old Dick and Pison

Scale- 1" = 1000'


PI
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2,000
PI
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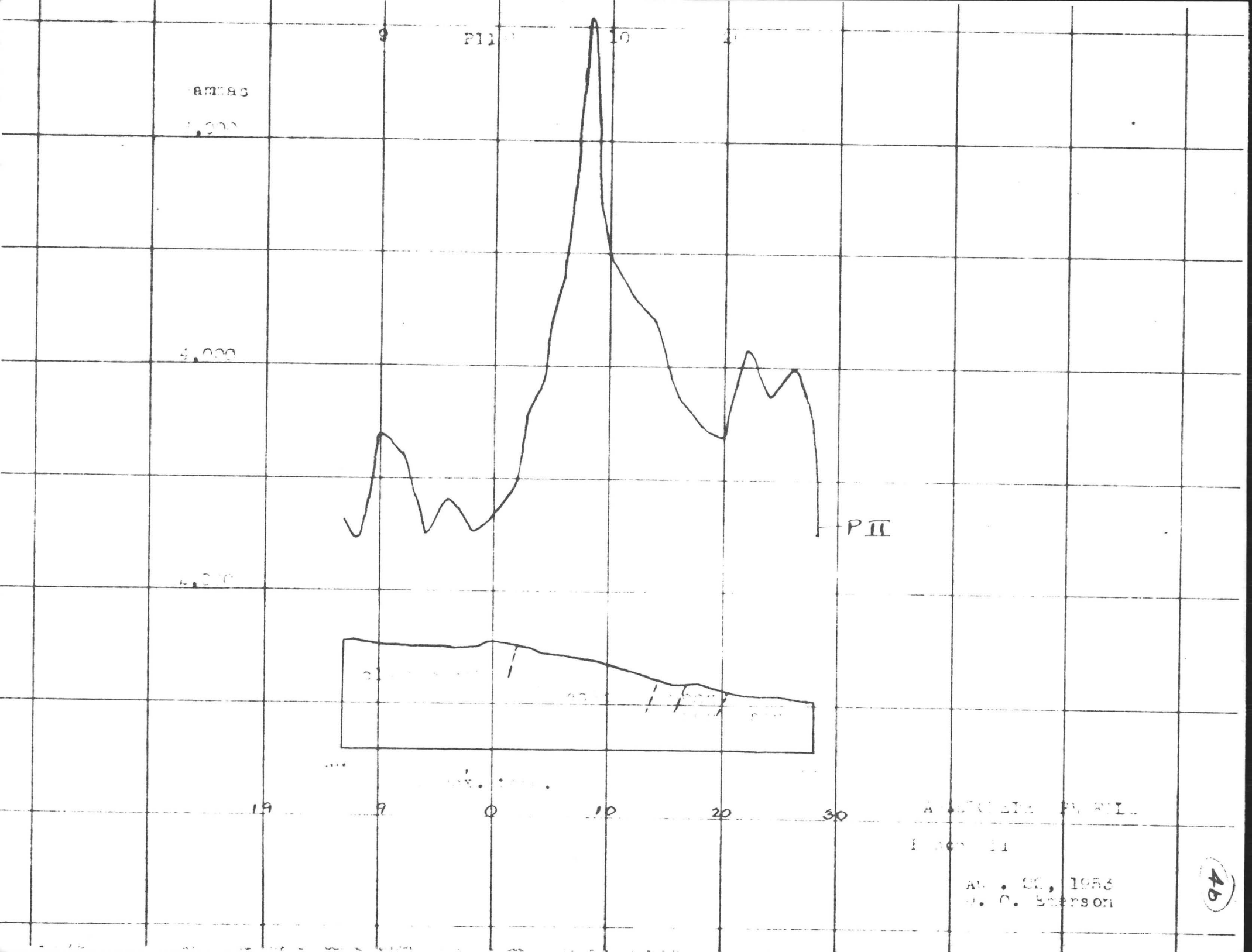
50
60
70
80



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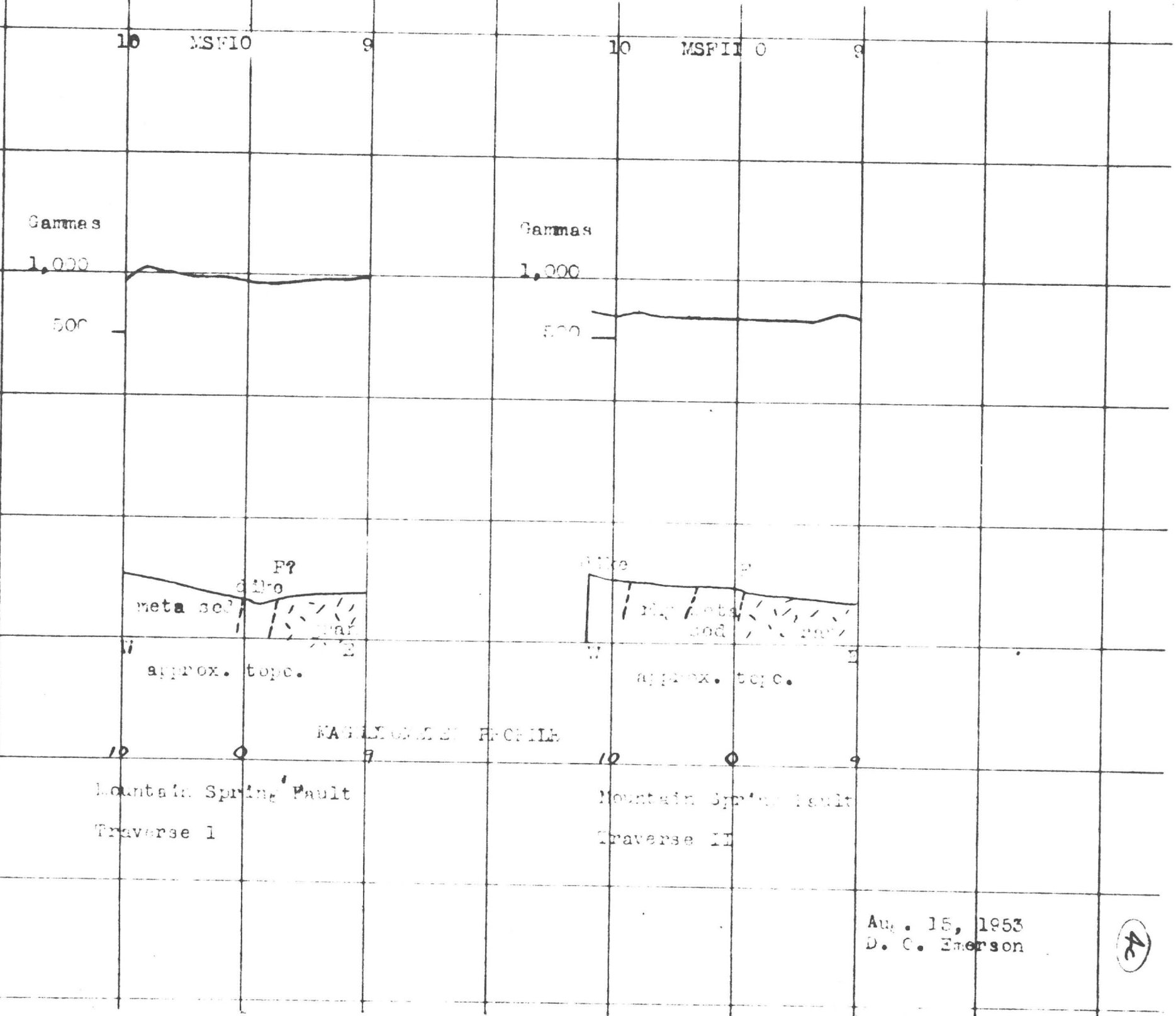
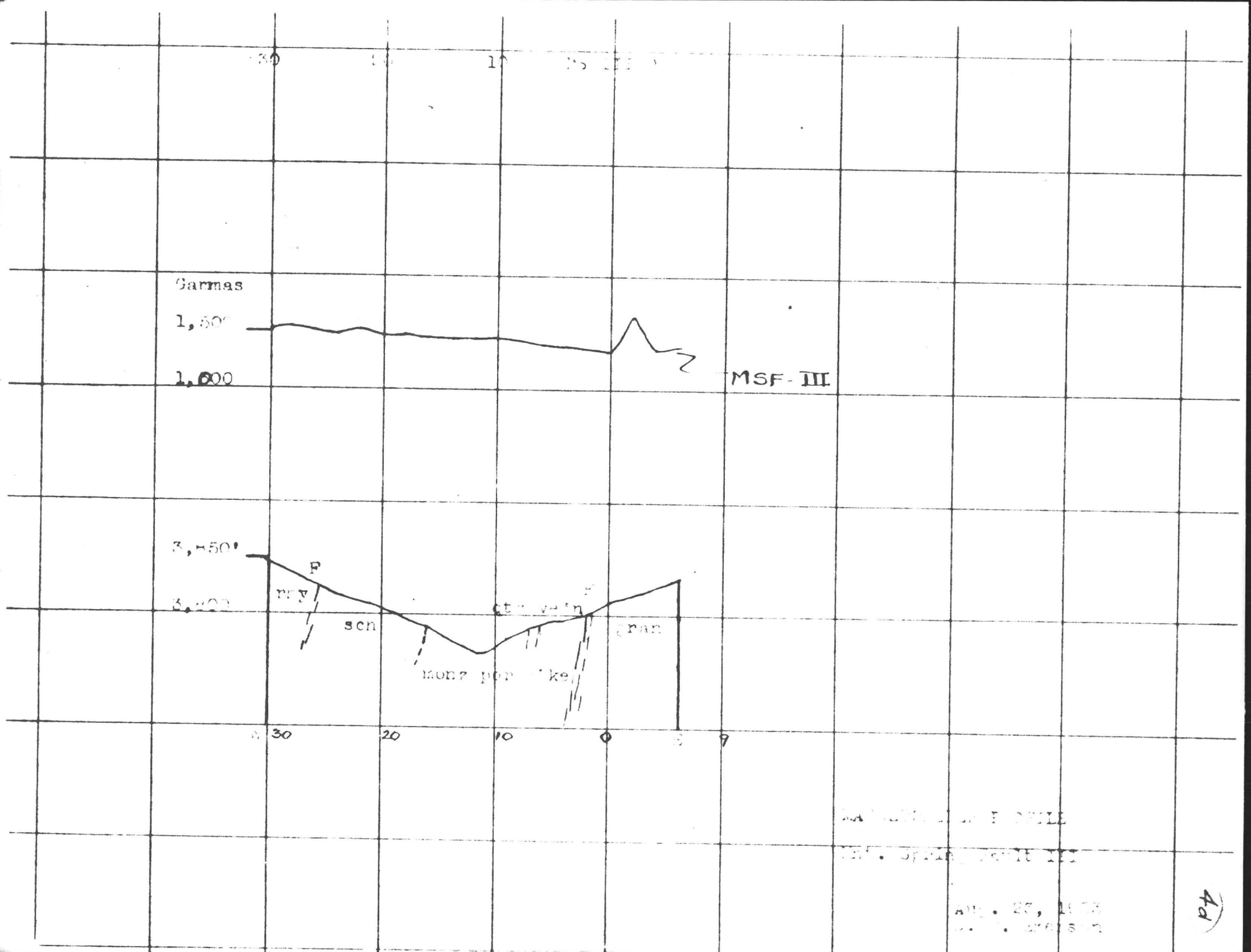
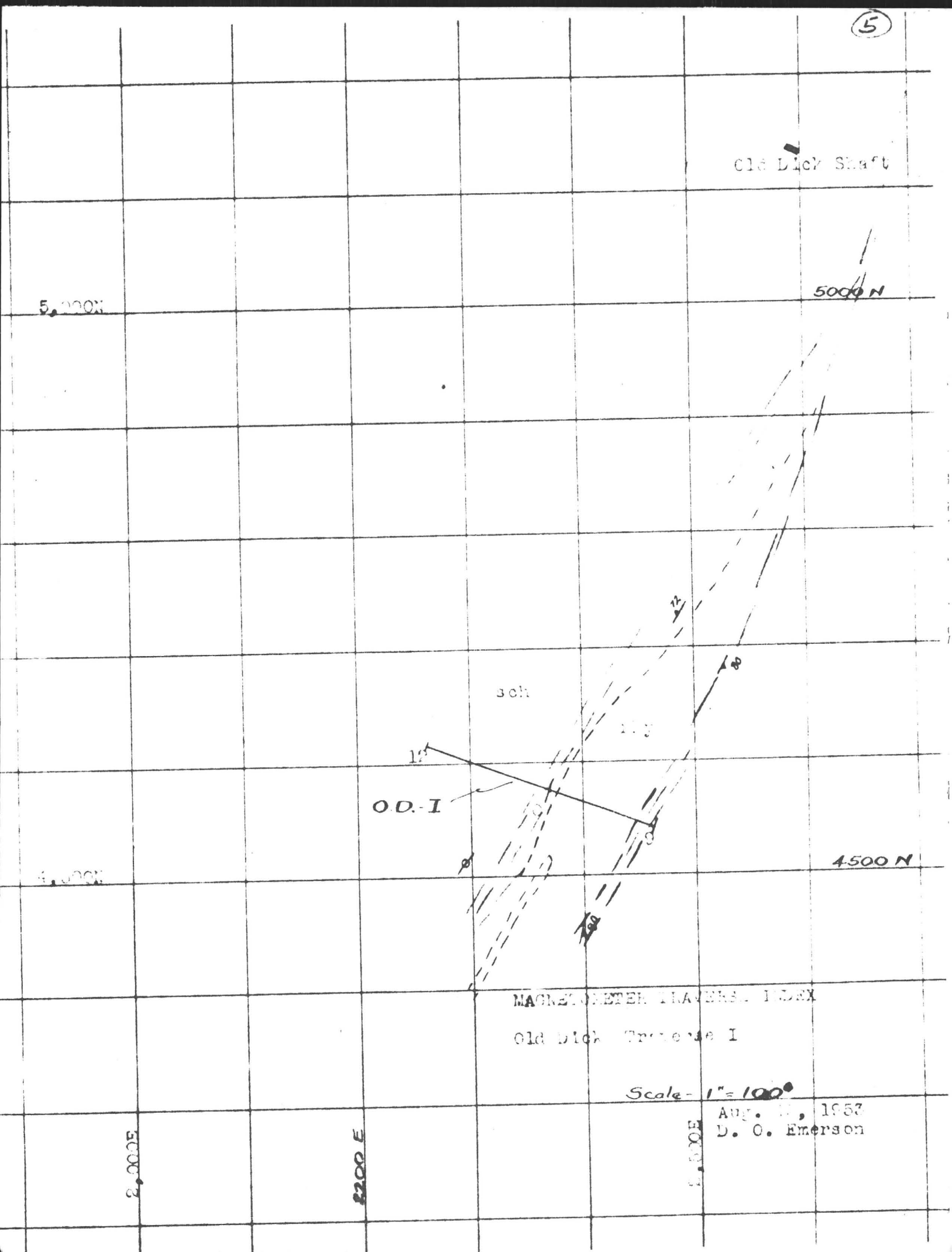


Aug. 15, 1953
D. C. Emerson

4c


Garmas
1,500
1,000
MSF-III
3,850'
F
sch
30
20
10
0



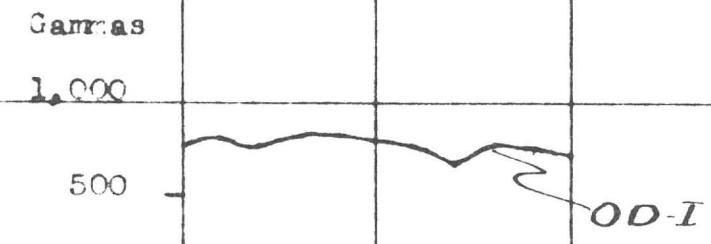
MAGNETOMETER SURVEY INDEX

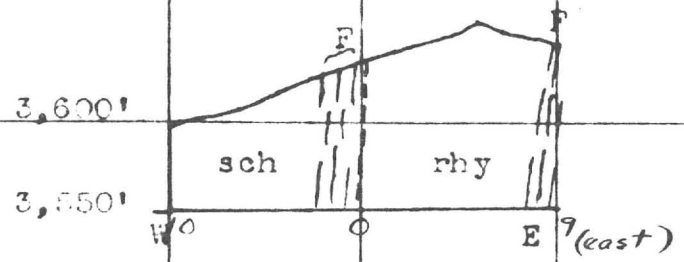
Old Dick Traverse I

Scale - 1" = 100'

Aug. [illegible], 1953
D. O. Emerson

10 OOI 9



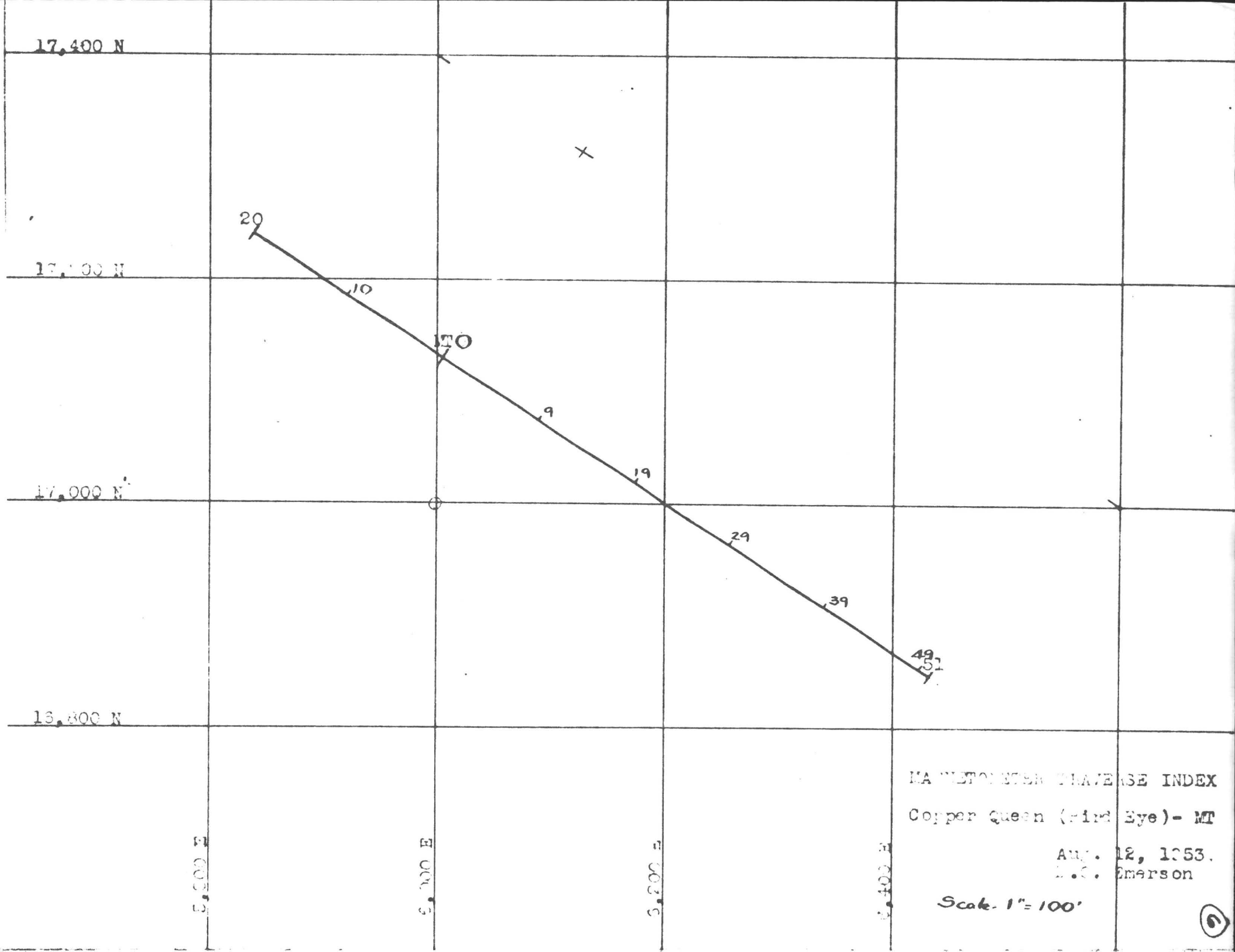


MAGNETOMETER PROFILE

Old Dick Traverse I

Aug. 15, 1953
D. O. Emerson

(5)



MAGNETOMETER TRAVERSE INDEX

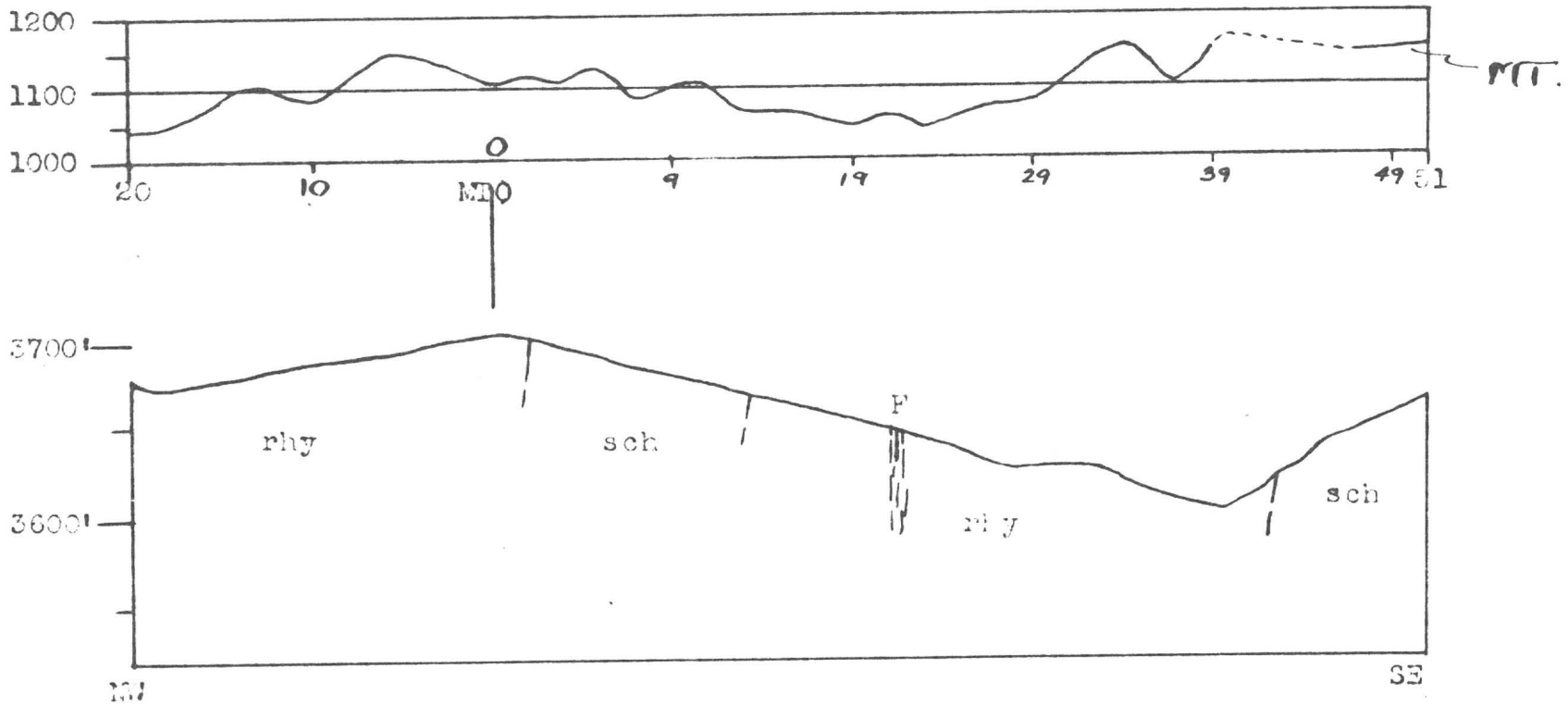
Copper Queen (Grid Eye)- MT

Aug. 12, 1953.
L.C. Emerson

Scale 1"=100'

(9)

Gammas (Drafted at 4X normal scale)



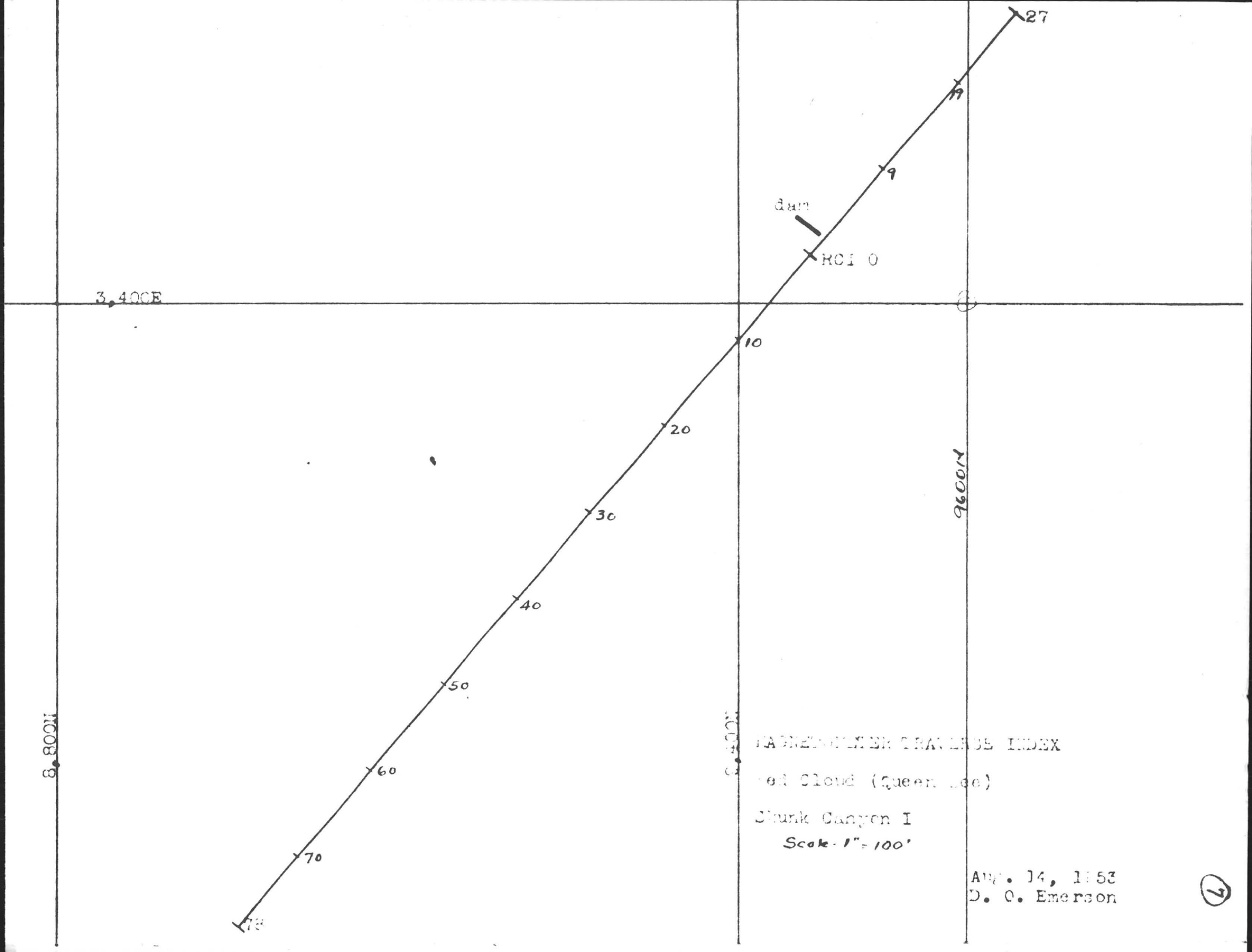
MAGNETOMETER PROFILE

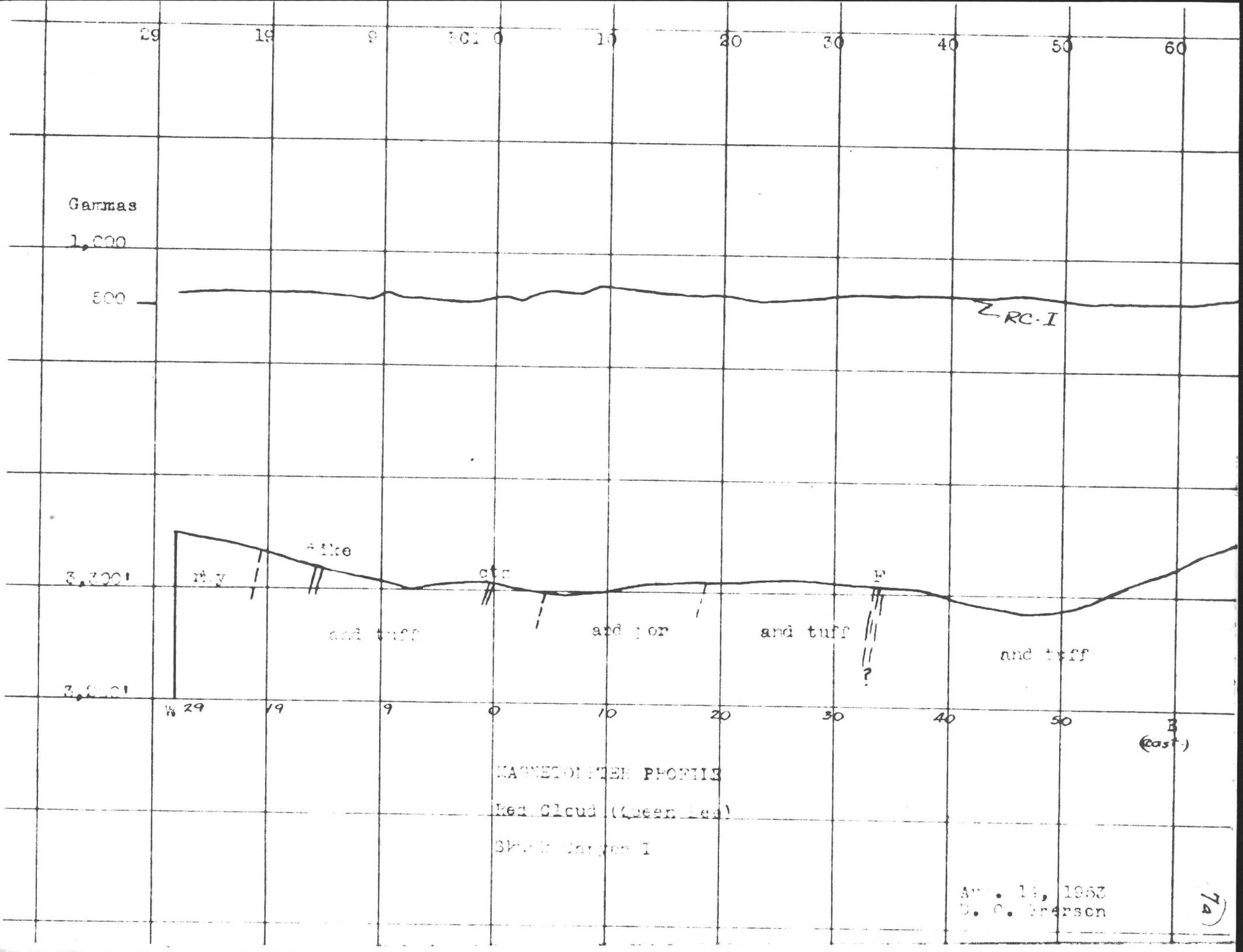
Traverse MT

Copper Queen (Bird Eye)

A[illegible], 1963
D.A. Watson

6a


27
19
9
dam
RC1 0
3,400E
10
20
30
40
50
60
70
78
9600N
8,800N
Sunk Canyon I
Scale 1" = 100'



MAGNETOMETER PROFILE

Red Cloud (Queen Lee)

Shaft Canyon I

Aug. 14, 1953
D. C. Pearson

7a

Index Map - 2

Copper Queen Mine

Base Line and Cross Line Index

15,200N

15,600N

16,000N

16,400N

5,000E

5,400E

5,800E

6,200E

MZ

MX

MV

NE

N

MAGNETOMETER RECONNAISSANCE WORK

BAGDAD MINING DISTRICT

YAVAPAI COUNTY, ARIZONA

Excerpt from report by K K Welker
Feb 5, 1954

development in this mine is too limited to provide much chance of proving or disproving this hypothesis.

While the Old Dick mine has been opened up to a greater extent than the others, most of this development has taken place within the last three years since Baker's examination. Although the mine was visited on various occasions during the past year, no opportunity was had for making a detailed study of the ore occurrence. Consequently little if anything new can be suggested at this time relating to ore controls at the Old Dick.

As a matter of fact, even at the three principal properties, the ore shoots have not been sufficiently delimited to offer anything more than the sketchiest basis for theorizing.

GEOPHYSICAL WORK

In contemplating the Bagdad exploration project, some thought was naturally given to the possibility of using geophysical methods. In view of the fact that pronounced magnetic effects were noticeable near the Queen workings and also that magnetite lenses existed near the King ore bodies, it was decided that some preliminary work with a magnetometer was justified. In this connection, Dr. G. Potapenko of Cal Tech was engaged in a consulting capacity to lay out and supervise the work.

During the month of August 1953, Mr. Donald Emerson, who was employed as field geophysicist, ran several magnetometer traverses in the south Bagdad area. The results were studied

and interpreted by Dr. Potapenko who submitted a detailed report with recommendations.

No attempt will be made here to summarize the report which is available in the company files. However, the principal recommendations presented by Dr. Potapenko were (1) to conduct an electrical self-potential survey in the Queen area; (2) to test by diamond drilling certain strong magnetic anomalies in the King area. Three locations were suggested.

Two of the holes recommended, No. Y and Z, were drilled to depths of 202' and 154' respectively. Neither encountered magnetite lenses nor sulfide ore bodies although a little pyrite was found. The anomalies recorded by the magnetometer were undoubtedly caused by disseminated magnetite, some of which was observed here and there in the core. (Even where not visible, its presence is indicated by the fact that most of the pieces of core disturbed the compass needle.)

In general, the results of the magnetic work were somewhat disappointing; while we hardly expected to locate an ore body directly, it was hoped that it might be of assistance in mapping structural elements. Actually, although several traverses were run across the Mountain Spring Fault, no indication of this major break was evident on the magnetic profiles. Neither did the rhyolite-schist contact just south of the Old Dick workings show up on the profiles.

CONSIDERATIONS FOR FURTHER GEOPHYSICS

Old Dick Area, Yavapai County
Arizona

for
Cyprus Mines Corporation

by

HEINRICHS GEOEXPLORATION COMPANY
P. O. BOX 5671 TUCSON, ARIZONA

February 8, 1962

Mr. Paul Allen, Vice President
Cyprus Mines Corporation
523 West Sixth Street
Los Angeles 14, California

Dear Paul:

Enclosed find two copies of a more formal report which follows my letter dated 30 January 1962. Two copies have been mailed to Mr. A. A. Friedman at Bagdad as requested.

Our statement is also enclosed.

We will await your early comment on our findings and trust we may be of service to you further.

Sincerely yours,

HEINRICHS GEOEXPLORATION CO.

Walter E. Heinrichs, Jr.
President & General Manager

WEH:jh

cc: A. A. Friedman

February 8, 1962

S T A T E M E N T

To: Cyprus Mines Corporation
523 West Sixth Street
Los Angeles 14, California

Attn: Old Dick Division

Re: Field appraisal, Old Dick area proposed geophysics.
January 1962

Services:

12/29/61 - 1/9/62	Brief on literature, examine rock samples & maps submitted----N. C.	
1/24-25-26/62	W. E. Heinrichs, Jr. 3 days @ $100.00/day----------	$300.00
1/28/62	W.E.H. & E.G.H. review data----------	N. C.
2/1 - 8/62	Consolidate data on maps, sample susceptibilities & report 1 staff day @ $80.00/day----------	80.00

Expenses: 1/24 - 27/62

2 vehicle days @ $10.00/day----------	20.00
560 miles @ $0.10/mile----------	56.00
Photos----------	5.33
Communications----------	5.06
Meals----------	3.07

TOTAL SERVICES & EXPENSES:------- $469.46

TABLE OF CONTENTS

INTRODUCTION

The letter report submitted 30 January 1962 contains the essence of our findings and is therefore repeated herein as a summary. The additional comments are mainly detailed observations for the sake of the record.

SUMMARY

January 30, 1962

Mr. Paul Allen, Vice President
Cyprus Mines Corporation
523 W. Sixth Street
Los Angeles 14, California

Re: Old Dick. Preliminary
Letter Report

Dear Paul,

As per our meeting at your motel room earlier this month, I went up to the Old Dick 24 January and returned 26~~27~~ January. Time was spent with Del and his staff, looking over the surface, underground and studying maps and data, etc., and a little summary review after I got back on ~~28~~ 27 January with Grover. Unfortunately, because of weather delays and other work, I have not yet had an opportunity for complete discussion with Grover and Bill for the benefit of all detail ideas available here. However, these can be provided later. Meanwhile, I think you will be mostly interested in my following general conclusions anyway.

1. Conditions definitely appear favorable for application of mainly electrical methods.

2. My suggestion is to first undertake a short preliminary program of a few trial profiles over relatively better known conditions near the Dick and Queen areas using two or three different methods. In particular, I have in mind especially self potential and induced polarization and possibly a little more magnetics and maybe some geochem.

3. From the results of such experimental work, if sufficiently definitive and favorable, we will know best if and how to proceed on a more production type basis. Furthermore, everyone will have a clearer idea of over all feasibility and problems and possibilities involved, especially those related to relial ility and desired extent and agree of coverage.

4. Such work would require about 10 Field days and $2,000 - $3,000, depending somewhat on which methods are used most, etc.

For the immediate record and benefit of others receiving copies of this letter, these conclusions are based on:

1. A strong belief that the relatively shallow massive and disseminated sulfides are undergoing more or less continual technical oxidation though possibly slow due to climate and low porosity and permeability and although its strong surface intensity diminishes rapidly with depth it does technically continue quite deep, even maybe considerably below 150 ft. Some related S. P. evidence is noted in previous S. P. data on the Queen by Jensen, his contrary views notwithstanding. Recent heavy moisture may materially enhance application of S. P. method.

2. If the cheaper S. P. method is not satisfactory, then certainly, though more expensive, I. P. should be because of good sulfide development.

3. In place weathering - not transported very far - suggests a possible geochem application.

4. Potapenko magnetic data is very difficult to review and appraise because of mode of presentation and some results not included in the report copies seen. Y & Z drill holes not too surprising to me to have missed much magnetite because of apparent related structural dip and/or depth factors. Mtn. Springs Fault may not have shown on Potapenko data because lines were too short. A quick 10 station recon line along the main road about 1 mile on either side of this fault suggests it might show up quite nicely. There is a weak possibility that some ore and/or mineralization might correlate with magnetic lows rather than highs due to silicification and/or magnetite alteration of the host rocks. I disagree with Potapenko that magnetite will <u>necessarily</u> preclude S. P. applicability at the King. 50 M.V. low at Pima is a case in point.

5. Power and pipe line artificial effects I think can be circumvented, reduced or tolerated.

The 1" = 500' base map Reg Skiles has proposed should be very useful.

Respectfully submitted,
HEINRICHS GEOEXPLORATION CO.

Walter E. Heinrichs, Jr.
President & General Manager

WEH:jh
cc: Extra enclosed
Del Friedman (2)

MAGNETICS

Potapenko Recon Report:

Many lines, for example across the Dick structure and Mtn. Spring Fault, are much too short to have provided enough background level on either side of the structures to be certain of interpretation. Vertical scale used on many of the plots does not show sufficient detail variation and in many cases only shows extremely large and/or possibly very deep effects, thus maybe masking some important shallower features. The more detailed coverage obtained in King and Queen areas should be contoured in plan and all lines plotted carefully in profile-plan on your 1" = 100' geology maps for maximum interpretational leverage. We attempted a quick rough try at the latter, from which some of our conclusions are based. However, a more careful plot and study should be made.

Major attention was apparently paid by Potapenko to massive magnetite concentrations and expected resultant highs and relatively less to possibly equally important lows, flats and slope intercepts. This may partially account for some impression that most highs are due to andesite. In our opinion, this may be a serious oversimplification, or a conclusion subject to considerable doubt and question.

Long recon line across Mtn. Spring Fault:

At any rate, the attached plot represents a very rough wide-spaced traverse along the main road across the Mtn. Spring fault. Total variation is about 200 gammas, but three poorly controlled stations on the east side of the fault show only a few gammas gradient, whereas the west side shows a plus gradient of 100 gammas and a minus gradient of at least 100 gammas. Incidently, the minimum low on the west side is not far from some exposed mineralization. This presents an intriguing question of possible relationship to the Dick structure.

Rock sample relative magnetic strengths:

All samples were from the Dick and Queen areas. However it should be pointed out that they may or may not be representative, average or typical. A table of those tested to date in order of increasing apparent susceptibility are:

Sample No. (as designated in R. Skiles letter 3 Jan. 1962)	ROCK TYPE	RELATIVE SUSCEPTIBILITY
1 & 3	Rhyolite	nil to very weak
6 & 7 & others by W.E.H.	Andesite with fine sulfides?	nil to very weak to medium
4 & 5	Schist	very weak to medium
10	Barren? diabase	medium
2 & others by W.E.H.	Diabase with sulfides	strong
others by W.E.H.	Non ore sulfides	very weak to strong
8, 9, 12, 13 & others by W.E.H.	Ore sulfides	weak to very strong and polarized

Generally if typical, these suggest mineralization may play almost as strong a part as rock type and that ore should be on or near the largest highs or lows and/or zones of maximum gradient, that diabase -- especially mineralized -- would give rise to some highs and possibly lows or flats, that schist and andesite would show only medium gradient unless mineralized and rhyolite very little. Since this does not entirely conform to Potapenko's results, three possibilities or combinations of all three are inferred:

1.) Our samples are not entirely representative of the average and we need to test more samples.

2.) Potapenko's data is partly erroneous.

3.) The designated surface mapped rock types are subject to some revision or question.

This situation is not necessarily unusual, but it does indicate there is definite room for additional magnetic checking and study. For example, the greatest anomalism encountered by Potapenko is near the King and Queen which are also areas of greatest production.

ELECTRICAL METHODS

Direct detection of sulfides appears unusually favorable for indiced polarization and possibly for natural potential. Electromagnetics and AFMAG seem less feasible than I. P. due to relative reliability and cost. Shallow E. M. done for

assessment work by Art Still on his claims was useful, but somewhat affected by terrain and not too definitive. The biggest problem is size of targets. However, the sulfide development is good, with considerable pyrite associated with ore and evident oxidation, and magnetics may still be of some aid. By applying a discrete combination of techniques, we believe the area of interest can be reliable and economically processed, with a fair chance that additional ore exists and if so, that it can be located.

This is notwithstanding our opinion that the Jensen experimental I. P. data on the Queen were very marginal. We think his results were largely artificial and natural E. M. background noise due to the technique he used. His procedure, though somewhat less unique than he states, still includes certain unsolved problems, which to our knowledge, no one has yet successfully resolved. Furthermore, although he considered 60 M.V. as average S. P. background in the west, we find 25 to 35 M.V. a more common average especially in Arizona, where also we have experienced very significant -- interpretable-- 50 M.V. lows.

BASE MAPS

For final interpretation, recording and presentation, any and all geophysical data should be plotted and studied in plan (as well as profile) at the same scale as all available geology

and natural physical and artificial features. The base map at 1" = 500' which we understand is now being prepared, will be very useful for this purpose.

Respectfully submitted,

HEINRICHS GEOEXPLORATION CO.

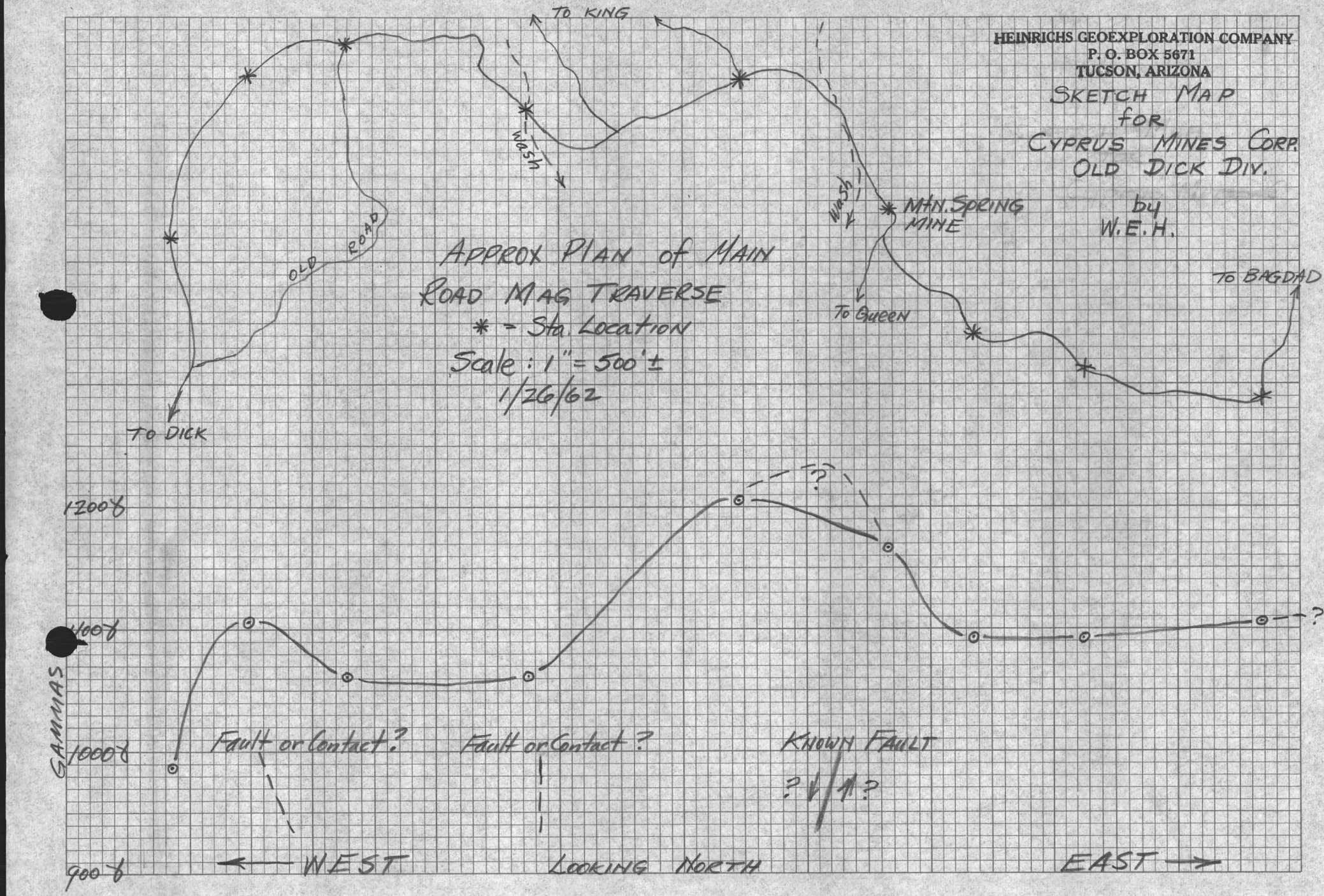
Walter E. Heinrichs, Jr.
President & General Manager

February 8, 1962
P. O. Box 5671
Tucson, Arizona

HEINRICHS GEOEXPLORATION COMPANY
P. O. BOX 5671
TUCSON, ARIZONA

SKETCH MAP for CYPRUS MINES CORP. OLD DICK DIV.

by W.E.H.



Grover 2/7/62 Walt.

E = 18.8

SAMPLE		
1	0	Nil
2	30.0	
3	—	Nil
4	—	"
5	—	"
6	—	"
7	—	"
8	—	"
9	18.8	
10	18.5	
11	—	"
12	18.0	
13	off Scale either dir.	

Mineralized bedrock - Strong

" outside? V×y weak weak or at most med.

Old Dick Billing 2/3/62

Cyprus Mines Corp.

Los Angeles ?, Cal

Attn: Old Dick Division

cc: Mr. Del Friedman (2)

Re: Field appraisal, Old Dick area proposed geophysics

Fees:

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2/1-8/62	W.E.H., I.B., E.G.H. & M.J.H. & J.W.C. Consolidate data on maps, sample susceptibilities & report	Charge 1 day @ 80.00	80.00
2/6-8/	~~W.E.H. additional days for report completion~~		

Expens:

Vehicle:

1/24/62 - 1/27/62 2 days @ 10.00/day - $20.00

560 miles @ 10¢/mile - 56.00

76.00 $76.00

Photos: 5.33

Communications: 5.06

Meals: 3.07

Total Expens: $89.46 — $89.46

$469.46

SAVE

January 30, 1962

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Respectfully submitted,
HEINRICHS GEOEXPLORATION CO.

WEH:jh
cc: Extra enclosed
Del Friedman (2)

Walter E. Heinrichs, Jr.
President & General Manager

1/24/62
Old Dick 1/25/62

1. Looked over surface area King to Green. on wed. Maps etc.

2. Thurs - underground - adit level 300 stope ½ 800'± 900' levels some oxidation to 800'??

3. Fairly strong oxidation to 150'±? but much sulfide remaining almost clear to surface. Oxidation slow? Reason? lack of porosity & permeability and climate?

4. Geechen - most weathering in place some top soil but also scattered float.

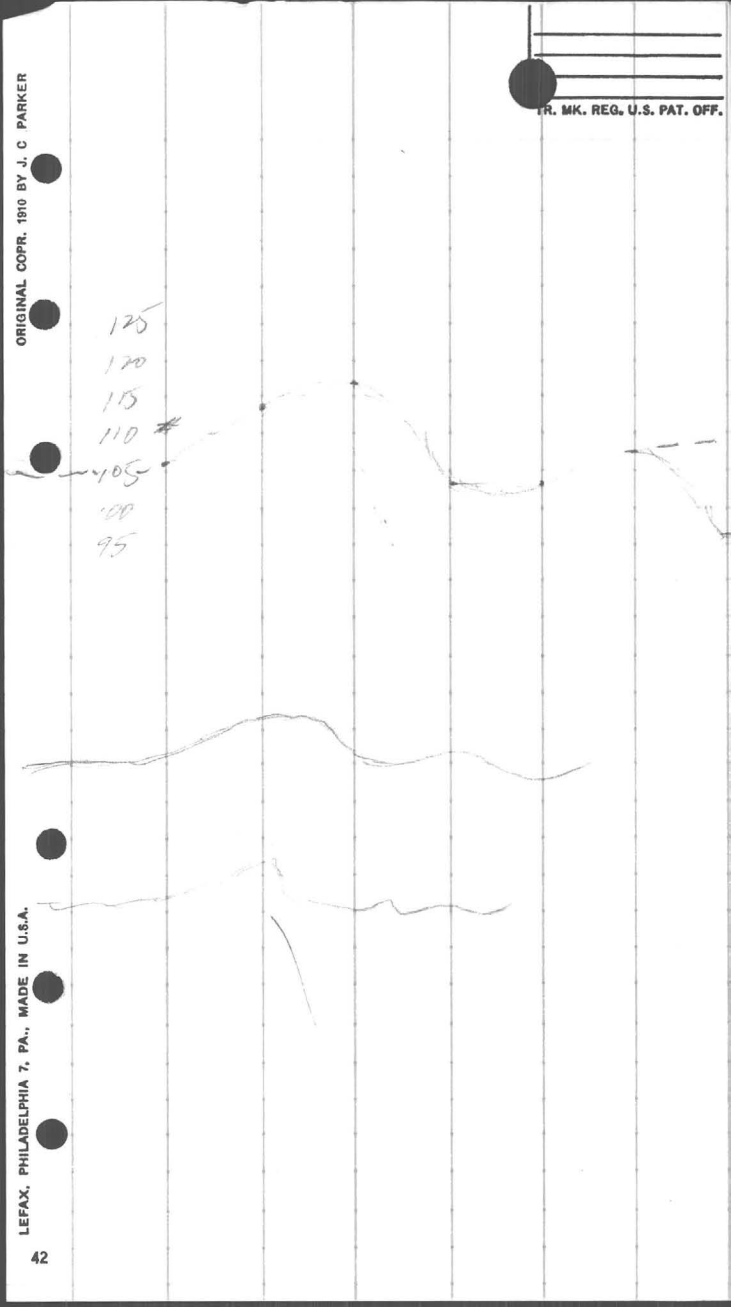
5. Pre-post ore faulting. Structural control??

6. Considerable disseminated pyrite

1/27/62

Mag Profile on Main Rd.

Time	Sta	Scale		Read.	Granite
10:50	"0"	1	1092	+106	Red Flag Bush
10:56	1	1169	+113.5	near Pit.	(below shack by big cedar)
10:59	1	1202	+117	cedar near road at turn around	
11:01	1	1061	+103	mid. rd. where wash crosses west of Copper King Rd.	
11:05	1	1061	+103	on rd. near side rd with cable on posts	
11:08	1	1107	+107.5	by big cedar at curve in rd. (E of pwr. lines)	
11:11	1	989	+96	by wood post in road at top of hill	
	East from 0				
11:21	1	1092	+106	on rd adjacent 2 granite boulders	
11:24	1	1107	+107.5	at next switch back	



Reginald Skiles 1/25/62

1. Potapenko – Magnetite at King not good for S.P.? – dies too short?
   one correlation not necessarily may higher.
2. Jensen – 60 mV. – S.P. background ? " " " ?
3. Potapenko – Welker – Mtn. Spring Fault no show 64 may. " " " ?
4. I.P. ok (Re. Jensen) (E.M. not because of caliche low (???!!))
5. Mag Lows (local) due to mineralization & / or silicification ?
6. Y & Z King area corr re: Potapenko
7. Z might have missed in F.W.
   Y " " gone over top in H.W. due to steeper dip.
   Might require more detail to pin down for sure.
8. Note hole # 2 Magnetite 317' – 651'
   " " # 4 " Minor at 709'

1/23/62

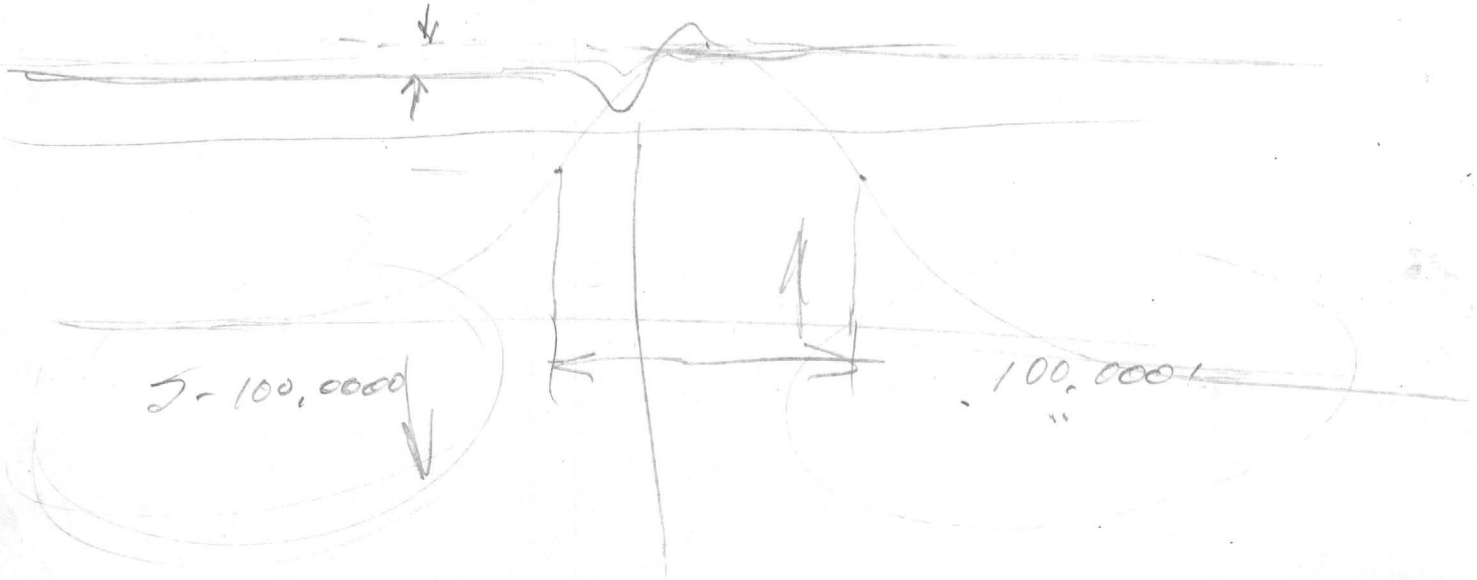
Cyprus - Old Dick

Phone - MEdford-3-2331
Bagdad, Ariz

30 Mi Beyond Congress Jctn.
#93 - 12 miles dirt to

Yarnell hill - Kirkland Jctn. - Kirkland - Bagdad.

Sandwich lunch
5 Miles - South.



LONG DISTANCE PHONE CALL REPORT

Request of Mr. W.

Number Called MEdford 3-2331
Exchange Number

Individual Del Friedman

Firm Cypress - Old Dick

Street Address

City Bagdad State Ariz

Remarks:

Is of Wed morning.

3:37 - 7
34
3
3.74

3.74
38
19
4.31

Date 1/23/62

Time Requested ____ A.M. P.M.

KIND OF SERVICE DESIRED

☐ Station to Station ☒ Person to Person

Time Called 2:52 ~~A.M.~~ P.M.

Time Connected 2:53 ~~A.M.~~ P.M.

Time Off 3:00 ~~A.M.~~ P.M.

Minutes Elapsed Time 7

CHARGES: $ 4.31

Phone Company Verification of Charge Given by

Switchboard Operator's Notations

☒ **Company Business**
☐ **Personal Call**

Charge to Cypress Old Dick A/C No.

Signed W.
Switchboard Operator

The **UTILITY** Line Form 39A

N18500 N18000 N17500 N17000 N16500 N16000

E15500 E15000 E14500 E14000 E13500

Rhyolite

Bird Eye - 2 Mt.

Portal

Section DB 245

Section DB 243

Section DB 241

Section DB 242

Section DB 247

WATER - AIR LINE

POWER LINE

DDH 5 DDH 4 DDH 6 DDH 7 DDH 8 DDH 9 DDH 3

5450 C Dropped in favor of inclined hole at NE end of section line

5-2

3950-C

QS-A QS-B QS-C

C03-17-17A

Rock & ore specimens (being sent under sep. cover)

Nil	1 Rhyolite
Strong	2 Diabase w/pyrite
Very weak	3 Rhyolite
med	4 Schist
Very weak	5 Schist
med	6 Andesite w/minor fine Pyrite
Nil or Very weak?	7 Andesite " " "
Weak	8 Ore sulphides > Underground at Copper Queen Mine
Med	9 Ore sulphides
"	10 Diabase
nil	11 Rhyolite
med	12 Ore Sulphides > Underground at Old Dick Mine
Strong & Folivized	13 Ore sulphides

(See numbers on map for specimen locations)

LEGEND

- RHYOLITE
- DIABASE
- ANDESITE
- SCHIST
- GOSSAN

NOTE

[redacted]

Section numbers refer to drawing numbers i.e. for Section DB247 see drawing DB 247

CYPRUS MINES CORP.

OLD DICK DIVISION

BAGDAD, ARIZONA

SURFACE MAP OF OLD DICK – COPPER QUEEN [redacted]

Date : 12-2-61

Scale : 1" = 100'

Drawn by: RS

Drawing No. DA-7

PRINT - B

GEOLOGIC MAP
OF
MOHAVE COUNTY, ARIZONA

PREPARED BY THE

ARIZONA BUREAU OF MINES
UNIVERSITY OF ARIZONA
TUCSON, ARIZONA

BY

Eldred D. Wilson and Richard T. Moore with additional data from maps by F. L. Ransome, C. Longwell, S. G. Lasky and B. N. Webber, and M. G. Dings and P. K. Sims, U.S. Geological Survey

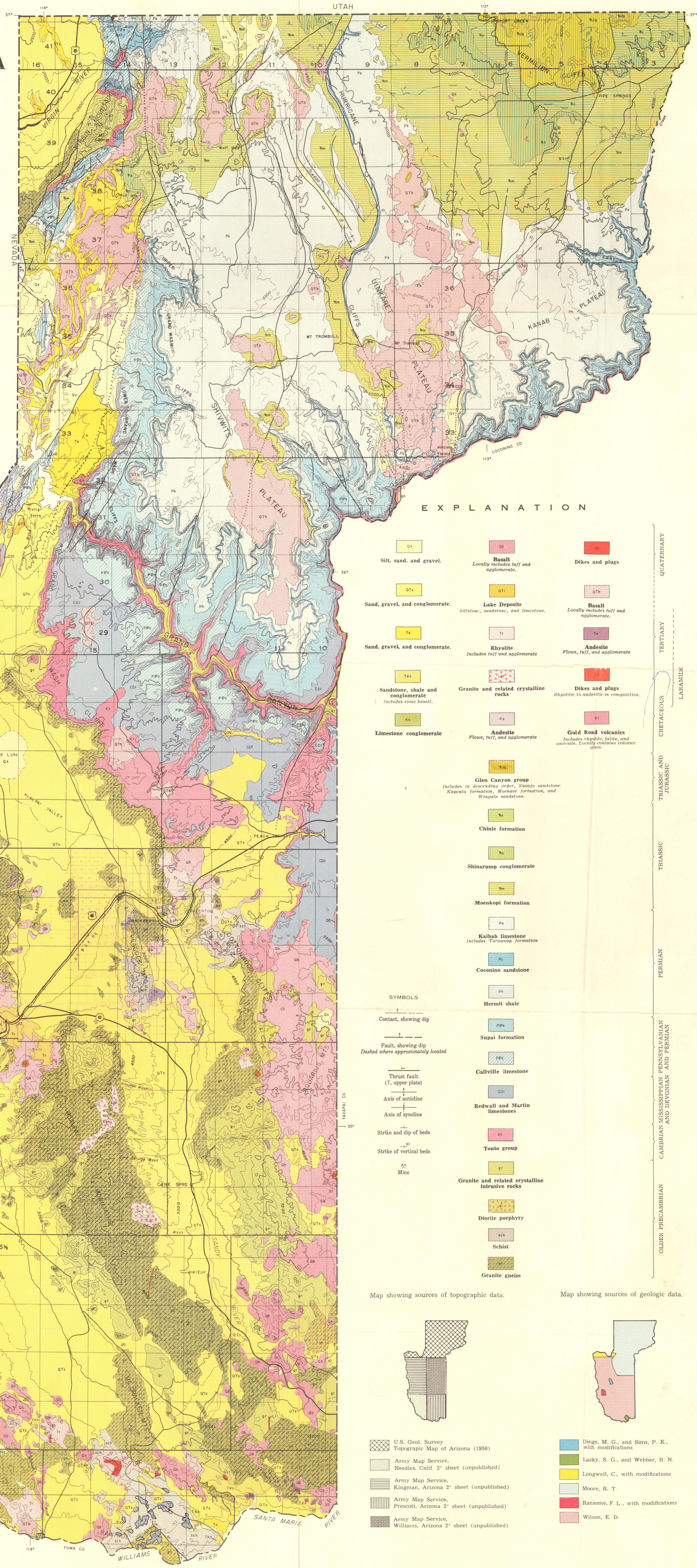
Scale $\frac{1}{375,000}$

10 0 10 20 Miles

10 0 10 20 30 Kilometers

Contour interval 500 feet
datum is mean sea level

1959



EXPLANATION

Qs — **Silt, sand, and gravel.**

Qb — **Basalt**
Locally includes tuff and agglomerate.

Qi — **Dikes and plugs**

QTs — **Sand, gravel, and conglomerate.**

QTl — **Lake Deposits**
Siltstone, sandstone, and limestone.

QTb — **Basalt**
Locally includes tuff and agglomerate.

Ts — **Sand, gravel, and conglomerate.**

Tr — **Rhyolite**
Includes tuff and agglomerate

Ta — **Andesite**
Flows, tuff, and agglomerate

TKs — **Sandstone, shale and conglomerate**
Includes some basalt.

Tgr — **Granite and related crystalline rocks**

Li — **Dikes and plugs**
Rhyolitic to andesitic in composition.

Ks — **Limestone conglomerate**

Ka — **Andesite**
Flows, tuff, and agglomerate

Kr — **Gold Road volcanics**
Includes rhyolite, latite, and andesite. Locally contains volcanic glass.

RJg — **Glen Canyon group**
Includes in descending order, Navajo sandstone Kayenta formation, Moenave formation, and Wingate sandstone.

Rc — **Chinle formation**

Rs — **Shinarump conglomerate**

Rm — **Moenkopi formation**

Pk — **Kaibab limestone**
Includes Toroweap formation

Pc — **Coconino sandstone**

Ph — **Hermit shale**

PPs — **Supai formation**

PPc — **Callville limestone**

CDl — **Redwall and Martin limestones**

Ct — **Tonto group**

gr — **Granite and related crystalline intrusive rocks**

di — **Diorite porphyry**

sch — **Schist**

gn — **Granite gneiss**

QUATERNARY
TERTIARY
CRETACEOUS
LARAMIDE
TRIASSIC AND JURASSIC
TRIASSIC
PERMIAN
CAMBRIAN MISSISSIPPIAN PENNSYLVANIAN AND DEVONIAN AND PERMIAN
OLDER PRECAMBRIAN

SYMBOLS

Contact, showing dip

Fault, showing dip
Dashed where approximately located

Thrust fault
(T, upper plate)

Axis of anticline

Axis of syncline

Strike and dip of beds

Strike of vertical beds

Mine

Map showing sources of topographic data.

U.S. Geol. Survey
Topograpic Map of Arizona (1956)

Army Map Service,
Needles, Calif. 2° sheet (unpublished)

Army Map Service,
Kingman, Arizona 2° sheet (unpublished)

Army Map Service,
Prescott, Arizona 2° sheet (unpublished)

Army Map Service,
Williams, Arizona 2° sheet (unpublished)

Map showing sources of geologic data.

Dings, M. G., and Sims, P. K., with modifications

Lasky, S. G., and Webber, B. N.

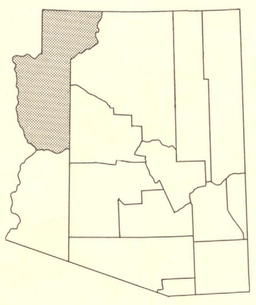
Longwell, C., with modifications

Moore, R. T.

Ransome, F. L., with modifications

Wilson, E. D.

INDEX MAP OF ARIZONA
Showing Location of Mohave County.



28,000N

27,600N

27,200N

27C00N

F

(l)

28

MF 0

11

15

ME-MF

(m)

23 MH

(my)

10

MD 0

MD

33

Y

Z

X

38

ME 0

25

(k)

20

MA0

1

MA

(n)

shaft

F

10

MN 0

MN

4,800E

5,200E

5,800E

Map 3

MAGNETOMETER TRAVERSE INDEX

Copper King Mine

Aug. 26, 1955
D. C. Emerson

Scale-1"=100'


WATER LINE
POWER LINE
Section DB 241
Section DB 242
Section DB 245
Section DB 243
Section DB 247
CQS-A
CQS-B
CQS-C
S-2
S-950-C
S-950-C Dropped in favor of inclined hole at NE end of section line.
10' Contour Interval
5' Contour Interval
E13,500
E14,000
E14,500
E15,000
E15,500
N16,000
N16,500
N17,000
N17,500
N18,000
N18,500
N19,000
N19,500
NOTE
[redacted]
Section numbers refer to drawing numbers i.e. for Section DB247 see drawing DB 247
CYPRUS MINES CORP.
OLD DICK DIVISION
BAGDAD, ARIZONA
SURFACE MAP OF OLD DICK - COPPER QUEEN [redacted]
Date : 12-2-61
Scale : 1" = 100'
Drawn by: R.S.
Drawing No: DA-7
PRINT - A

29,200

26,800

69,000 VOLT TRANSMISSION LINE
PARKER DAM TO BAGDAD

28,400

28,000

27,600

27,200

25,800

25,400

3899.4 N

CK3-4

CK3-2

CK3-3

CK3-1

18 MH (m) 29 MH

28 ME 0 11 (m) 15 ME-MF

10 MD 0 (m) 33 MD

38 MA 1 (m) 25

Q 3851 20

COPPER KING MINE

3835

37 MN

10 MN 0

COPPER KING PATENTED PLAIN

6,200

EXPLANATION

ROCKS

TERTIARY

WHITE RHYOLITE

LATE CRETACEOUS (?) OR EARLY TERTIARY (?)

DIORITE PORPHRY

BRECCIA "PIPE"

PRE-CAMBRIAN

KING META-RHYOLITE

IRON-STAINED SERICITE SCHIST

HORNBLENDE DIORITE

YAVAPAI SCHIST

META-AGGLOMERATE

META-BASALTS AND -ANDESITES

META-TUFFACEOUS SEDIMENTS

SYMBOLS

FOLIATION

JOINTING

TEST PIT

MONUMENT

GOSSAN

FAULT

CYPRUS MINES CORPORATION

GEOLOGY AND TOPOGRAPHY OF THE

COPPER KING AREA

APRIL 1953

SCALE 1" = 100'

1" = 10'

P.D. PACK

K.J. COKE

1,600 2,200 2,600 3,000

9,800

9,200

8,400

8,000

7,600

7,200

RCS-2 RCS-5 RCS-1 RCS-3 RCS-4

3400 3500 3350 3450

QUEEN BEE CLAIM

CB-1

EXPLANATION

FAULT
FOLIATION
SILICIFICATION
MINERALIZATION
MONUMENTS
RCS-4 DIAMOND DRILL HOLE

RHYOLITE
ANDESITE PORPHRY
ANDESITIC TUFF
ANDESITE DIKE
SILICIFICATION
QUARTZ - TOURMALINE
BLEACHED ZONE

CYPRUS MINES CORPORATION

GEOLOGY AND TOPOGRAPHY OF THE
(Red Cloud - Skunk Canyon)
QUEEN BEE AREA

JULY 1953

SCALE 1" = 100'
C I = 10'

K K WELKER
P D PACK

YOUNG DICK
Pat Claim

NO. 1 COR

N 19.500

E 14.000

N

DC-8023

DC-8052

DC-8811

DC-3335

DC-3838

DF-3335

Sec. 18 Sec. 17 T 14 N R 9 W Sec. 20 Sec. 19

Section O.D. 3

Section A

Section O.D. 3

OLD DICK
Pat Claim

OLD DICK 1st S. EXT.
Pat Claim

3800

4000

LEGEND

- UNDIFFERENTIATED BASIC ROCKS (more or less metamorphosed)
- TUFF; numbers 1, 2, 3, 4 designate separate tuff bands
- METARHYOLITE
- DIABASE SILLS & DIKES
- ANDESITE (?) PORPHYRY
- MASSIVE IRON OXIDES
- ROCK WITH MUCH IRON OXIDE & SULFIDE CRYSTAL CASTS
- BLEACHED & SILICIFIED AREA
- CONTACTS: KNOWN, PROBABLE, INFERRED
- FAULTS: KNOWN, PROBABLE, INFERRED
- ATTITUDE OF BEDDING, FLOW STRUCTURE, OR CONTACT
- ATTITUDE OF SCHISTOSITY
- ATTITUDE OF PERSISTENT JOINTING IN RHYOLITE
- ATTITUDE OF FAULT PLANE

Absolute elevations correct within 10 ft.

Claim boundries from patent survey plats

TOPOGRAPHY & SURFACE GEOLOGY
OLD DICK MINE AREA
BAGDAD, ARIZONA

Scale: 1"-100'
By: AB III & SFM
Date: 9-5-49

Coronado Copper & Zinc Co.

Drawing No. EB-1

17,600

17,400

17,200

17,000

16,800

16,600

16,400

16,200

16,000

15,800

15,600

15,400

15,200

15,000N

14,600E

14,800

15,000

15,200

15,400

15,600

15,800

16,000

20
10
MTO
0
10
20
30
40

68
58
LINE 4
LINE 3
LINE 2
LINE 1
0
1
2
3
4
5
6+40NE
TMV 0
LV6
LV5
LV4
28 MV
MX 0
MZ 0
52
MX
58
67 MZ
12 NE
12 SW
ANCHOR AND UPPER QUEEN SHAFT

EXPLANATION

- Tertiary gravel, silt, and clay sediments
- Rhyolite tuffs
- Rhyolite porphyry dikes and sills
- Quartz-sericite-pyrite shear zone
- Porphyritic flows and fragmentals
- Basic intrusive
- Quartz veins and lenses
- Silicification
- Mineralization and gossan
- Shearing
- Brecciation and/or fragmental pyroclastics
- Fault
- Strike and dip of bedding
- Strike and dip of foliation
- Strike and dip of jointing
- Diamond drill hole
- Outcrop indicated by color shading

CYPRUS MINES CORPORATION
Copper Queen Project

GEOLOGIC MAP
COPPER QUEEN AREA

Scale: in = 100 ft
Contour Interval: 10 ft.

July, 1953
Carithers

20,400N
20,000N
19,600N
19,200N
18,800N
18,400N
18,000N
6400E
6800E
MOUNTAIN SPRING PATENTED CLAIM
COLORENTA CLAIM
WONDER CLAIM
MSF III
MOUNTAIN SPRING SHAFT
EXPLANATION
DIORITE
BASALT AND GABBRO
ALASKITE (?)
RHYOLITE
GRANITE SCHIST COMPLEX
ANDESITE
CHLORITE SCHIST
UNDIFFERENTIATED SCHIST
SILICIFIED META-SEDIMENTS
MICACEOUS META-SEDIMENTS
QUARTZ VEINS AND LENSES
MINERALIZATION AND GOSSAN
SYMBOLS
FAULT
FOLIATION
BEDDING
MONUMENT
ROAD
TEST PIT
CYPRUS MINES CORPORATION
GEOLOGY AND TOPOGRAPHY OF THE
MOUNTAIN SPRING
MINE AREA
SEPTEMBER, 1953
SCALE 1" = 100'
W CARITHERS
P D PACK