A Correct.

Q Can that be an expensive process, the testing before making the actual shot?

A Not very expensive. No.

Q What does it entail?

A A three thousand dollars instrument, and an example of the size explosion that you anticipate you are going to shoot, and one person or two people -- one person setting them off and one person at the recorder recording.

You could do several of these tests in a day, easily.

Q Would you use the same amount of a charge?

A Oh, yes, I would.

Q Would you put it at the same depth?

A I would.

Q Would you put it at the same distance?

A Ideally, yes.

You would, yes.

Q And where would you put the sensing equipment?

A At the receiving end of things.

Q Would you be above ground or below ground?

A Right at the surface I'd put it.

Q And if you were anticipating as a part of the culture a well, would you put it below the surface?

A No.

Q It would be good enough at the top of the surface?

A Put it right on the collar.

Q Is there any particular equipment, vibrator equipment, that you would use, I mean, who makes this type of equipment that you would feel would be accurate?

A About a dozen different companies make it.

Q Can you name me --

A Springnether, Dallas Instruments, Vibration Engineers.

Those are three that come to mind.

Q So that the reading you got at the surface you would feel, and assuming it was a safe reading, you would feel would be valid, say, four hundred feet below the surface, or at least would be an indication to you that there was no danger -- let me rephrase it. It is a lousy question.

I am going to rephrase it for you.

You take a certain poundage, you take a certain distance, you have got one of these vibrator machines or recording machines that you recognize as being good equipment, and you measure the charge from, you know, from the hole where the charge is to the vibrating equipment, the equipment measuring the vibrations, and it doesn't show any danger. The calibrations show no danger, or, conversely,

shows that it is safe.

Do you feel that those calculations would be as good four hundred feet below the surface as they would be at the surface?

A Probably.

Q I think I asked you this, but I'm not sure.

I want you to assume, I think it is a fact that is in evidence, that the charges in these particular cases were, in this particular case, were 30 feet below the surface, give or take.

MS. HOLLOWELL: In the range of.

Q Yes, let's put it in the range of, approximately, and that you knew as a fact that they would all be in this particular range of 30 feet.

Do you feel it is necessary to put them down 30 feet to get a reading, an accurate reading of safety on your vibrator calculator?

A Necessary in what context?

Q I am just thinking, if I were going out there and I were going to do some seismic testing, would it be necessary for me to -- I know one end, from what you told me -- at the receiving end it is not necessary to drop that monitoring equipment -- is it necessary for me at the sending end to drop it, or is it better -- let's put it that way -- is it better?

MS. HOLLOWELL: It is better to what?

MR. WHITNEY: Drop it to 30 feet.

MS. HOLLOWELL: The same amount of feet that will actually be used to bury the dynamite, the 28 to 30 feet.

A My recommendation would be to, in any test, to maintain as few variables as possible, and if I am going to plan to do my shooting at 30 feet on a production basis, then I would do the testing at 30 feet.

Q Would that not also apply if you were going, if you were concerned about things that were two to three hundred feet below the surface?

A In a technical sense you could say yes, that there will be differences in energy imparted at the surface as opposed to depths below the surface, but in a practical sense, the maximum motion is probably going to be at the surface, anyway, so that you are going to have a worst case situation as a generalization with your test equipment.

Q How about would it be even more of a worst case situation if one were to put the dynamite at the surface?

A I don't think so.

I think it would be just the opposite.

Q Would you tell me why?

A The matter of coupling probably would be the

most significant factor.

Q Which would have a tendency to be more pronounced beneath the surface than at the surface?

A You are going to couple the explosion to the ground by having the explosion in the subsurface than by having the explosion in the pattern near the surface. In other words, it is simply going to be coupled better, less confined.

Q Let's see if we have everything.

I have asked you to bring some things, sir. Have you told me those things that you have brought on your -- I wonder if we can go to your subpoena, because I'd like to take a look.

(Whereupon there was a recess.)

A We can refer to this. That is Blasting Vibration Effects by L. Don Leeds, a publication of the Hercules Powder Company.

Q What part did that play, sir?

Is this just general background for you?

A Yes.

Q Was it a review for you?

A Yes. It talks about the different types of waves and energy.

There is a good illustration there.

It is a typical example.

Q Is it possible to get this copied?

A Certainly.

Q What else, sir?

A Seismic Effects of Core Blasting. That is the original Bureau of Mines publication bulletin 442.

Q This bulletin 442, do you believe that it has been affected or qualified by the publication that you have --

A Definitely qualified, yes.

Q Do you mind if I make a copy of that, too?

A No.

Q Anything else, sir?

A Here is a companion volume.

Q And that is called Blasting Vibrations and Their Effects on Structures. 1971, Bureau of Mines publication.

A Yes.

Q Bulletin 656, is that correct?

A Yes.

MS. HOLLOWELL: You may want to get those.

MR. WHITNEY: I am worried about this one. This one was published in --

MS. HOLLOWELL: I meant the Bureau of Mines one.

MR. WHITNEY: I can get those, yes, but this one is Wilmington 99 Delaware, so, you wonder if that isn't

an antiquity.

Q And the other one, sir?

A This is Vibrations from Underground Blasting, Bureau of Mines, Report of Investigations, RI 90, RI 7937, 1974.

Q That is fine. I can get that. Thank you.

Are there any more?

A No, I don't think so.

I think there was just a press release on this one.

This is just further extrapolation by industry of what was --

Q Is that just a frontispiece, sir?

A What was said in the original Bureau of Mines publication we looked at. My copy suddenly disappeared.

Q That is the one you referred to in your affidavit?

A Yes.

Q That is being copied now.

A Okay.

Q And this just extrapolates what that publication says as an example of what industry is doing to follow up on it.

Okay.

A This is where the --

MS. HOLLOWELL: I guess basically we have given you everything.

Q Okay, and then I have asked now insofar as the statements were concerned, and you talked about the letter from Hans Ackermann--

A To Herb Schumann, yes.

Q Are there any other letters?

MS. HOLLOWELL: Well, let me see if I can respond a little bit to this.

Mr. Heinrichs has sat through Schumann and Bartell's deposition, as you know, and he has also reviewed with me and we brought a bunch of the exhibits that you and I worked on in Denver.

MR. WHITNEY: Can you just briefly describe them?

MS. HOLLOWELL: In particular, Mr. Heinrichs was given all of the analog records Mr. Ackermann produced to us, which is the hard copy of the material from the geophone tape.

THE WITNESS: From the magnetic tape, yes.

MS. HOLLOWELL: So, he reviewed all of that.

He has, in addition, reviewed the maps that have been previously identified today, and there was one map that we got in Denver which is the seismic subsidence study. It is plotted on a --

MR. WHITNEY: It is like a triangle?

MS. HOLLOWELL: Yes. It is just a line. He took a look at that.

Of course, since we don't have the depositions down from Denver yet, we don't have all of those exhibits.

So, at this point, I would say there is still stuff he is going to be examining.

MR. WHITNEY: But that was the one that looks like a slice of pie?

MS. HOLLOWELL: Yes, that is the one.

THE WITNESS: It is the one by Dick Raymond, I believe.

MS. HOLLOWELL: Then he reviewed everything in the file folders produced by Mr. Bartell at his deposition.

He has reviewed the three or four page subsidence report generated by Schumann and Raymond.

THE WITNESS: Correct.

MS. HOLLOWELL: And he has reviewed that abstract that Schumann produced at his deposition as to the existence of fault.

And of course, we have copies now of Schumann's and Bartell's deposition, and he has not reread in depth those deposition transcripts, but he was present at the

depositions.

I think that that covers pretty much what he has looked at, the way your subpoena was worded, of statements by the defendants, in addition, of course, to everything attached to your motion for summary judgment, and in particular the affidavits, Mr. Bartell's affidavit or declaration, whatever it is.

Is that about it, Walter?

THE WITNESS: I think that is it.

Q You stated in your affidavit you felt that actually the seismic testing wasn't necessary. That is the gist I got out of it. Is that correct?

A Yes. I think that the seismic work was perhaps somewhat gilding the lily, or perhaps more an exercise in routine habit, as opposed to we are really in a jam here, we have got to get some more information, you know.

This is the impression I am given.

Q And the impression you are gathering is from your examination of the materials that we furnished you?

A Yes.

Q Such as the gravity map, aerial photographs, and the like?

A Yes.

Q As well as the historical geological data that was furnished?

A Correct.

Q Was it helpful to do this blasting?

A I guess you'd have to say it certainly tended to confirm what information, hard evidence there already was in existence. It did do that. I mean --

Q Was it a matter of judgment, as far as the people testing are concerned?

MS. HOLLOWELL: The question is calling for speculation on the witness's part.

Q Well, Mr. Heinrichs, you know, you have been at the game for almost fifty years.

A Pretty close.

Q Yes. That was a decision that the people in the field made, was it not?

MS. HOLLOWELL: If you know.

A I don't know.

Q You are just feeling that, well, somebody obviously did it in some areas and didn't do it in others, is that correct?

A This is true, apparently.

Q So, somebody must have decided or felt that, at least in their opinion, it was necessary?

MS. HOLLOWELL: Again, I object. It assumes facts not in evidence.

The witness said he doesn't know why the

decision was made.

Q But a decision was made. You know of the existence of a decision. We know they did the testing.

A Yes. There was seismic work done, that is for sure.

Q You mentioned that fault. The fault is east, is it not, of the shot hole 2-B?

A Yes, it is.

Q Would that have played any part in the testing from shot hole 2-B to either increase or decrease the possibility of damage to that well?

MS. HOLLOWELL: I am lost, Jim.

MR. WHITNEY: Let me put it this way; as far as we know, and as far as the witness has testified, shot hole 2-B was some eight to nine hundred feet west or southwest of where the Arizona Maintenance well was.

As far as we know, the fault which has been defined is west of not only the shot hole, but the well, also.

Q Isn't that correct?

A No. I thought it was east.

Q I'm sorry. East of it.

A I have a little trouble with your question, because you are --

Q What I am wondering is did the fault have

anything to do with your opinion; was it anything that you plugged in to reach the determination that you have?

A No.

Q It wouldn't have had any effect?

MS. HOLLOWELL: Which opinion -- the opinion the blasting caused the well damage, or that -- you have also had him testify that the blasting maybe wasn't necessary.

Q The opinion I am referring to was the opinion that you felt the blasting may have caused the damage directly or indirectly to the well.

A The blasting was the probable cause, yes.

Q Now, did the fact that there was this fault to the east play any part at all in your opinion?

A No, it did not.

MR. WHITNEY: Okay.

That is all I have.

MS. HOLLOWELL: I have one question.

EXAMINATION

BY MS. HOLLOWELL:

Q Mr. Heinrichs, Mr. Whitney just asked you whether or not the existence of a fault to the east of the well site and the shot hole affected your opinion as to the blasting being the probable cause of the damage, and you said it was not.

In your opinion would the existence of earth

fissures in the area of shot hole 2-B have had any impact on possible damage caused by the blast?

A Let's say the effects on the well are similar to the effects that appear at the surface in the fissures, in other words, the same types of phenomenon are probably going on at both places.

So, in that context, there would be a similar relationship, but that they are directly interconnected I wouldn't say is necessarily so.

MS. HOLLOWELL: I don't have anything else.

MR. WHITNEY: That is all.

Can we treat this deposition as continued?

MS. HOLLOWELL: Sure, given that you extended me that courtesy in Denver.

C E R T I F I C A T E

STATE OF ARIZONA)
) SS.
COUNTY OF PIMA)

BE IT KNOWN that I, Peter A. Lumia, C. S. R., took the foregoing deposition pursuant to Notice at the time and place stated in the caption hereto; that I was then and there a Notary Public in and for the State of Arizona; that by virtue thereof I was authorized to administer an oath; that the witness, WALTER HEINRICHS, before testifying, was first duly sworn according to law, and that the testimony of the witness was reduced to writing under my direction.

I DO FURTHER CERTIFY that I am not of counsel nor attorney for either or any of the parties to said cause or otherwise interested in the event thereof; and that I am not related to either or any of the parties to said action.

_____
NOTARY PUBLIC

My Commission Expires:
November 21, 1990

RIE

Cu - ppm

T 13 N

T 12 N

Area of possible fraction between Bug Claims & Patented Claims

GOPHER M.S. 69

GOLD QUARRY No. 3

HURON

SILVERTON M.S. 1597

YANKEE GIRL M.S. 1597

AMERICAN FLAG M.S. 1597

TRINITY M.S. 1597

HENRIETTA MILL SITE M.S. 1597

BUG 59 · BUG 54 · BUG 53

BUG 60 · BUG 52 · BUG 51

BUG 61 · BUG 50 · BUG 49

BUG 62 · BUG 48 · BUG 47 · BUG 40

BUG 63 · BUG 46 · BUG 45 · BUG 38 · BUG 37

BUG 64 · BUG 44 · BUG 43 · BUG 36 · BUG 35

BUG 42 · BUG 41 · BUG 34 · BUG 33

Amended

KATHY 2 · KATHY 1

Amended

BUG 56 · KATHY 4 · KATHY 3

BUG 57 · KATHY 6 · KATHY 5

BUG 58 · KATHY 8 · KATHY 7

BUG 66 · BUG 10 · BUG 9

BUG 68 · BUG 12 · BUG 11

BUG 70 Amended · BUG 14 · BUG 13 Amended

PAT. FEE SIMPLE

BUG 72 · BUG 16 · BUG 15

BUG 74 · BUG 18 · BUG 17

BUG 76 · BUG 20 · BUG 19

BUG 78 · BUG 22 · BUG 21

BUG 24 · BUG 23

BUG 26 · BUG 25

BUG 28 · BUG 27

BUG 30 · BUG 29

BUG 65

BUG 31 & 32 not located or surveyed

MTN. CHIEF No. 1 *

MTN. CHIEF No. 4 *

MTN. CHIEF No. 3 *

MOUNTAIN CHIEF *

MTN. CHIEF No. 2 *

MTN. CHIEF No. 5 *

MONTEZUMA

EAGLE FRACTION

BRUSH

CAT

PRINCESS PLACER *

HURON No. 2

SWINDLER

VICTOR

HURON No. 1

MATTIE

Abandoned Railroad Bed

STATE HIGHWAY 69 RIGHT OF WAY

Gas Line

Power Line abandoned in this area

Mesa Verde Area

Mesa Verde Boundary

Loc. ARKANSAS TRAVELER

Chiseled Rock W.C.

Substation

Drinen Ranch House

To Masse Ranch House

H.E.S. 62

PAT. FEE SIMPLE

H.E.S. 72

MASCOT

PROTECTION 12

BUTTER NUT

MARTIN

BOGGS

PUTNAM

LOGAN

IRON QUEEN

DAILY

PAT. FEE SIMPLE

PAT. FEE SIMPLE

STATE HIGHWAY 69 RIGHT OF WAY

Abandoned Rail Road Bed

Pits not dug Claims surveyed but abandoned

LODE CLAIM *

MARY COPPER

LODE CLAIM

LODE CLAIM No. 2 *

LODE CLAIM No. 3 *

LODE CLAIM No. 4 *

32 · 33 · 5 · 4 · 8 · 9

13 02 15 5E

NOTE:

Roads are approximate only, &

Control for location known along surveyed claim lines only.

4" X 4" posts mark all corners of claims except where witness corners set.

▫ Building

■ Corner located in field — brass cap

Railroad

Road

State Highway 69, Right of Way; Highway 50' wide in center of R/W

W.C. indicates identified witness corner post for claims

Patented Mining Claims taken from Land Office Plats

• Location Monument

* Unpatented Claim

Adverse claims:

Arkansas Traveler
Loc. Sept. 26, 1962
Rec. Sept. 28, 1962
by R. H. Kettner
Ellen Kettner
A. C. Forbis or Farbis 710 Delano St. (Prescott?)

Mary Copper
Lode Claim 1, 2, 3, 4
Rec. Bk. 213, p. 195
Loc. April 9, 1932
by R. D. Terrell
J. D. Baker

N

HEINRICHS GEOEXPLORATION COMPANY
P.O. Box 5671 Tucson, Arizona

Cu Geochem
KATHY - BUG CLAIM GROUP
FOR
PHELPS DODGE CORPORATION

YAVAPAI COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: E. G. H.	
DATE: Mar. 1963	SHEET OF	
DRAWN BY: i. b.	DRAWING NO.:	FILE:

Geochem

RIE

30 29 28 27

T13N

31 32 33 34

T12N

6 5 4

7 8 9

RIE

60W 50W 40W 30W 20W 10W 0 10E 20E 30E

29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11

10 9 8 7 6 5 4 3 2 1 0

N

DH. K1
S 90° E - 45°
1500

DH. K2
S 75° E - 45°
1500

Bug
Kathy Group
Group

LEGEND

Contour interval logarithmic

034 Data plot point at 2a, a=500'

a na a
I V

Proposed diamond drill hole

Phelps Dodge Corporation
Geophysical Research and Exploration Department

KATHY PROJECT

Apparent Resistivity Plan Map

($\rho/2\pi$ in ohm-feet)

Scale: 1"=500' April, 1963

PLATE 6

R I E

T 13 N

T 12 N

GOPHER M.S. 69

SILVERTON M.S. 1597

YANKEE GIRL M.S. 1597

AMERICAN FLAG M.S. 1597

TRINITY M.S. 1597

HENRIETTA MILL SITE M.S. 1597

GOLD QUARRY No 3

HURON

Area of possible fraction between Bug Claims & Patented Claims

O E/W

STATE HIGHWAY 69 RIGHT OF WAY

Abandoned Railroad Bed

Power Line abandoned in this area

MTN. CHIEF No 1*

MTN. CHIEF No 3*

MTN. CHIEF No 4*

MOUNTAIN CHIEF*

MTN. CHIEF No 2*

MTN. CHIEF No 5*

MONTEZUMA

EAGLE FRACTION

FLAT

BRUSH

HURON No 2

SWINDLER

HURON No 1

PRINCESS PLACER*

SHAFT

14W

23.5 Gas Line

22.5

21.5

21

20.5

BUG 59 · BUG 54 · BUG 53

BUG 60 · BUG 52 · BUG 51

BUG 61 · BUG 50 · BUG 49

BUG 62 · BUG 48 · BUG 47 · BUG 40

32

BUG 63 · BUG 46 · BUG 45 · BUG 38 · BUG 37

BUG 64 · BUG 44 · BUG 43 · BUG 36 · BUG 35

BUG 42 Amended · BUG 41 · BUG 34 · BUG 33

BUG 65

BUG 55 · KATHY 2 · KATHY 1 Amended

Approx. Boundary

ARKANSAS TRAVELER

BUG 56 · KATHY 4 · KATHY 3

BUG 57 · KATHY 6 · KATHY 5

BUG 58 · KATHY 8 · KATHY 7

Chiseled Rock W.C.

Substation

Drive Hole 110' deep est. Location

MATTIE

EMMA GROUP of Montana Phosphate Products Co ?
John S. Phillips
Sept. 64
Lode

Drinen Ranch House

BUG 66 · BUG 10 · BUG 9

BUG 60 · BUG 12 · BUG 11

BUG 70 Amended · BUG 14 · BUG 13 Amended

PAT. FEE SIMPLE

BUG 72 · BUG 16 · BUG 15

To Masse Ranch House

BUG 74 · BUG 18 · BUG 17

BUG 76 · BUG 20 · BUG 19

BUG 78 · BUG 22 · BUG 21

BUG 24 · BUG 23

BUG 26 · BUG 25

BUG 28 · BUG 27

BUG 30 · BUG 29

MARTIN · BOGGS · PUTNAM

LOGAN · IRON QUEEN · DAILY · PAT. FEE SIMPLE

MASCOTT

BUTTER NUT

PROTECTION 12

H.E.S. 62

H.E.S. 72

PAT. FEE SIMPLE

Goswick Ranch Housing Area

STATE HIGHWAY 69 RIGHT OF WAY

Abandoned Rail Road Bed

Pits not dug. Claims surveyed but abandoned

BUG 31 & 32 not located or surveyed

LODE CLAIM*

LODE CLAIM No 2*

LODE CLAIM No 3*

LODE CLAIM No 4*

LODE CLAIM No 5

MARY COPPER

LODE CLAIM

□ – S.P.

△ – GEOCHEM

Aug. 1965
— indicates S.P. & Geochem
--- " S.P. ONLY

NOTE:

Roads are approximate only, &
Control for location known along surveyed claim lines only.
4" X 4" posts mark all corners of claims except where witness corners set.
□ Building
* Corner located in field — brass cap
Railroad
Road
State Highway 69, Right of Way; Highway 50' wide in center of R/W
W.C. indicates identified witness corner post for claims
Patented Mining Claims taken from Land Office Plats
• Location Monument
* Unpatented Claim

Adverse claims:

Arkansas Traveler — by R. H. Kettner, Ellen Kettner, A. C. Forbis or Farbis 710 Delano St. (Prescott?)
Loc. Sept. 26, 1962
Rec. Sept. 28, 1962

Mary Copper — by R. D. Terrell, J. D. Baker
Lode Claim 1, 2, 3, 4
Rec. Bk. 213, p. 195
Loc. April 9, 1932

N

HEINRICHS GEOEXPLORATION COMPANY	
P.O. Box 5671 Tucson, Arizona	
KATHY – BUG CLAIM GROUP	
FOR	
PHELPS DODGE CORPORATION	
YAVAPAI COUNTY, ARIZONA	
SCALE: 1" = 500'	CONTOUR INTERVAL:
	DATA BY: E. G. H.
DATE: Mar. 1965	SHEET OF
DRAWN BY: I. b.	DRAWING NO.:
REVISIONS	
FILE:	

RIE

30 29 28 27

60W 50W 40W 30W 20W 10W 0 10E 20E 30E

T13N

31 32 33 34

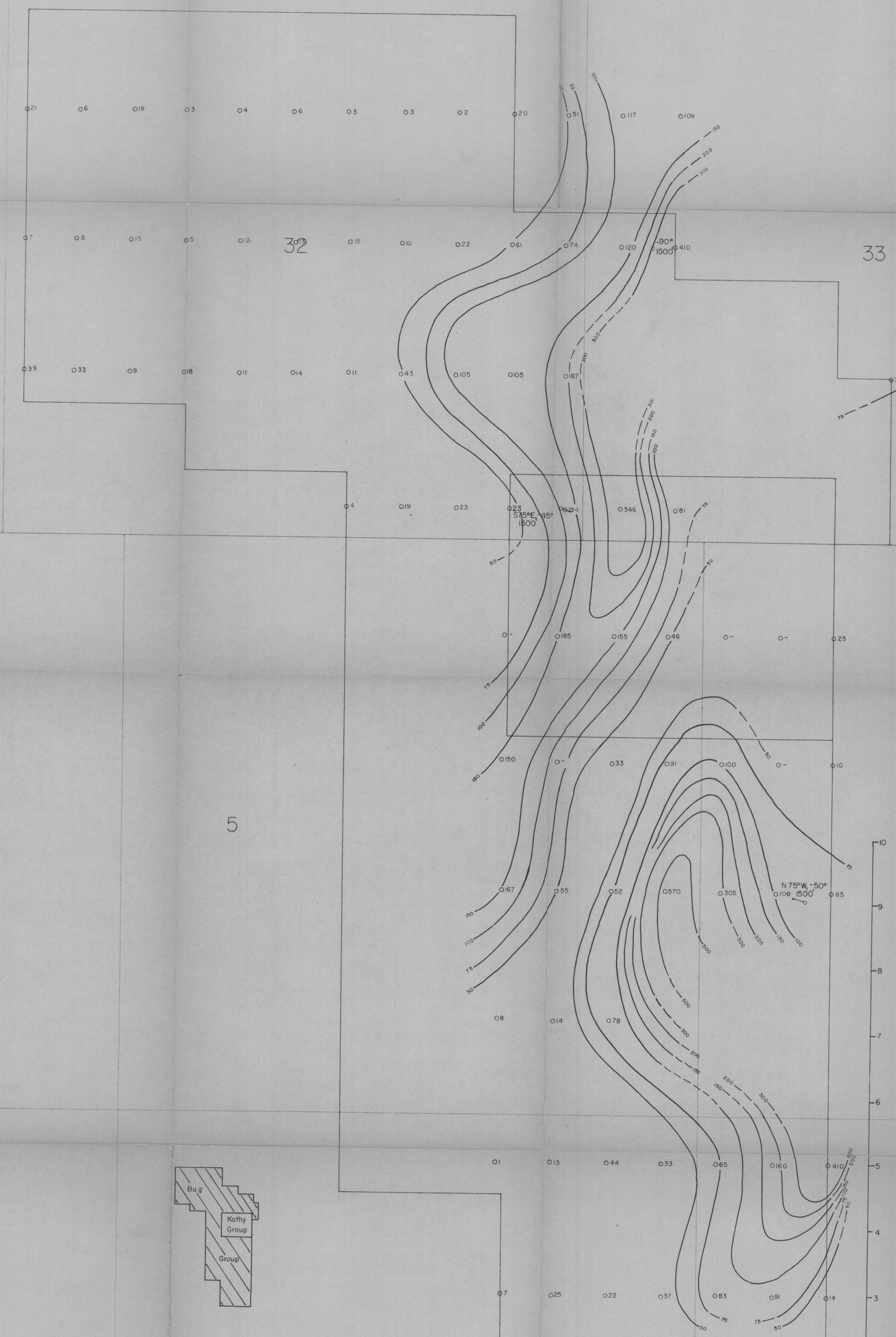
T12N

6 5 4

7 8 9

T12N

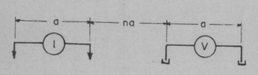
RIE



LEGEND

Contour interval logarithmic

034 Data plot point at 2a, a=500'



Proposed diamond drill hole

Phelps Dodge Corporation
Geophysical Research and Exploration Department

KATHY PROJECT

METAL FACTOR PLAN MAP

Scale: 1"=500' April, 1963

PLATE 8

R I E

T 13 N

T 12 N

Area of possible fraction between Bug Claims & Patented Claims

GOPHER M.S. 69

GOLD QUARRY No. 3

SILVERTON M.S. 1597

YANKEE GIRL M.S. 1597

AMERICAN FLAG M.S. 1597

TRINITY M.S. 1597

HENRIETTA MILL SITE M.S. 1597

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MTN. CHIEF No. 4*

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MOUNTAIN CHIEF*

MTN. CHIEF No. 2*

MTN. CHIEF No. 5*

Power Line abandoned in this area

Abandoned Railroad Bed

STATE HIGHWAY 69 RIGHT OF WAY

MONTEZUMA

EAGLE FRACTION

BRUSH FLAT

HURON

HURON No. 2

SWINDLER

HURON No. 1

Gas Line

PRINCESS PLACER*

SHAFT

SP Line 23.5

SP Line 22.5

SP Line 21.5

SP Line 20.5

SP Line 19

SP Line 17

SP Line 15

SP Line 13

SP Line 11

BUG 59 · BUG 54 · BUG 53

BUG 60 · BUG 52 · BUG 51

BUG 61 · BUG 50 · BUG 49

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32

BUG 63 · BUG 46 · BUG 45 · BUG 38 · BUG 37

BUG 64 · BUG 44 · BUG 43 · BUG 36 · BUG 35

BUG 42 Amended · BUG 41 · BUG 34 · BUG 33

BUG 55 · KATHY 2 · KATHY 1 Amended

BUG 65

33

ARKANSAS TRAVELER

BUG 56 · KATHY 4 · KATHY 3

BUG 57 · KATHY 6 · KATHY 5

BUG 58 · KATHY 8 · KATHY 7

Substation

T.P. Line #1

T.P. Line #2

BUG 66 · BUG 10 · BUG 9

Drinen Ranch House

5

BUG 68 · BUG 12 · BUG 11

4

BUG 70 Amended · BUG 14 · BUG 13 Amended

PAT. FEE SIMPLE

BUG 72 · BUG 16 · BUG 15

To Masse Ranch House

BUG 74 · BUG 18 · BUG 17

PAT FEE SIMPLE

BUG 76 · BUG 20 · BUG 19

MASCOTT

PROTECTION 12

BUTTER NUT

H E S 62

PAT. FEE SIMPLE

H E S 72

MARTIN

BOGGS

PUTNAM

LOGAN

IRON QUEEN

DAILY

PAT FEE SIMPLE

BUG 78 · BUG 22 · BUG 21

STATE HIGHWAY 69 RIGHT OF WAY

BUG 24 · BUG 23

BUG 26 · BUG 25

Abandoned Rail Road Bed

8

9

BUG 28 · BUG 27

BUG 30 · BUG 29*

LODE CLAIM*

MARY COPPER

LODE CLAIM

LODE CLAIM No. 2*

LODE CLAIM No. 3*

LODE CLAIM No. 4*

Pits not dug
Claims surveyed but abandoned

BUG 31 & 32 not located or surveyed

MATTIE

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■ Corner located in field — brass cap
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P.O. Box 5671 Tucson, Arizona

Location I.P. 1965
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FOR
PHELPS DODGE CORPORATION
YAVAPAI COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: E. G. H.	
DATE: Mar. 1963	SHEET OF	
DRAWN BY: I. b.	DRAWING NO.:	FILE:

E.G.H

LOCATION I.P. SURVEYS FOR

~~OF~~ AFFIDAVIT OF LABOR

FOR Assessment yr SEPT 1, 1963 - Sept. 1, 1964

RIE

30 29 28 27

60W 50W 40W 30W 20W 10W 0 10E 20E 30E

T13N

31 32 33 34

6 5 4

T12N

7 8 9

29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11

10 9 8 7 6 5 4 3 2 1 0

N

K-1 K-2 K-3

S75°E, -45°, 500'

N75°W, -50°, 500'

Bug

Kathy Group

Group

LEGEND

Contour interval logarithmic

0.34 Data plot point at 2a, a=500'

a na a

I V

Proposed diamond drill hole

Phelps Dodge Corporation
Geophysical Research and Exploration Department

KATHY PROJECT

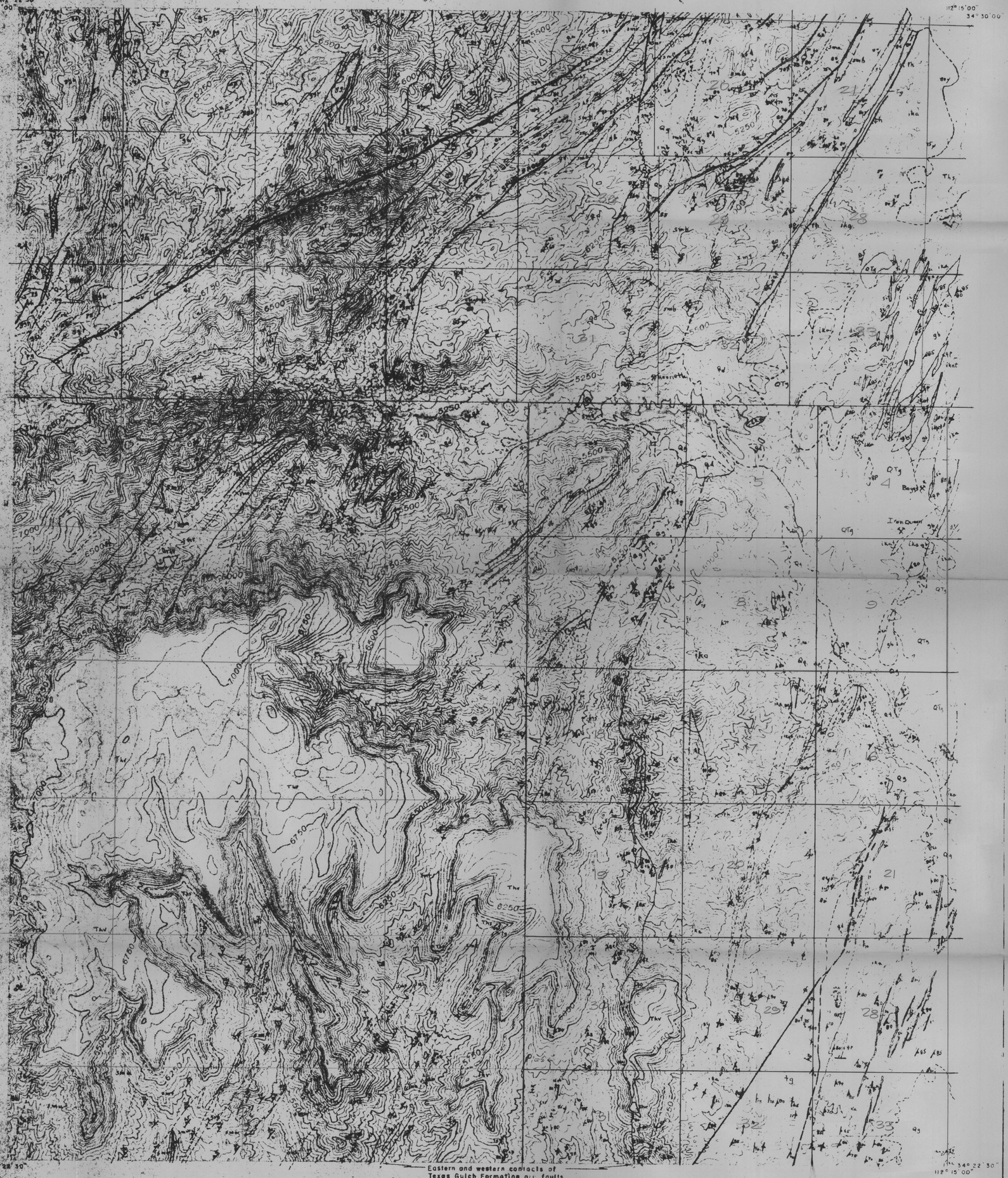
Percent Frequency Effect Map

Scale: 1"=500' April, 1963

PLATE 7

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

OPEN FILE REPORT



Geology by C. A. Anderson 1958-62 and P. M. Blacet, 1959, 1961

PRELIMINARY GEOLOGIC MAP OF THE NE 1/4 MOUNT UNION QUADRANGLE, YAVAPAI COUNTY, ARIZONA

By
C. A. Anderson and P. M. Blacet

APPROXIMATE MEAN DECLINATION, 1959

Scale 1:24000

Contour interval 50 feet
Datum is mean sea level

EXPLANATION

AGE UNKNOWN — TERTIARY — QUATERNARY

Pliocene (?) — Pleistocene — Recent

Qa — Terrace deposits

Qg — Reddish gravels

QTg — Gravels and sand

Tkv — Hickey Formation

Tkv, basalt flows
Tkg, conglomerate and sandstone

d — Diorite

rh — Rhyolite dikes

gdp — Granodiorite porphyry dikes

fg — Fine-grained granite

pg — Fine to medium-grained granodiorite

gg — Medium to coarse-grained granodiorite

qd — Quartz diorite

di / qm — Alaskite

qm, facies with fine-grained interstitial biotite

ap — Aplite

db — Diabase dikes

gb — Gabbro

gn — Gneissic granodiorite

qp — Quartz porphyry

ikat / ikc / ikv — Iron King Volcanics

ikat, tuffaceous andesitic sedimentary rocks
ikv, andesite and basalt flows
ikc, interbedded ferruginous chert and slate

OLDER PRECAMBRIAN

Yavapai Series

Alder Group

Spud Mountain Volcanics

smt — Upper unit

smt, fine-grained bedded andesitic tuffaceous sedimentary rock
ssr, interbedded rhyolitic tuff

sma, intercalated andesite and basalt flows
sms, undifferentiated

smb — Lower unit

smb, andesitic breccia and interbedded tuffaceous sedimentary rock
sma, intercalated andesite flows
ssr, interbeds of rhyolite tuff
sms, massive volcanic sandstone

ggb / ggr — Green Gulch Volcanics

ggb, basaltic flows
ggr, rhyolitic tuffs and flows(?)

tg — Texas Gulch Formation

Grey slate, banded rhyolitic sandstone, rhyolitic tuff, and interbedded conglomerate

PRODUCTS OF ALTERATION AND METALLIZATION

Qsig — Quartz lenses, pods, and veins

ss — Silicified and sericitized rocks

Contact
Dashed where approximately located

Fault
Dashed where approximately located

Minor folds and plunge of axis

80 — Strike and dip of beds

90 — Strike of vertical beds

80 — Strike and dip of foliation

Strike of vertical foliation

40 80 75 — Strike and dip of foliation and plunge of lineation

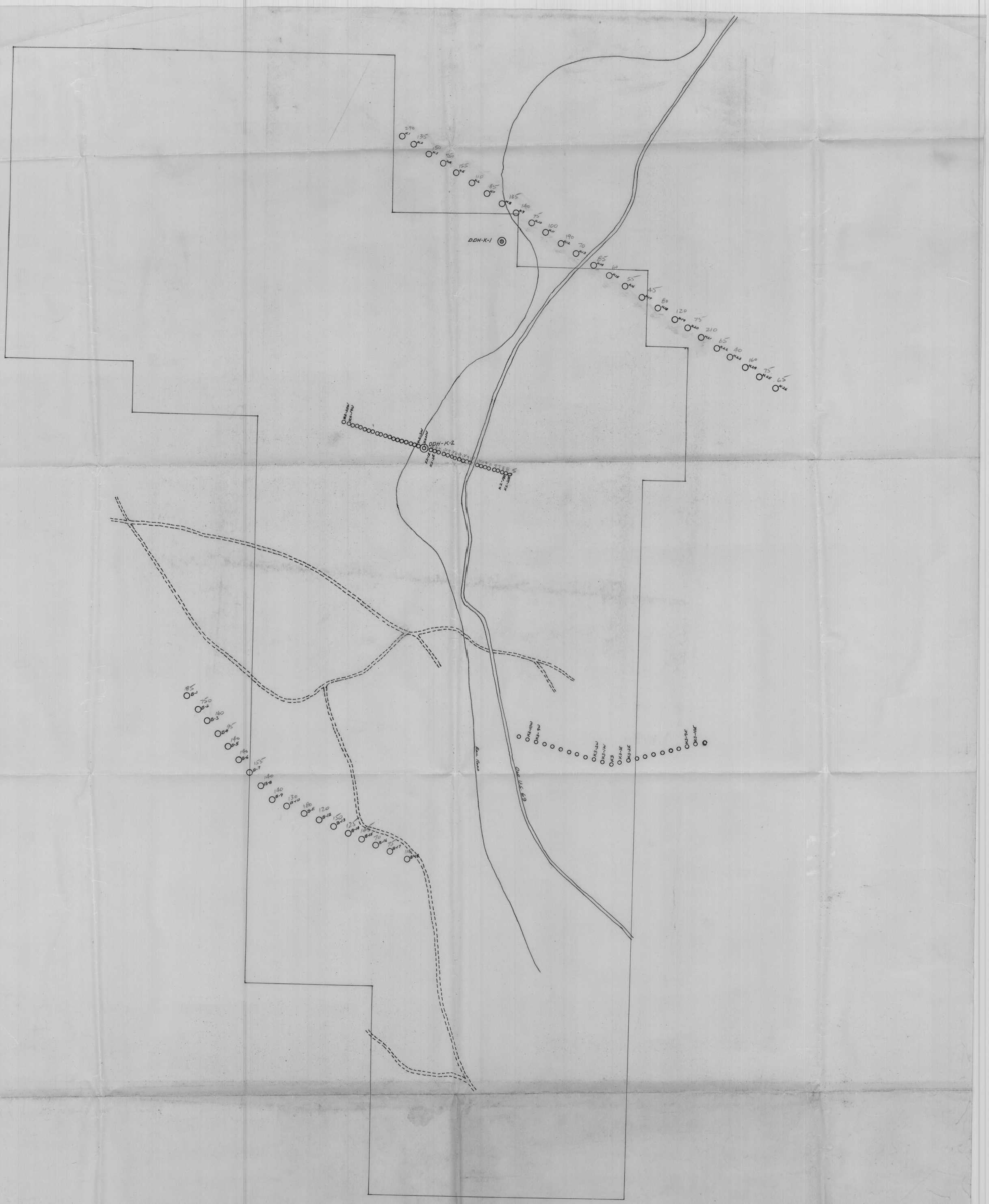
cb, intersection of cleavage and bedding

Approximate strike and top of pillow structure

Approximate strike of pillow structure

Mine

Prospect



GEOCHEMICAL SAMPLE LOCATION MAP

KATHY CLAIM GROUP

YAVAPAI COUNTY, ARIZONA

30 29 RIE 28 27

60W 50W 40W 30W 20W 10W 0 10E 20E 30E

T 13 N

31 33 34

6 5 4

T 12 N

7 8 9

29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

N

-90° 1500'

S 75°E, -45° 1500'

N 75°W, -50° 1500'

Bug

Kathy Group

LEGEND

- Above 30000γ
- 15000γ-30000γ
- 10000γ-15000γ
- 7000γ-10000γ
- 5000γ-7000γ
- 0γ-5000γ
- Below 0γ

- Magnetometer station
- Magnetometer station with value in gammas
- Vertical magnetic intensity contour
- 500γ contour
- (6a) Magnetic anomaly number
- Proposed diamond drill hole

Note: Pace survey.

Phelps Dodge Corporation
Geophysical Research and Exploration Department

KATHY PROJECT

Vertical Magnetic Intensity

Contour Interval: 500, 1000, & 5000γ

Scale: 1"=500' April, 1963

PLATE 5

GEOLOGIC MAP OF KATHY CLAIM GROUP – YAVAPAI COUNTY, ARIZONA

Scale 1" = 2000' March 1963

NOTE: Scale of this map is 1" = 500' — An enlargement of geology mapped at scale of 1" = 2000'

EXPLANATION

OLDER PRECAMBRIAN ROCKS (MAINLY SCHIST)

- Iron King Volcanics ika, ikat
- Spud Mountain Volcanics sma, smb, smt, smr
- Yavapai Series ca, cr
- Intrusive Rocks qd, qp, gb, db
- Iron Formation (abun. magnetite) fe

POST PRECAMBRIAN ROCKS

- Q — Alluvium and Slope Wash
- di — Diorite
- rh — rhyolite dike
- ◎ — Diamond drill hole
- Foliation
- Fault

MINERALIZATION

- qv — Quartz Veins and Lenses
- py — Pyrite
- cu — Copper (sulfide and oxide)
- ep — Epidote
- Road
- X — Prospect

PLATE 3

R I E

T 13 N

T 12 N

Area of possible fraction between Bug Claims & Patented Claims

GOPHER M.S. 69

GOLD QUARRY No.3 *

SILVERTON M.S. 1597

YANKEE GIRL M.S. 1597

AMERICAN FLAG M.S. 1597

HENRIETTA M.S.

HURON

STATE HIGHWAY 69 RIGHT OF WAY

Abandoned Railroad Bed

Power Line abandoned in this area

Gas Line

MTN. CHIEF No.1 *

MTN. CHIEF No.4 *

MTN. CHIEF No.3 *

MOUNTAIN CHIEF *

MTN. CHIEF No.2 *

MTN. CHIEF No.5 *

MONTEZUMA

EAGLE FRACTION

BRUSH FLAT

HURON No.2

SWINDLER

PRINCESS PLACER *

VICTOR

HURON No.1

MATTIE

Goswick Ranch Housing Area

Approx. Boundary

Loc.

ARKANSAS TRAVELER

Chiseled Rock

Substation

Drinen Ranch House

To Masse Ranch House

H.E.S. 62

H.E.S. 72

PAT. FEE SIMPLE

MASCOT

PROTECTION 12

BUTTER NUT

MARTIN

BOGGS

PUTNAM

LOGAN

IRON QUEEN

DAILY

PAT. FEE SIMPLE

STATE HIGHWAY 69 RIGHT OF WAY

Abandoned Rail Road Bed

Pits not dug

BUG 31 & 32 not located or surveyed

LODE CLAIM No.2 *

MARY COPPER

LODE CLAIM No.3 *

LODE CLAIM No.4 *

BUG 59	BUG 54	BUG 53
BUG 60	BUG 52	BUG 51
BUG 61	BUG 50	BUG 49
BUG 62	BUG 48	BUG 47
BUG 63	BUG 46	BUG 45
BUG 64	BUG 44	BUG 43
BUG 42 Amended	BUG 41	BUG 34
BUG 55	KATHY 2	KATHY 1 Amended
BUG 56	KATHY 4	KATHY 3
BUG 57	KATHY 6	KATHY 5
BUG 58	KATHY 8	KATHY 7
BUG 66	BUG 10	BUG 9
BUG 68	BUG 12	BUG 11
BUG 70 Amended	BUG 14	BUG 13 Amended
BUG 72	BUG 16	BUG 15
BUG 74	BUG 18	BUG 17
BUG 76	BUG 20	BUG 19
BUG 78	BUG 22	BUG 21
BUG 24		BUG 23
BUG 26		BUG 25
BUG 28		BUG 27
BUG 30		BUG 29

BUG 40	BUG 37
BUG 38	BUG 35
BUG 36	BUG 33

32 · 33 · 4 · 5 · 8 · 9

NOTE:

Roads are approximate only, &
Control for location known along surveyed claim lines only.
4" x 4" posts mark all corners of claims except where witness corners set.
□ Building
■ Corner located in field — brass cap
Railroad
Road
State Highway 69, Right of Way; Highway 50' wide in center of R/W
W.C. indicates identified witness corner post for claims
Patented Mining Claims taken from Land Office Plats
• Location Monument
* Unpatented Claim

Adverse claims:

Arkansas Traveler — by R. H. Kettner, Ellen Kettner, A. C. Forbis or Farbis 710 Delano St. (Prescott?)
Loc. Sept. 26, 1962
Rec. Sept. 28, 1962

Mary Copper — by R. D. Terrell, J. D. Baker
Lode Claim 1, 2, 3, 4
Rec. Bk. 213, p. 195
Loc. April 9, 1932

N

HEINRICHS GEOEXPLORATION COMPANY
P.O. Box 5671 Tucson, Arizona

Zn Geochem

KATHY - BUG CLAIM GROUP

FOR

PHELPS DODGE CORPORATION

YAVAPAI COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: E. G. H.	
DATE: Mar. 1963	SHEET OF	
DRAWN BY: I. b.	DRAWING NO.:	FILE:

Geochem

R I E

T 13 N

T 12 N

Pb - ppm

Area of possible fraction between Bug Claims & Patented Claims

GOPHER M.S. 69

GOLD QUARRY No. 3

HURON

SILVERTON M.S. 1597

YANKEE GIRL M.S. 1597

AMERICAN FLAG M.S. 1597

TRINITY M.S. 1597

HENRIETTA MILL SITE M.S. 1597

MTN. CHIEF No. 1*

MTN. CHIEF No. 4*

MTN. CHIEF No. 3*

MOUNTAIN CHIEF*

MTN. CHIEF No. 2*

MONTEZUMA

EAGLE FRACTION

BRUSH

HURON No. 2

PRINCESS PLACER*

VICTOR

HURON No. 1

SWINDLER

STATE HIGHWAY 69 RIGHT OF WAY

Abandoned Railroad Bed

Power Line abandoned in this area

Gas Line

Goswick Area

Post Boundary

Loc. ARKANSAS TRAVELER

Chiseled Rock W.C.

Substation

H.E.S 62

H.E.S 72

PAT. FEE SIMPLE

MATTIE

Drinen Ranch House

To Masse Ranch House

MASCOTT

PROTECTION 12

BUTTER NUT

MARTIN

BOGGS

PUTNAM

LOGAN

IRON QUEEN

DAILY

PAT FEE SIMPLE

STATE HIGHWAY 69 RIGHT OF WAY

Abandoned Rail Road Bed

Pits not dug. Claims surveyed but abandoned

BUG 31 & 32 not located or surveyed

LODE CLAIM No. 2*

MARY COPPER LODE CLAIM No. 3*

LODE CLAIM No. 4*

LODE CLAIM No. 5*

BUG 59 · BUG 54 · BUG 53

BUG 60 · BUG 52 · BUG 51

BUG 61 · BUG 50 · BUG 49

BUG 62 · BUG 48 · BUG 47 · BUG 40

BUG 63 · BUG 46 · BUG 45 · BUG 38 · BUG 37

BUG 64 · BUG 44 · BUG 43 · BUG 36 · BUG 35

BUG 42 Amended · BUG 41 · BUG 34 · BUG 33

KATHY 2 · KATHY 1 Amended

BUG 56 · KATHY 4 · KATHY 3

BUG 57 · KATHY 6 · KATHY 5

BUG 58 · KATHY 8 · KATHY 7

BUG 66 · BUG 10 · BUG 9

BUG 68 · BUG 12 · BUG 11

BUG 70 Amended · BUG 14 · BUG 13 Amended

PAT. FEE SIMPLE

BUG 72 · BUG 16 · BUG 15

BUG 74 · BUG 18 · BUG 17

BUG 76 · BUG 20 · BUG 19

BUG 78 · BUG 22 · BUG 21

BUG 24 · BUG 23

BUG 26 · BUG 25

BUG 28 · BUG 27

BUG 30 · BUG 29

32 · 33 · 5 · 4 · 8 · 9

(23.5) (22.5) (21.5) (21) (20.5) (19) (17) (15) (13)

NOTE:

Roads are approximate only, &

Control for location known along surveyed claim lines only.

4" x 4" posts mark all corners of claims except where witness corners set.

□ Building

■ Corner located in field — brass cap

Railroad

Road

State Highway 69, Right of Way; Highway 50' wide in center of R/W

W.C. indicates identified witness corner post for claims

Patented Mining Claims taken from Land Office Plats

• Location Monument

* Unpatented Claim

Adverse claims:

Arkansas Traveler — by R. H. Kettner, Ellen Kettner, A. C. Forbis or Farbis 710 Delano St. (Prescott?)
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Rec. Bk. 213, p. 195
Loc. April 9, 1932

N

HEINRICHS GEOEXPLORATION COMPANY
P.O. Box 5671 Tucson, Arizona

Pb Geochem

KATHY - BUG CLAIM GROUP

FOR

PHELPS DODGE CORPORATION

YAVAPAI COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: E. G. H.	
DATE: Mar. 1963	SHEET OF	
DRAWN BY: i. b.	DRAWING NO.:	FILE:

Geochem

RIE
T 13 N
T 12 N
32
33
4
5
8
9
16
17
GOPHER
SILVERTON
AMERICAN FLAG
YANKEE GIRL
HENRIETTA MILL SITE
GOLD QUARRY
MOUNTAIN CHIEF 1
MOUNTAIN CHIEF 2
MOUNTAIN CHIEF 3
MOUNTAIN CHIEF 4
MOUNTAIN CHIEF 5
MONTEZUMA
EAGLE FRACTION
PRINCESS PLACER
BRUSHY FLAT
IRON No. 2
HURON
HURON No.
VICTOR
KATHY 2
KATHY 3
KATHY 4
KATHY 5
KATHY 6
KATHY 7
KATHY 8
MASCOTT
PROTECTION
BUTTER NUT
HES 62 PAT 338408
PAT 675 05
MATTIE PAT 20584
R.No.1999.06
MARTIN
BOGGS
R.No.1999.05
PUTNAM
LOGAN
IRON QUEEN
DAILEY
DEMENO P.
IRON KING P.
HUBBARD P.
Report No. 1999.02
Report No. 1999.03
R.No.1999.04
R.No.1999.07
R.No.1999.08
R.No.1999.09
R.No.1999.10
R.No.1999.11
R.No.1999.12
R.No.1999.13
R.No.1999.14
Phx 0945 (200')
Phx 085908
Phx 085401 (100')
AR 0108 (200')
7/1898 (100')
11/18/53 (25')
Gosnick, George Giles
paper not set
" set
Sources of information
USBLM
State Land Dept
Yavapai County Assessor Office & Recorder Office
Phx 9999 (100') Power Line, BLM number & right of way dimension
Parcel number
Federal Power Authority Withdrawl Boundary
LOGAN Patent Mining Claim
Fee Simple
R.No.1999.07 Areas open to mineral entry
R.No.1999.11 Areas not open to mineral entry
Outline of anomalous areas
LAND OWNERSHIP
Parcel no. Name Address
1 ---- R. E. Sanders et ux 36. No. 47th Place, Phoenix, Ariz.
Marie P.
Sylvia J.
2 ---- Mrs. Amelia H. Hull R.F.D. Virden, Illinois
3 ---- Alviloa Gardner P.O. Box 1026 Brookings, Oregon
James Cerny
4 ---- Fred Gibbs
5 ---- Len Collins
6 ---- Pete & Myrtle Masse 5224 E. Double Tree Rd. Scottsdale, Ariz.
7 ---- Damon D. Whittaker
8 ---- Pepperdine College Los Angeles, Calif.
9 ---- Giles W. & Geo. & Pearl, Mayer, Arizona
Merle Goswick
10 ---- David S. Hall P.O. Box 385 Prescott, Ariz.
11 ---- 2/3 Ethel C. Edwards P.O. Box 231 Mayer, Ariz.
1/3 Elva V. Breckenridge P.O. Box 352 Prescott, Ariz.
12 ---- Prescott National Forest
HEINRICHS GEOEXPLORATION COMPANY
P.O. Box 5671 Tucson, Arizona
LAND STATUS MAP
YAVAPAI COUNTY ARIZONA
SCALE: 1" = 500
CONTOUR INTERVAL:
DATA BY: E G H
SHEET OF
DATE: DEC, 1962
DRAWN BY: I B & E G H
DRAWING NO.:
REVISIONS
FILE:
Field Survey Map

HEINRICHS GEOEXPLORATION COMPANY
P.O. Box 5671 Tucson, Arizona

KATHY CLAIM GROUP
LAND STATUS MAP
FOR

YAVAPAI COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	
DATE: Sept. 1962	SHEET OF	
DRAWN BY: I. B.	DRAWING NO.:	FILE:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE

PRESCOTT QUADRANGLE
ARIZONA—YAVAPAI CO.
15 MINUTE SERIES (TOPOGRAPHIC)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

ARIZONA
(YAVAPAI COUNTY)
MINGUS MOUNTAIN QUADRANGLE
15-MINUTE SERIES

Mapped by the U.S. Forest Service
Edited and published by the Geological Survey
Control by U.S. Forest Service, USGS and USC&GS
Topography from aerial photographs by KEK plotter
Aerial photographs taken 1946 Field check 1947
10,000-foot grid based on Arizona coordinate system, central zone
No distinction is made between dwellings, barns, commercial and industrial buildings.
Dashed land lines indicate approximate location

SCALE 1:62500

CONTOUR INTERVAL 50 FEET
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1947

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO OR WASHINGTON 25, D. C.

ROAD CLASSIFICATION

HARD-SURFACE ALL WEATHER ROADS	DRY WEATHER ROADS
Heavy-duty ____ 4 LANE OR 2 LANE	Improved dirt ____
Medium-duty ____ 4 LANE OR 2 LANE	Unimproved dirt =======
Loose-surface, graded, or narrow hard-surface _ _ _	

U. S. Route ◯ State Route

MT. UNION, ARIZ.
N3415—W11215/15

EDITION OF 1949

Mapped by the U.S. Forest Service
Edited and published by the Geological Survey
Control by U.S. Forest Service, USGS and USC&GS
Topography from aerial photographs by KEK plotter
Aerial photographs taken 1946. Field check 1947
Polyconic projection. 1927 North American datum
10,000-foot grid based on Arizona coordinate system, central zone
No distinction is made between dwellings, barns, commercial and industrial buildings.
Dashed land lines indicate approximate location

SCALE 1:62500

CONTOUR INTERVAL 50 FEET
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1947

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ROAD CLASSIFICATION

HARD-SURFACE ALL WEATHER ROADS	DRY WEATHER ROADS
Heavy-duty ____ 4 LANE OR 2 LANE	Improved dirt ____
Medium-duty ____ 4 LANE OR 2 LANE	Unimproved dirt =======
Loose-surface, graded, or narrow hard-surface _ _ _	

U. S. Route ◯ State Route

MAYER, ARIZ.
N3415—W11200/15

EDITION OF 1949

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 $\frac{1}{62,500}$ (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 $\frac{1}{62,500}$.

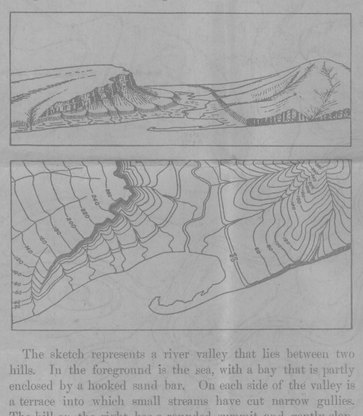
A survey of Puerto Rico is now in progress. The scale of the published maps is $\frac{1}{20,000}$.

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.

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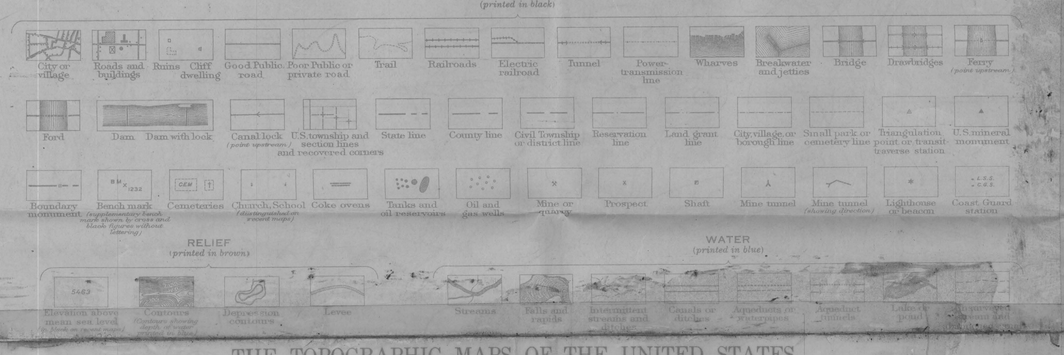
THE DIRECTOR,
United States Geological Survey,
Washington, D. C.

November 1937.

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.

STANDARD SYMBOLS



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 $\frac{1}{62,500}$ (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 $\frac{1}{62,500}$.

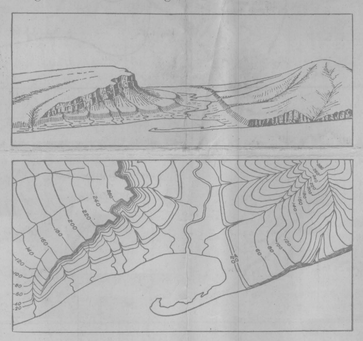
A survey of Puerto Rico is now in progress. The scale of the published maps is $\frac{1}{20,000}$.

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.

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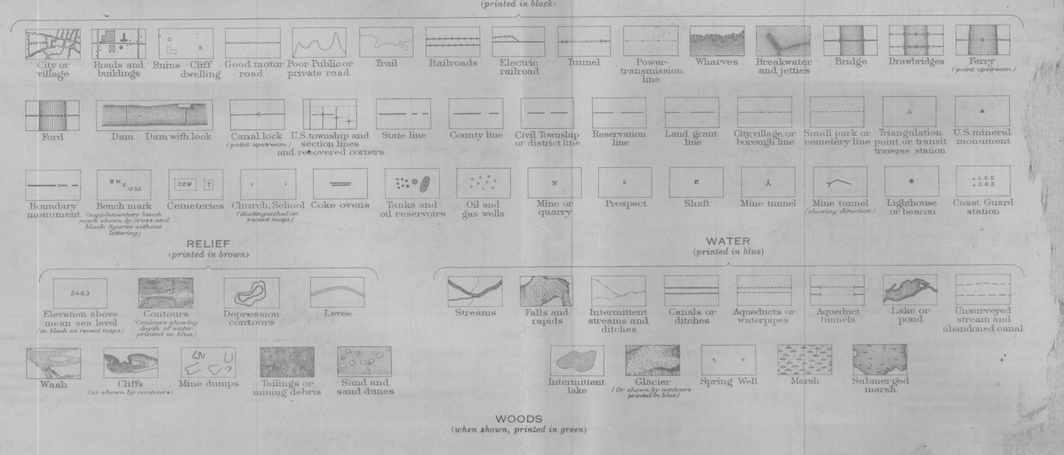


CLAIM MAP OF THE
BIG BUG MINING DISTRICT
YAVAPAI COUNTY ARIZONA

Scale 1 inch = 2000 feet

T. 13 N. R. 1 W.

T. 13 N. R. 1 E.

T. 12½ N. R. 1 W.

T. 12 N. R. 1 W.

T. 12 N. R. 1 E.

T. 11½ N. R. 1 E.

Gila and Salt River Meridian

Third Standard Parallel North

HUMBOLDT

McCabe

Chaparral Siding

Huron

Walker

Providence

Poland

Poland Jct.

MAYER

Bluebell Siding

Cordes Siding

Chaparral Gulch

Galena Gulch

Tronderoga Gulch

Eugenie Gulch

Big Bug Gulch

Poland Branch

Prescott & Eastern Railroad

Agua Fria Creek

Lynx Creek

Grapevine Gulch

Hackberry Creek

Cedar Canyon

U.S.M.M. No 1

U.S.M.M. No 2

U.S.M.M. No 3

U.S.L.M. No 1597

U.S.L.M. No 1538

U.S.L.M. No 1671

U.S.L.M. No 4-1245

U.S.L.M. No 1528

3-19-18

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE

PRESCOTT QUADRANGLE
ARIZONA—YAVAPAI CO.
15 MINUTE SERIES (TOPOGRAPHIC)

FLAGSTAFF 84 MI.
34 MI TO U.S. 66

(SIMMONS) (CLARKDALE)

112°30' 363 000m.E. R. 2 W. 25' (PAULDEN) R. 1 W. 20' 390 000 FEET R. 1 E. 112°15' 34°45'

T. 16 N. 3845 000m N.

1 360 000 FEET

PRESCOTT NAT'L FOR.

Chino Valley

CHINO VALLEY

Prescott South Base

Granite Siding

Granite Creek

WINDMILL

OLD HOPKINS MINE

Well

T. 15 N.

40'

Well

TELEPHONE LINE

ATCHISON TOPEKA AND SANTA FE

PRESCOTT MUNICIPAL AIRPORT

AIRWAY BEACON

RADIO DIRECTION FINDER

INNER LOOP

Granite

Agua Fria River

Coyote Wash

PRESCOTT MERIDIAN

JEROME 16 MI. FLAGSTAFF 73 MI.

SIMMONS 16 MI. (IRON SPRINGS)

WHIPPLE MILITARY RESERVATION

Willow Cr Reservoir

Granite Dells

Entro

Storm Ranch

Watson L

Reservoir

Willow Creek

Glassford Hill

Glassford

UPPER DAM

LOWER DAM

DOODLE BUG DIGGINGS

Lynx Creek

Fain Ranch

Clipper Wash

Yaeger

Yaeger Canyon

Fria River

SALT RIVER

GILA AND SALT RIVER MERIDIAN

T. 14 N. 35'

SKULL VALLEY 16 MI. IRONSPRINGS 4.5 MI.

Forbing Park

Miller Valley

WHIPPLE MILITARY RESERVATION

YAVAPAI IND RES

Whipple

PRESCOTT (BM 5355)

RADIO TOWER

Miller Cr

Butte

Aspen

Manzanita

Granite Basin Cr

Schoolhouse Spring

Barnum Cr

Government Can

Bendaro Cr

Light Salida Gulch

Charcoal Gulch

Green Gulch

Chaparral Gulch

PRESCOTT NATIONAL FOREST

IRON KING MINE

Reservoir

1 280 000 FEET

3819 000m N.

T. 13 N.

34°30' 112°30' 330 000 FEET R. 2 W. 25' (MT. UNION) R. 1 W. 20' R. 1 E. 384 000m E. 112°15' 34°30'

WILHOIT 13 MI.
PHOENIX (CIVIC CENTER) 110 MI.

(KIRKLAND) (MAYER)

(MINGUS MTN.)

DEWEY 0.8 MI.
PHOENIX (CIVIC CENTER) 83 MI.

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1959
MR 7261

Mapped by the U. S. Forest Service
Edited and published by the Geological Survey

Control by U. S. Forest Service, USGS, and USC & GS
Topography from aerial photographs by K E K plotter
Aerial photographs taken 1946. Field check 1947
Polyconic projection. 1927 North American datum
10000 foot grid based on Arizona coordinate system
Central Zone
Red tint indicates area in which only
landmark buildings are shown
Dashed land lines indicate approximate location
1000-meter Universal Transverse Mercator grid ticks,
zone 12, shown in blue

15° TRUE NORTH MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1947

SCALE 1:62500
1 0 1 2 3 4 MILES
3000 0 3000 6000 9000 12000 15000 18000 21000 FEET
1 .5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 50 FEET
DATUM IS MEAN SEA LEVEL

ARIZONA
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy-duty ——— Light-duty ———
Unimproved dirt - - - - - -
U. S. Route State Route

PRESCOTT, ARIZ.
N3430—W11215/15

1947

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D. C.
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

RIE

T 13 N

T 12 N

GOPHER M.S. 69

GOLD QUARRY No 3 *

HURON

Area of possible fraction between Bug Claims & Patented Claims

SILVERTON M.S. 1597

YANKEE GIRL M.S. 1597

AMERICAN FLAG M.S. 1597

TRINITY M.S. 1597

HENRIETTA MILL SITE M.S. 1597

BUG 59 · BUG 54 · BUG 53

BUG 60 · BUG 52 · BUG 51

BUG 61 · BUG 50 · BUG 49

BUG 62 · BUG 48 · BUG 47 · BUG 40

BUG 63 · BUG 46 · BUG 45 · BUG 38 · BUG 37

BUG 64 · BUG 44 · BUG 43 · BUG 36 · BUG 35

BUG 42 Amended · BUG 41 · BUG 34 · BUG 33

BUG 55 · KATHY 2 · KATHY 1 Amended

BUG 56 · KATHY 4 · KATHY 3

BUG 57 · KATHY 6 · KATHY 5

BUG 58 · KATHY 8 · KATHY 7

BUG 66 · BUG 10 · BUG 9

BUG 68 · BUG 12 · BUG 11

BUG 70 Amended · BUG 14 · BUG 13 Amended

BUG 72 · BUG 16 · BUG 15

BUG 74 · BUG 18 · BUG 17

BUG 76 · BUG 20 · BUG 19

BUG 78 · BUG 22 · BUG 21

BUG 24 · BUG 23

BUG 26 · BUG 25

BUG 28 · BUG 27

BUG 30 · BUG 29

BUG 31 & 32 not located or surveyed

32

33

5

4

8

9

MTN. CHIEF No.1 *

MTN. CHIEF No.4 *

MTN. CHIEF No.3 *

MOUNTAIN CHIEF *

MTN. CHIEF No.2 * SHAFT

MTN. CHIEF No.5 *

MONTEZUMA

EAGLE FRACTION

BRUSH FLAT

PRINCESS PLACER *

HURON No.2

SWINDLER

VICTOR BUG 65

HURON No.1

STATE HIGHWAY 69 RIGHT OF WAY

Abandoned Railroad Bed

Power Line abandoned in this area

Gas Line

no claim notice

Gaswick Ranch Housing Area

Approx. Boundary

Loc. ARKANSAS TRAVELER

Full of Garbage

no claim notice full of Garbage

Abandoned Homesite

MATTIE

W.C. Chiseled Rock

Substation

H.E.S. 62

H.E.S. 72

PAT. FEE SIMPLE

Drinen Ranch House

To Masse Ranch House

MASCOTT

PROTECTION 12

BUTTER NUT

PAT FEE SIMPLE

MARTIN

BOGGS

PUTNAM

LOGAN

IRON QUEEN

DAILY

PAT FEE SIMPLE

STATE HIGHWAY 69 RIGHT OF WAY

Abandoned Rail Road Bed

LODE CLAIM *

LODE CLAIM No.5 *

MARY COPPER

LODE CLAIM

LODE CLAIM No.2 *

LODE CLAIM No.3 *

LODE CLAIM No.4 *

Pits not dug. Claims surveyed but abandoned

NOTE:

Roads are approximate only, &

Control for location known along surveyed claim lines only.

4" X 4" posts mark all corners of claims except where witness corners set.

□ Building

■ Corner located in field — brass cap

Railroad

Road

State Highway 69, Right of Way; Highway 50' wide in center of R/W

W.C. indicates identified witness corner post for claims

Patented Mining Claims taken from Land Office Plats

• Location Monument

* Unpatented Claim

Adverse claims:

Arkansas Traveler
Loc. Sept. 26, 1962
Rec. Sept. 28, 1962
by R. H. Kettner
Ellen Kettner
A. C. Forbis or Farbis 710 Delano St. (Prescott?)

Mary Copper
Lode Claim 1, 2, 3, 4
Rec. Bk. 213, p. 195
Loc. April 9, 1932
by R. D. Terrell
J. D. Baker

Bug 66 Loc. 200' W. of E. Center

N

HEINRICHS GEOEXPLORATION COMPANY
P.O. Box 5671 Tucson, Arizona

KATHY-BUG CLAIM LOCATION GROUP

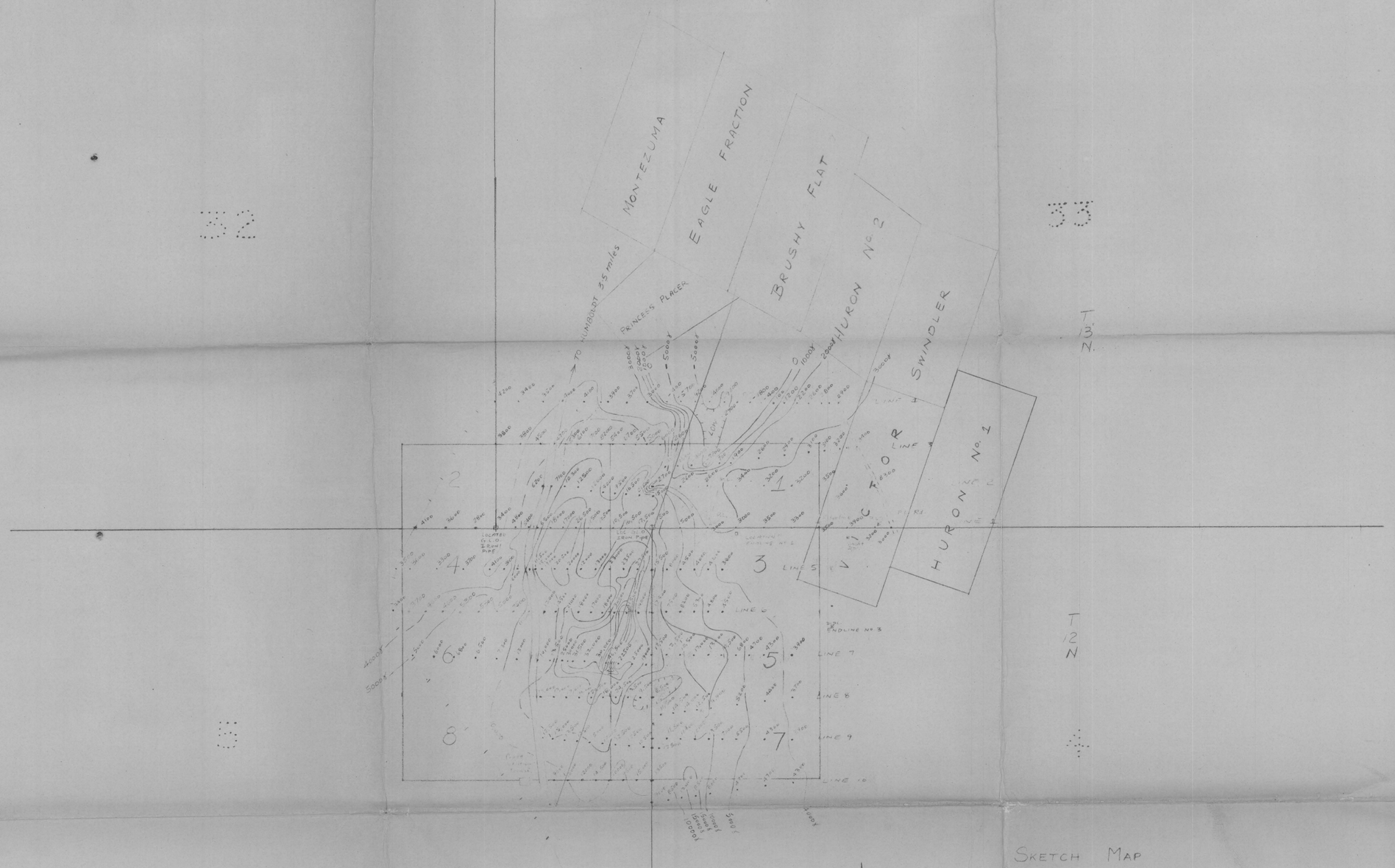
FOR

PHELPS DODGE CORPORATION

YAVAPAI COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: E. G. H.	
DATE: Mar. 1963	SHEET OF	
DRAWN BY: i. b.	DRAWING NO.:	FILE:

R I E



R.I.E.

Scale: 1" = 500

SKETCH MAP
MAGNETOMETER SURVEY
KATHY CLAIM GROUP
YAVAPAI COUNTY
ARIZONA

by

HEINRICHS GEOEXPLORATION CO
Sept. 30, 1961

ARUELA INST.
Pace Survey