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TOMBSTONE MINING DISTRICT
Cochise County, Arizona

State of Maine
Area of Interest

Austral Oil
Reports & Technical Data

1968

REPPERTON IP
SURVEY

601

APPENDIX A

REPORT ON THE
INDUCED POLARIZATION SURVEY
ON THE
AUSTRAL OIL CO. HOLDINGS, TOMBSTONE AREA
COCHISE COUNTY, ARIZONA

RECEIVED
APR 2 1969
JAMES STEWART COMPANY
PHOENIX, ARIZONA

602

REPORT ON THE INDUCED POLARIZATION SURVEY ON THE AUSTRAL OIL CO. HOLDINGS, TOMBSTONE AREA COCHISE COUNTY, ARIZONA

I

INTRODUCTION

At the request of Mr. Bill Lundby, representing Austral Oil Co., a reconnaissance induced polarization survey was conducted on the Austral Oil Co. holdings near Tombstone, Arizona. The property is situated several miles Southwest of Tombstone.

The induced polarization survey was attempted to assist in locating any zones of mineralization that might be present at depth.

II

PRESENTATION OF RESULTS

The induced polarization and resistivity results are shown on the following enclosed data plots.

Seven lines with a bearing of N 45° W were run using dipole spacings of five hundred (500) feet.

LINE NO. 1	500' electrode spacing
LINE NO. 2	500' electrode spacing
LINE NO. 3	500' electrode spacing
LINE NO. 4	500' electrode spacing
LINE NO. 5	500' electrode spacing
LINE NO. 6	500' electrode spacing
LINE NO. 7	500' electrode spacing

A plan map of the surveyed area is included to exhibit the orientation and spacing of the lines run.

III

DISCUSION OF RESULTS

The apparent resistivities measured during the reconnaissance survey are in most cases moderately low. All lines run exhibit that the area surveyed is structurally quite complex.

The percent frequency effect (PFE) values range from usually excepted background to marginally anomalous. The metallic conducting factor (MCF) values exhibit a range which one would expect to find unmineralized to disseminated sulfides in the subsurface structures.

LINE NO. 1, has three possible weakly anomalous zones which are near the areas of 0.5 N to 1.5 N, 1.5 S to 2.5 S and 4.5 S to 5.0 S.

LINE NO. 2, has possible near surface and deeper marginally anomalous zones between 0.5 S and 2.5 S.

LINE NO. 3 is in a higher resistivity area, however, lower resistivity zones in the region of 2.0 N to 2.5 N and 0.5 S to 1.0 S, offer the slim possibility of bedded mineralization.

LINE NO. 4, has a weakly anomalous area between 0.5 N and 1.5 N.

LINE NO. 5, has several possible weakly anomalous zones, from 4.0 N to 5.0 N, 1.5 N to 2.5 N and 0.5 S to 1.0 S.

LINE NO. 6, has two weakly anomalous areas, 4.5 N to 5.0 N and 0.0 NS to 0.5 S.

LINE NO. 7, is not too interesting except for a possible anomalous zone from 0.5 N to 1.0 N.

Since the induced polarization measurement is essentially an averaging process, as are all potential methods, it is frequently difficult to exactly pinpoint the source of an anomaly. Certainly, no anomaly can be located with more accuracy than the spread length; i.e. when using 500' spreads, the position of a narrow sulfide body can only be determined to lie between two stations 500' apart. In order to locate sources at greater depth, larger spreads must be used, with a corresponding increase in the

uncertainties of location. Therefore, while the center of the indicated anomaly probably corresponds fairly well with the source, the length of the indicated anomaly along the line should not be taken to represent the exact edges of the anomalous material.

It should be mentioned that a mineralized body having dimensions of less than 0.1 the dipole spacing of 500 feet could go undetected.

IV

CONCLUSIONS AND RECOMMENDATIONS

The reconnaissance induced polarization survey of this area indicates that zones of weak mineralization exist. A detailing of the weakly anomalous zones, using shorter dipole spacings, might prove advantageous if future drilling is being considered.

Respectfully submitted,

Nicholas H. Carouso

Nicholas H. Carouso 7-24-68

THE INDUCED POLARIZATION METHOD

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

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

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

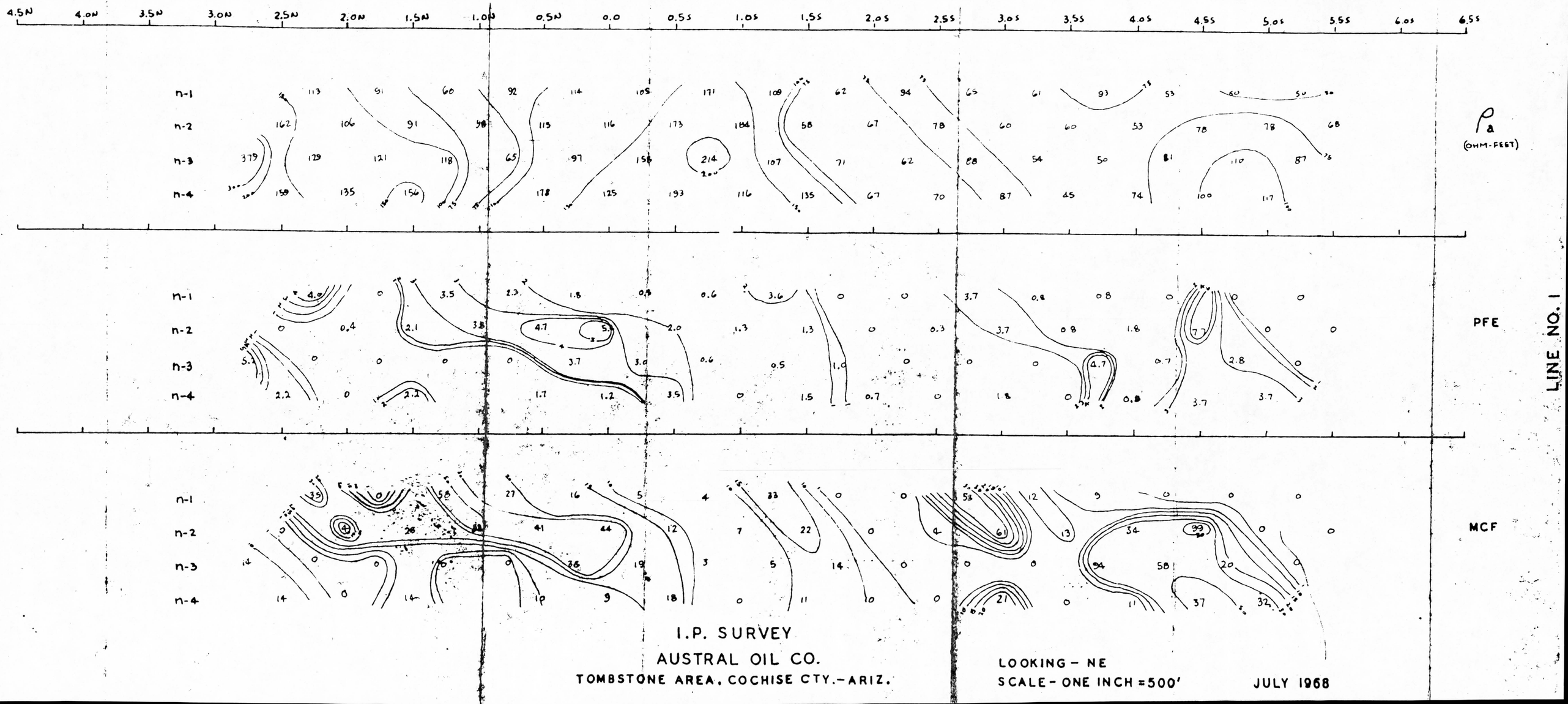
When the D. C. voltage used to create this D. C. current flow is cut off, the Coulomb forces between the charged ions forming the polarization cause them to return to their steady state. This movement of charge creates a small current flow which can be measured on the surface of the ground as a decaying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

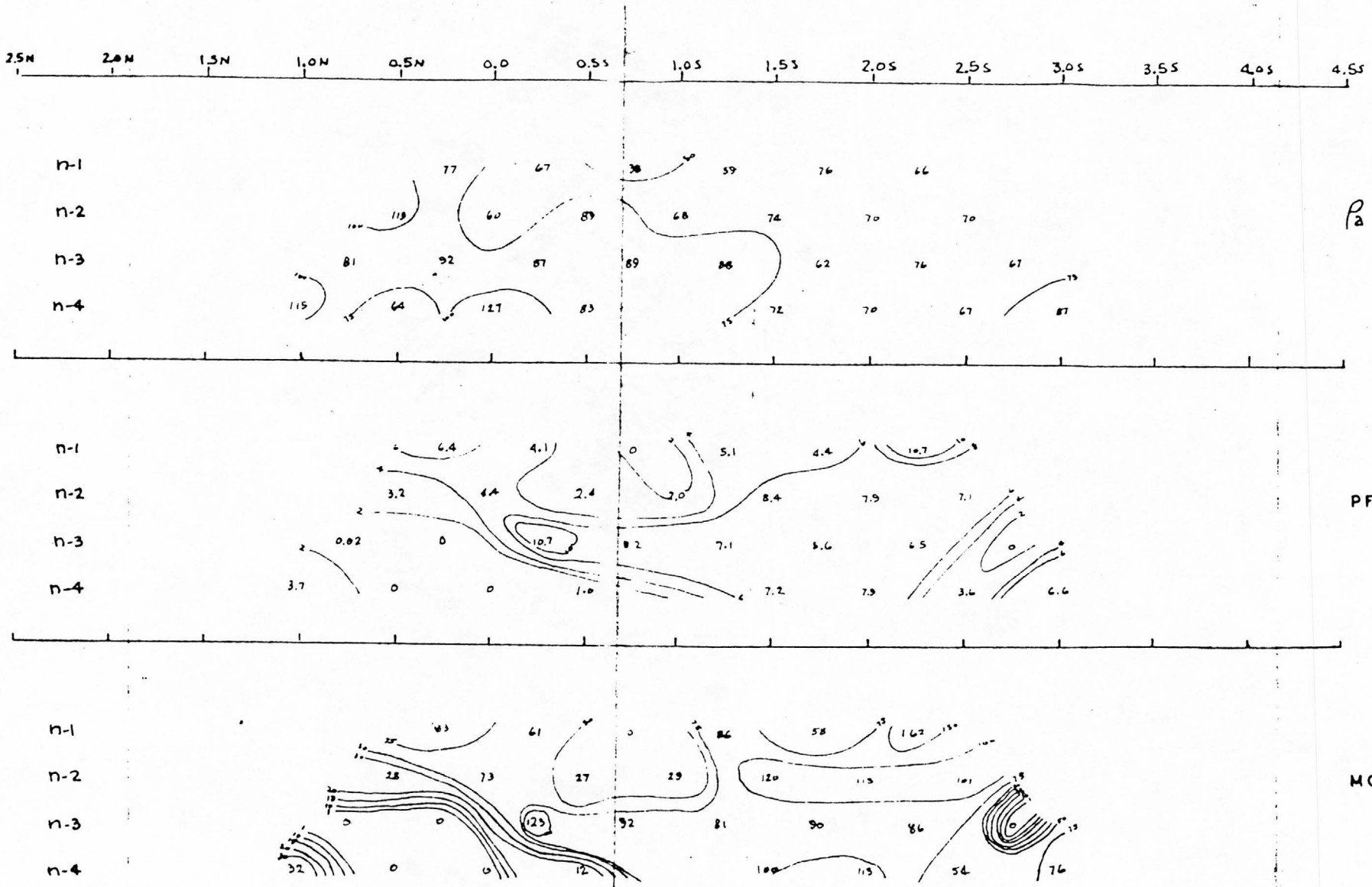
Now if the direction of the current through the system is reversed repeatedly before the polarization occurs, the effective resistivity of the system as a whole will change as the frequency of the switching is changed.

In this induced polarization reconnaissance survey, five equally spaced co-linear current electrodes were placed in the ground by

burying aluminum foil in pits wetted with brine. Observations were made in accordance with a symmetrical dipole-dipole configuration where the distance between the receiver or potential electrodes was kept equal to the distance between adjacent electrode pairs. Generally the receiving dipole is separated by one to six dipole units ("n" separation) from the sending dipole. A precisely controlled square wave current was sent through a sending dipole at 0.05 and 3.0 cycles per second from which, at the receiving dipole, a D. C. and an A. C. voltage was measured, respectively. By knowing the geometry involved (the dipole length or spacing and the separation distance between the two receiving-sending dipole pairs), along with the two voltages, an apparent D. C. and an A. C. resistivity was calculated. From these apparent resistivities, their percentage difference was determined, thus giving the Percent Frequency Effect (PFE). A third quantity proportional to PFE and inversely proportional to D. C. resistivity, called Metallic Conduction Factor (MCF) was computed in order to somewhat normalize PFE for variations in ground conductivity purely as a technical interpretational aid.

The IP technique was developed primarily for porphyry type deposits and is perhaps the only reliable means of detecting hidden disseminated sulfides. However, the IP method works just as well or perhaps better on semi-massive to massive sulfides, contrary to some of the earlier thinking, for it gives increased response with increased volume percentage of sulfides.


4.5N 4.0N 3.5N 3.0N 2.5N 2.0N 1.5N 1.0N 0.5N 0.0 0.5S 1.0S 1.5S 2.0S 2.5S 3.0S 3.5S 4.0S 4.5S 5.0S 5.5S 6.0S 6.5S
n-1
n-2
n-3
n-4
ρa
(OHM-FEET)
PFE
MCF
LINE NO. 1
I.P. SURVEY
AUSTRAL OIL CO.
TOMBSTONE AREA, COCHISE CTY.-ARIZ.
LOOKING - NE
SCALE - ONE INCH = 500'
JULY 1968



I.P. SURVEY

AUSTRAL OIL CO.

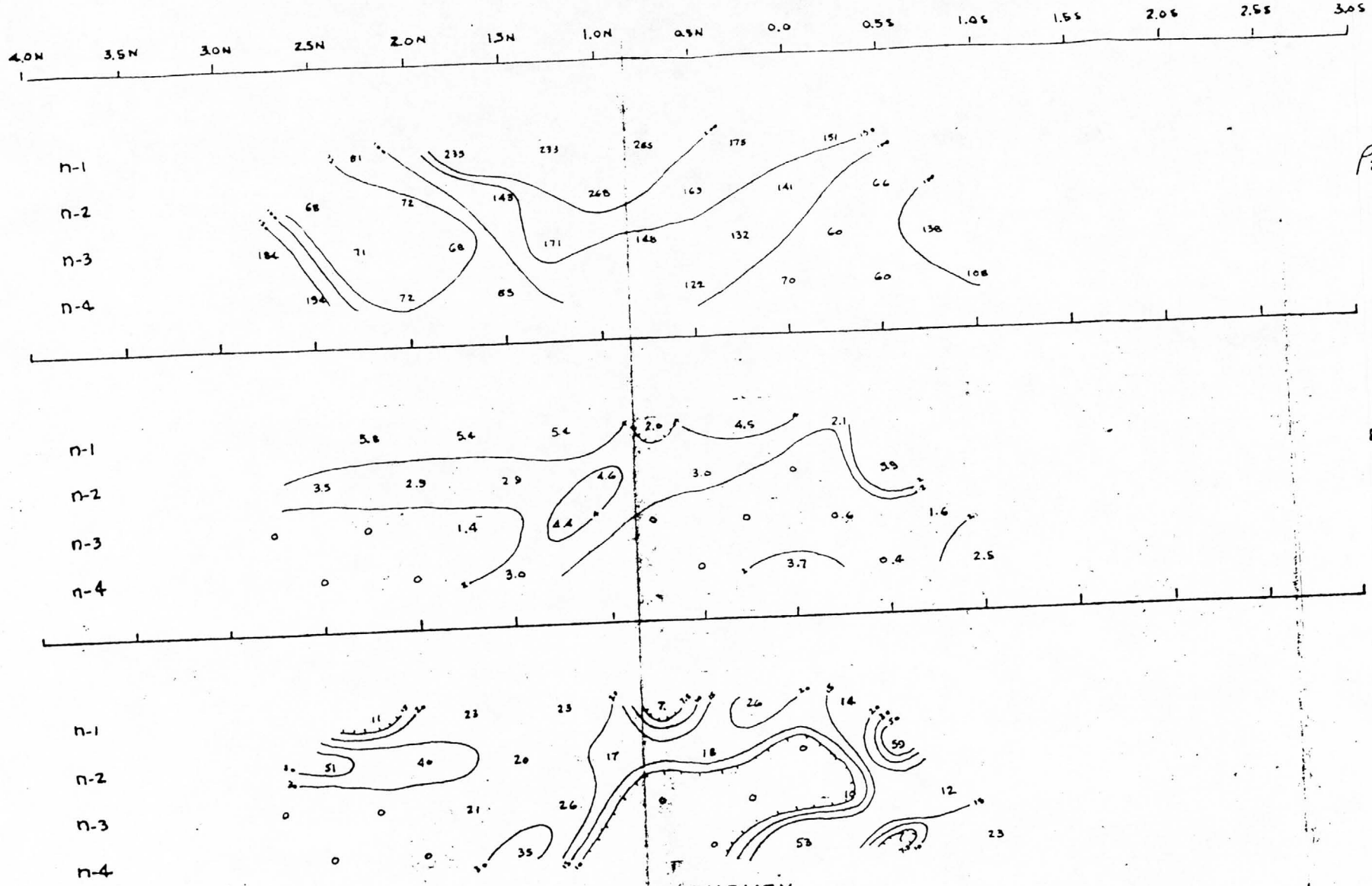
TOMBSTONE AREA, COCHISE CTY.-ARIZ.

LOOKING - NE

SCALE - ONE INCH = 500'

JULY 1968

LINE NO. 2



LINE NO. 3

I.P. SURVEY

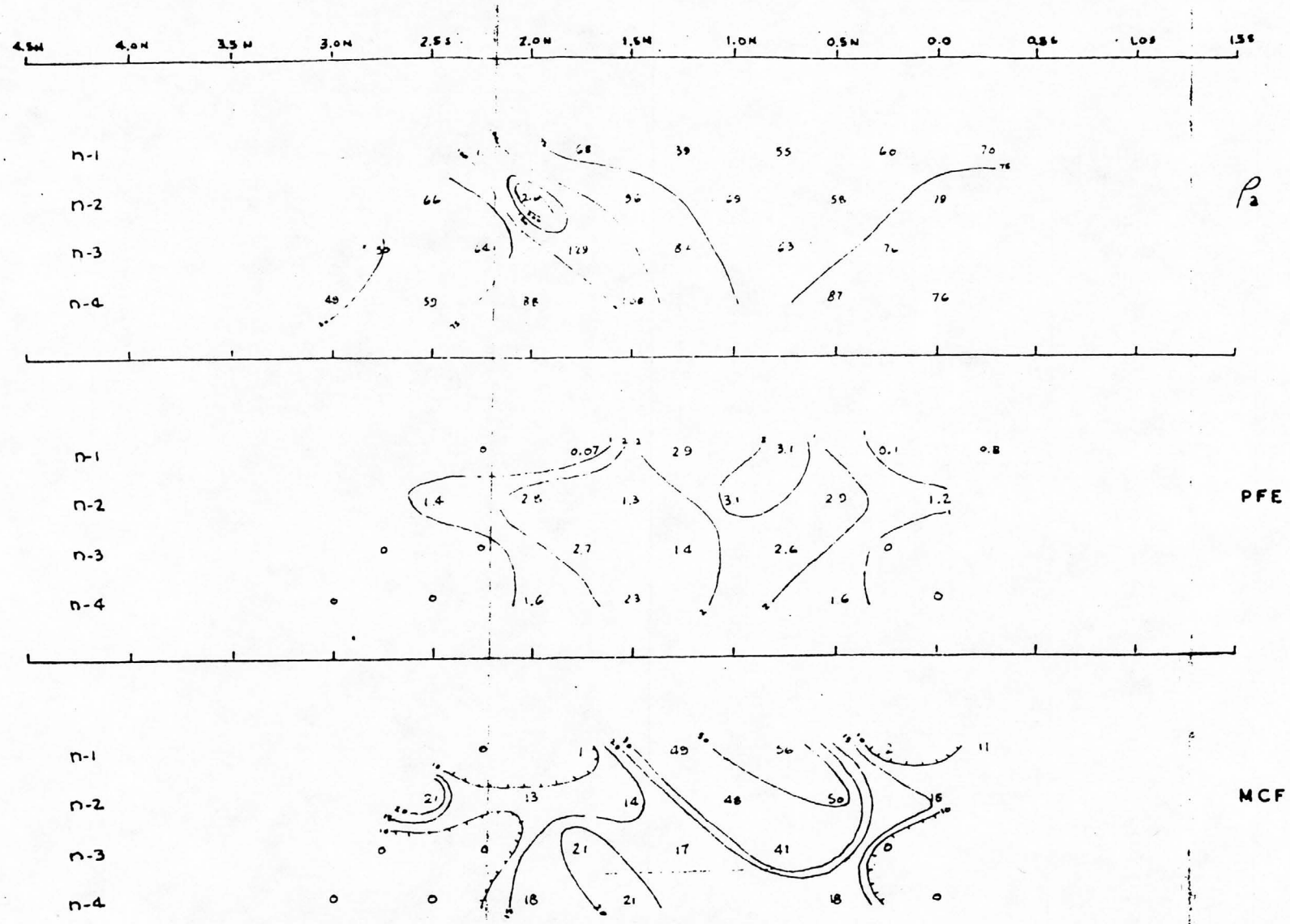
AUSTRAL OIL CO.

TOMBSTONE AREA. COCHISE CTY.- ARIZ.

LOOKING - NE

SCALE- ONE INCH = 500'

JULY 1968



I.P. SURVEY

AUSTRAL OIL CO.

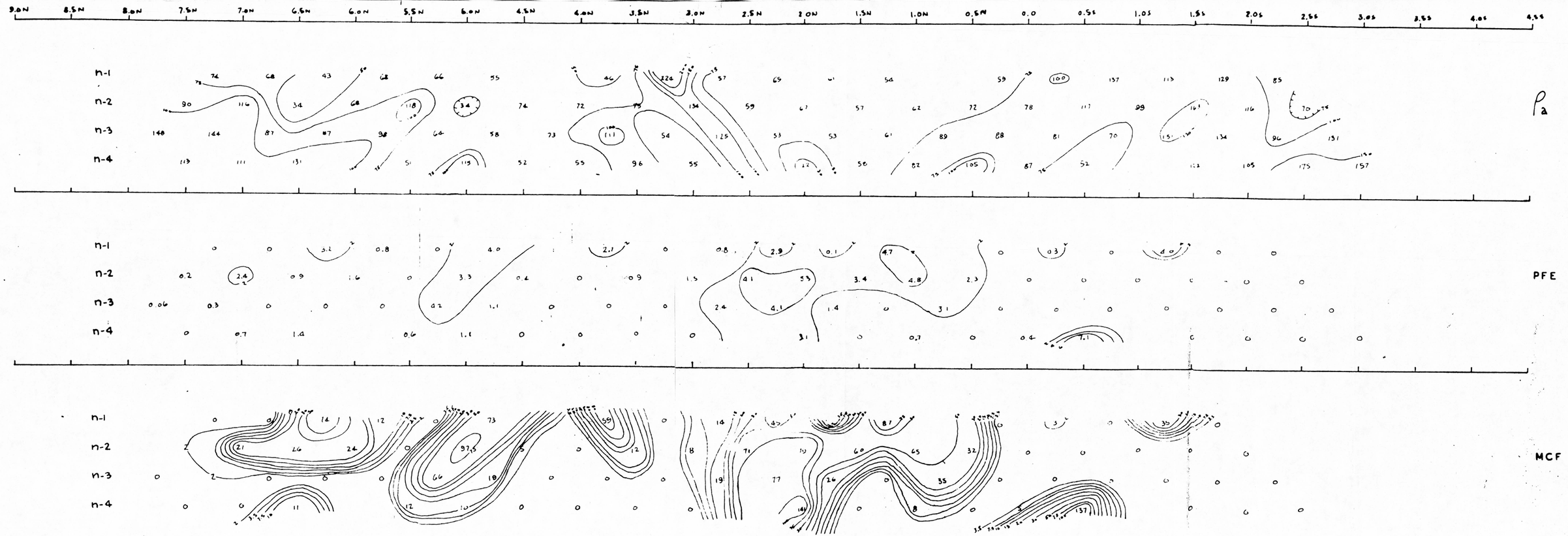
TOMBSTONE AREA, COCHISE CTY.- ARIZ.

LOOKING — NE

SCALE — ONE INCH = 500'

JULY 1968

LINE NO. 4

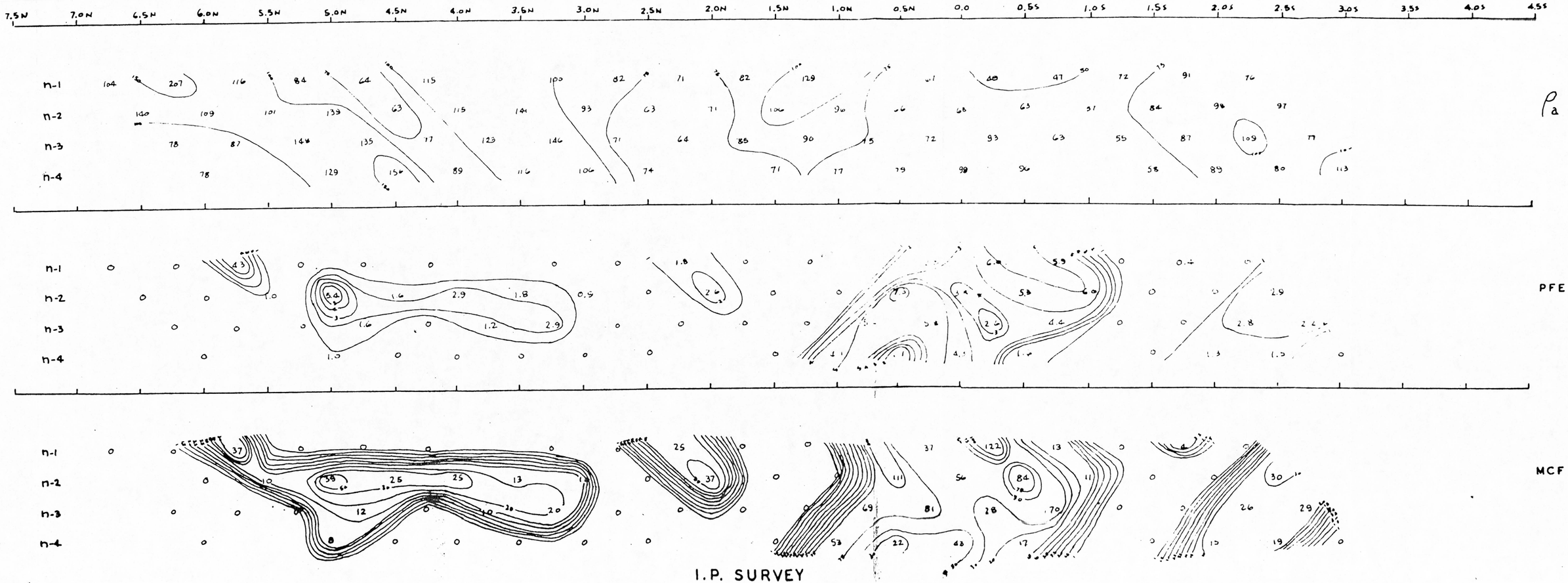


I.P. SURVEY

AUSTRAL OIL CO.

LOOKING - NE

TOMBSTONE AREA, COCHISE CTY., ARIZ.



LINE NO. 6

I.P. SURVEY

AUSTRAL OIL CO.

TOMBSTONE AREA, COCHISE CTY. - ARIZ.

LOOKING - NE

SCALE - ONE INCH = 500'

JULY 1968

METALLURGICAL
WORK

APPENDIX B

METCON LABORATORY

PROJECT CT-15

FOR

AUSTRAL OIL COMPANY

TOMBSTONE, ARIZONA

July 22, 1968

SUMMARY

Preliminary work only has been done, Due to misunderstanding no further work was carried on until Mr. Carouso came in during the first week in July and indicated the urgency. Since then additional work has been done, the results of which are not all available. Cyanide assays of pregnant liquor, obtained at a custom assay office failed to check expected results within credibility figures.

PROCEDURE

A large sample of ore (over a thousand pounds) from the Tombstone, Arizona area was delivered to METCON LABORATORY by the Austral Oil Company. This was thoroughly mixed by coning several times after which coning and quartering continued until a small enough sample was achieved for screen analysis and an aliquot portion for head assay.

RECEIVED
APR 2 1969
JAMES STEWART COMPANY
PHOENIX, ARIZONA

SCREEN ANALYSIS AND ASSAY OF SCREEN FRACTIONS

No.	SCREEN	WGT. %	ASSAY OZ/TON Au	ASSAY OZ/TON Ag	UNITS Au	UNITS Ag	% DISTRIBUTION Au	% DISTRIBUTION Ag
525	1.050	29.73	0.008	3.18	0.0024	0.945	35	29.8
526	0.742	10.10	0.010	3.21	0.0010	0.324	15	10.3
527	0.525	9.52	0.006	2.31	0.0006	0.220	9	6.9
528	0.371	8.08	0.008	2.35	0.0006	0.190	8	6.0
529	3 MESH	6.20	0.005	1.94	0.0003	0.120	4	3.8
530	4 "	5.11	0.004	2.18	0.0002	0.111	3	3.5
531	6 "	4.30	0.004	3.62	0.0002	0.156	3	4.9
532	10 "	4.87	0.004	3.84	0.0002	0.187	3	5.9
533	20 "	5.26	0.003	2.18	0.0002	0.115	3	3.6
534	35 "	4.35	0.008	4.53	0.0003	0.197	4	6.2
535.	48 "	1.71	0.005	6.28	0.0001	0.107	1	3.4
536	65 "	2.49	0.005	6.02	0.0001	0.150	1	4.7
537	100 "	1.36	0.004	6.27	0.0001	0.085	1	2.7
538	200 "	3.69	0.010	4.83	0.0004	0.178	6	5.6
539	-200 "	3.23	0.010	2.59	0.0003	0.084	4	2.7
	Calculated Screen Head				0.007	3.169		
	Actual Assay of Screen Feed				0.010	2.82		

Looking at the silver distribution in the screen analysis, it appears there is little to be gained by screening or classifying since the silver distribution follows the fraction weights very closely.

Three alkalinity checks were made to determine if acid generating minerals were in evidence.

TEST No. 1

200 grams of ore - minus 9 mesh

200 ml of water

Rolled for 1 hour Final pH 6.0

TEST No. 2

Same as above but with the addition of

2 grams CaO. Final pH 11.2

TEST No. 3

Same as above but with the addition

of 1 gram of CaO and rolled for

20 hours. Final pH 11.0

It appears that once sufficient lime has been added to raise the pH substantially on the alkaline side there is little degradation. Apparently there are not many sulfides available for creating acid.

646

Additional tests, Nos. 4 through 9 were completed to determine the protective alkalinity as follows:

400 grams of ore - each charge

0.645 grams of 77.5% available CaO (equal to 0.5 grams on a 100% basis)

1000 ml of water

	TIME ON ROLLS (HRS.)	MESH OF ORE	LIME TITRATION OF FINAL LIQUOR
4	1	-10	0.0050% CaO
5	2	-10	0.0060% "
6	3	-10	0.0055% "
7	4	-10	0.0050% "
8	1	-100	0.0030% "
9	4	-100	0.0030% "

The final liquor was titrated with 0.1 N HNO_3.

Four preliminary tests were run to compare mesh size with leach capabilities.

Make-up of each charge as follows (differing only in screen size):

500 grams of ore assaying Au 0.010 Ag 2.82

500 ml of water

5 grams CaO

1.885 grams NaCN (KCN equivalent to 0.5%)

All were rolled for 20 hours and tailing assayed.

SAMPLE No.	100 % MINUS SCREEN MESH	Au	Ag	% RECOVERY
603	9	Nil	0.73	74.12
604	20	"	0.64	77.31
605	35	"	0.60	78.73
606	48	"	0.52	81.57

No further gold assays will be obtained since obviously 100 % recovery of the gold is evidenced.

It could well be that finer grinds might be even more easily leached however in reducing to all minus 48 mesh in a mill a lot of very fine material would be created. In this test the samples were screened before each additional pass through the pulverizer (loose plates) so not too much in fines above the next smaller mesh screen could be created.

Cyanide consumption is not known at this point since the assay results were not credible. These will be rerun.

We will fabricate some laboratory size tanks for counter-current

leaching (probably of the pachuca type) and proceed with tank type leaching as soon as possible.

We are nearly set up to do our own assaying of Cyanide and available lime. Since this appears to be something the assay offices are not readily able to slot into their line-up, quite probably we can do a better job.

Registered Professional Engineer (Metallurgical)
CERTIFICATE NO. 6619
PHIL ALLEN
Date Signed 7/24/68
ARIZONA, U.S.A.

Phil Allen, Director
METCON Laboratory

PA/vi

GEOCHEM

Rocky Mountain Geochemical Corporation

2050 EAST 14TH STREET
TUCSON, ARIZONA 85719

Phone 622-5702
Area Code: 602

CERTIFICATE OF ANALYSES

Date September 20, 1969

Client Mr. William Lundby
225 West Flores
Tucson, Arizona

Colin - Grace

Report on: 55 Samples

Submitted by: William Lundby

Date Received: 9/10/69

Analysis: Molybdenum and Silver

Remarks: Molybdenum determined Colorimetrically; Silver determined by Atomic Absorption.

Job No. 69-21-10T

cc: Enclosed
RMGC-Salt Lake
file

AB:sh

All values are reported in parts per million unless specified otherwise. A minus sign (−) is to be read "less than" and a plus sign (+) "greater than." Values in parenthesis are estimates. This analytical report is the confidential property of the above mentioned client and for the protection of this client and ourselves we reserve the right to forbid publication or reproduction of this report or any part thereof without written permission.

ND = Non Detected 1 ppm = 0.0001% 1 Troy oz./ton = 34.28 ppm % Mo. x 1.6683 = %MoS_2

Sample No.	ppm Molybdenum	ppm Silver
1-0	1	-1
1-3N (S)	-1	-1
1-3S (S)	-1	-1
1-6N	-1	-1
1-6S (S)	-1	-1
1-9S (S)	-1	-1
1-12S (S)	-1	-1
1-15S (S)	1	-1
2-6N(S)	-1	-1
2-12N (S)	-1	-1
2-15S (S)	-1	-1
4-0	-1	-1
4-1	-1	-1
4-2	1	-1
4-3	1	-1
4-4	1	-1
4-5	-1	-1
4-6	-1	-1
4-7	-1	-1
4-8	-1	-1
4-9	1	-1
4-10	1	-1
5-0	1	-1
5-1	-1	-1
5-2	1	-1

Sample No.	ppm Molybdenum	ppm Silver
5-3	1	-1
5-4	-1	-1
5-5	-1	-1
5-6	-1	-1
5-7	1	-1
5-8	1	1
5-9	-1	-1
5-10	-1	-1
6-0	-1	-1
6-1	-1	-1
6-2	1	-1
6-3	-1	-1
6-4	-1	-1
6-5	-1	-1
6-6	-1	-1
6-7	-1	-1
6-8	-1	-1
6-9	1	-1
6-10	1	-1
7-0	-1	-1
7-1	-1	-1
7-2	-1	-1
7-3	-1	-1
7-4	-1	-1
7-5	-1	-1

Sample No.	ppm Molybdenum	ppm Silver
7-6	-1	-1
7-7	-1	-1
7-8	1	-1
7-9	-1	-1
7-10	-1	-1

ROCKY MOUNTAIN GEOCHEMICAL CORPORATION

Tucson, Arizona September 20, 1969

By Anita Bradshaw

Anita Bradshaw

SOIL & ROCK
GEOCHEM

ROCKY MOUNTAIN GEOCHEMICAL LABORATORIES

519 North Washington Ave. Phone: 445-4393

PRESCOTT, ARIZONA 86301

CHEMICAL ANALYSIS CERTIFICATE

Date May 11, 1968

Client Mr. William Lundby
Austral Oil Company
Box 695
Tombstone, Arizona

Submitted by W. Lundby

Date Received 5/2/68

Report on 28 Rock Chip & 213 Soil Pulp Samples

Analysis COPPER, SILVER

Remarks Atomic Absorption method used.

All results given in parts per million.
-5 is read "less than 5 part per million."
-¼ is read "less than ¼ part per million."

Pulps to be saved for at least six months.

SAMPLE NO.	COPPER	SILVER
GT-5-R	-5	-¼
GT-7-R	-5	-¼
GT-11-R	10	-¼

cc: Encl.
File

REGISTERED ASSAYER CERTIFICATE NO. 5847 EDWIN ADAM JOHNSON DATE Signed 5/11/68 ARIZONA, U.S.A.

All values are reported in parts per million unless specified otherwise. A minus sign (—) is to be read "less than" and a plus sign (+) "greater than." Values in parenthesis are estimates. This analytical report is the confidential property of the above mentioned client and for the protection of this client and ourselves we reserve the right to forbid publication or reproduction of this report or any part thereof without written permission.

(All results given in parts per million)

SAMPLE NO.	COPPER	SILVER
GT-14-R	5	-¼
GT-22-R	10	-¼
GT-26-R	170	½
GT-29-R	30	-¼
GT-41-R	5	-¼
GT-42-R	10	¼
GT-44-R	-5	½
GT-48-R	10	-¼
GT-54-R	10	-¼
GT-61-R	20	¼
GT-72-R	5	-¼
GT-81-R	10	-¼
GT-84-R	10	-¼
GT-103-R	5	-¼
GT-109-R	20	-¼
GT-121-R	10	-¼
GT-123-R	10	-¼
GT-140-R	20	¼
GT-170-R	30	¼
GT-188-R	15	-¼
GT-317-R	10	-¼
GT-321-R	15	-¼
GT-329-R	20	-¼
GT-330-R	5	-¼
GT-332-R	10	-¼

(All results given in parts per million)

SAMPLE NO.	COPPER	SILVER
GT-1-S	110	12½
GT-2-S	55	2-3/4
GT-3-S	40	3/4
GT-4-S	25	1¼
GT-5-S	25	¼
GT-6-S	40	1
GT-7-S	25	3/4
GT-8-S	45	1½
GT-9-S	45	5½
GT-10-S	40	1-3/4
GT-11-S	50	½
GT-12-S	50	½
GT-13-S	55	11
GT-14-S	40	1¼
GT-15-S	60	2
GT-16-S	30	1¼
GT-17-S	50	1¼
GT-18-S	50	1¼
GT-19-S	30	1-3/4
GT-20-S	370	200
GT-21-S	35	½
GT-22-S	70	2
GT-23-S	60	2
GT-24-S	40	½
GT-25-S	50	2-3/4

(All results given in parts per million)

SAMPLE NO.	COPPER	SILVER
GT-26-S	40	3-3/4
GT-27-S	55	½
GT-28-S	25	¼
GT-29-S	60	¼
GT-30-S	40	½
GT-31-S	40	3/4
GT-32-S	45	2-3/4
GT-33-S	40	½
GT-34-S	50	½
GT-35-S	40	½
GT-36-S	40	-¼
GT-37-S	40	¼
GT-38-S	40	3/4
GT-39-S	40	5½
GT-40-S	25	¼
GT-41-S	50	¼
GT-42-S	40	¼
GT-43-S	45	1¼
GT-45-S	60	4
GT-46-S	600	85
GT-47-S	105	7
GT-48-S	60	4
GT-49-S	65	1½
GT-50-S	55	3-3/4
GT-51-S	50	4
GT-52-S	45	½

(All results given in parts per million)

SAM PLE NO.	COPPER	SILVER
GT-53-S	45	1½
GT-55-S	40	¼
GT-56-S	50	½
GT-57-S	700	380
GT-58-S	45	1½
GT-59-S	70	3
GT-60-S	140	15
GT-62-S	45	-¼
GT-63-S	55	3/4
GT-64-S	40	¼
GT-65-S	60	¼
GT-66-S	55	¼
GT-67-S	60	½
GT-68-S	50	¼
GT-69-S	40	½
GT-70-S	50	2
GT-71-S	55	¼
GT-73-S	55	½
GT-74-S	70	2-3/4
GT-75-S	45	½
GT-76(A)-S *	70	3
GT-76(B)-S *	45	1¼
GT-77-S	35	-¼
GT-78-S	45	-¼
GT-79-S	40	-¼
GT-80-S	35	-¼

* These two duplicate numbered samples were marked (A), (B), by us.

(All results given in parts per million)

SAMPLE NO.	COPPER	SILVER
GT-82-S	40	$\frac{1}{4}$
GT-83-S	35	$\frac{1}{2}$
GT-85-S	240	22
GT-86-S	60	1
GT-87-S	50	$\frac{1}{2}$
GT-88-S	55	$-\frac{1}{4}$
GT-89-S	40	$\frac{1}{4}$
GT-90-S	45	$-\frac{1}{4}$
GT-91-S	45	$-\frac{1}{4}$
GT-92-S	40	$-\frac{1}{4}$
GT-93-S	50	$\frac{1}{4}$
GT-94-S	60	$-\frac{1}{4}$
GT-95-S	60	$\frac{1}{2}$
GT-96-S	65	$\frac{1}{4}$
GT-97-S	50	$\frac{1}{4}$
GT-98-S	40	$-\frac{1}{4}$
GT-99-S	45	$-\frac{1}{4}$
GT-100-S	75	$-\frac{1}{4}$
GT-101-S	40	$-\frac{1}{4}$
GT-102-S	55	$-\frac{1}{4}$
GT-103-S	45	$\frac{1}{4}$
GT-104-S	70	$-\frac{1}{4}$
GT-105-S	50	$-\frac{1}{4}$
GT-106-S	35	$-\frac{1}{4}$
GT-107-S	55	$-\frac{1}{4}$
GT-108-S	45	$-\frac{1}{4}$

(All results given in parts per million)

SAMPLE NO.	COPPER	SILVER
GT-109-S	45	-¼
GT-110-S	50	-¼
GT-111-S	55	½
GT-112-S	1300	210
GT-113-S	60	1
GT-114-S	40	-¼
GT-115-S	45	-¼
GT-116-S	50	-¼
GT-117-S	40	-¼
GT-118-S	65	-¼
GT-119-S	50	-¼
GT-120-S	45	16
GT-122-S	60	½
GT-124-S	40	-¼
GT-125-S	50	-¼
GT-126-S	50	1-3/4
GT-127-S	45	-¼
GT-128-S	40	-¼
GT-129-S	50	-¼
GT-130-S	65	-¼
GT-131-S	40	¼
GT-132-S	40	½
GT-133-S	50	-¼
GT-134-S	40	1
GT-135-S	160	65
GT-136-S	45	½
GT-137-S	50	¼

(All results given in parts per million.)

SAMPLE NO.	COPPER	SILVER
GT-138-S	50	½
GT-139-S	55	¼
GT-141-S	75	7
GT-142-S	45	-¼
GT-143-S	75	1¼
GT-144-S	55	¼
GT-145-S	55	-¼
GT-146-S	55	-¼
GT-147-S	65	2
GT-148-S	60	-¼
GT-149-S	50	-¼
GT-150-S	30	-¼
GT-151-S	45	½
GT-152-S	70	1¼
GT-153-S	20	¼
GT-154-S	40	-¼
GT-155-S	35	-¼
GT-156-S	30	-¼
GT-157-S	40	-¼
GT-158-S	40	-¼
GT-159-S	45	¼
GT-160-S	45	-¼
GT-161-S	30	-¼
GT-162-S	40	½
GT-163-S	35	-¼

(All results given in parts per million.)

SAMPLE NO.	COPPER	SILVER
GT-164-S	30	-¼
GT-165-S	40	-¼
GT-166-S	40	¼
GT-167-S	40	-¼
GT-168-S	30	-¼
GT-169-S	35	-¼
GT-171-S	55	½
GT-172-S	35	¼
GT-173-S	40	-¼
GT-174-S	30	-¼
GT-175-S	50	-¼
GT-176-S	40	-¼
GT-177-S	40	-¼
GT-178-S	45	¼
GT-179-S	50	2
GT-180-S	40	¼
GT-181-S	35	-¼
GT-182-S	40	¼
GT-183-S	35	-¼
GT-185-S	40	-¼
GT-186-S	110	4
GT-187-S	55	-¼
GT-189-S	20	-¼
GT-201-S	55	¼
GT-202-S	35	-¼

(All results given in parts per million.)

SAMPLE NO.	COPPER	SILVER
GT-300-S	50	$\frac{1}{4}$
GT-301-S	45	$\frac{1}{4}$
GT-302-S	40	$\frac{1}{4}$
GT-303-S	35	$-\frac{1}{4}$
GT-304-S	35	$-\frac{1}{4}$
GT-305-S	40	$-\frac{1}{4}$
GT-306-S	40	$-\frac{1}{4}$
GT-307-S	40	$-\frac{1}{4}$
GT-308-S	40	$-\frac{1}{4}$
GT-309-S	40	$\frac{1}{4}$
GT-310-S	35	$-\frac{1}{4}$
GT-311-S	45	$1\frac{1}{4}$
GT-312-S	60	$\frac{1}{4}$
GT-313-S	20	$-\frac{1}{4}$
GT-314-S	35	$-\frac{1}{4}$
GT-315-S	20	$-\frac{1}{4}$
GT-316-S	30	$-\frac{1}{4}$
GT-318-S	35	$-\frac{1}{4}$
GT-319-S	50	$-\frac{1}{4}$
GT-320-S	55	$-\frac{1}{4}$
GT-322-S	70	$-\frac{1}{4}$
GT-323-S	65	$\frac{1}{4}$
GT-324-S	45	$-\frac{1}{4}$
GT-325-S	35	$-\frac{1}{4}$
GT-326-S	65	$-\frac{1}{4}$

(All results given in parts per million.)

SAMPLE NO.	COPPER	SILVER
GT-327-S	40	$-\frac{1}{4}$
GT-328-S	40	$-\frac{1}{4}$
GT-331-S	60	$1\frac{1}{4}$
GT-333-S	35	$-\frac{1}{4}$
GT-334-S	35	$-\frac{1}{4}$
GT-335-S	55	$-\frac{1}{4}$
GT-336-S	40	$\frac{1}{4}$
GT-337-S	60	$\frac{1}{4}$

MISC #6
GEOPHYSICS

8840 Wrightstown Road
Tucson, Arizona
October 1, 1969

Mr. T. J. Colvin
Box 162
Tombstone, Arizona

Mr. W. W. Grace
Scottsdale, Arizona

Dear Tom and Bill:

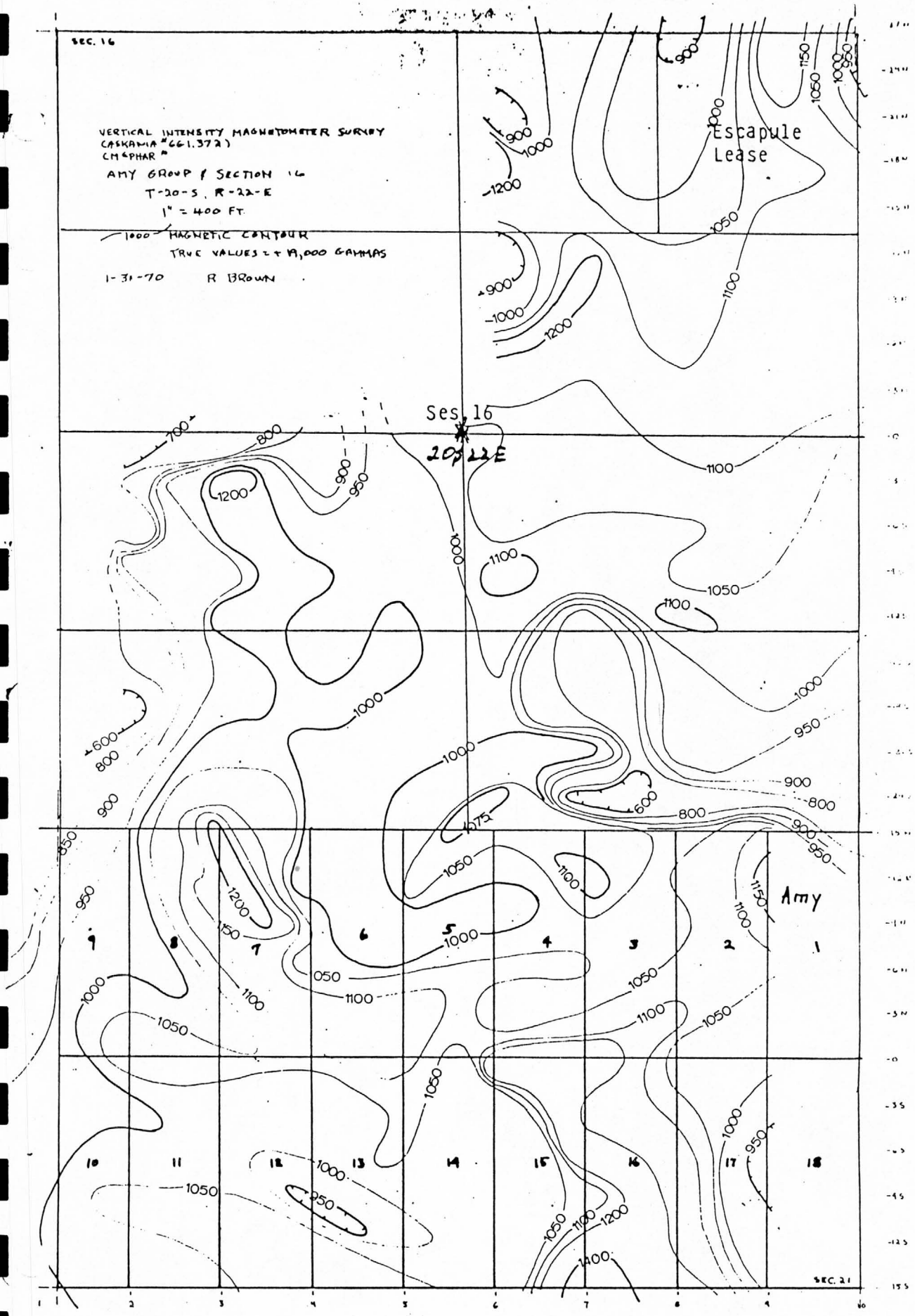
The magnetometer and geochemical surveys have been completed on the Amy group of claims near Tombstone, Arizona. As soon as I receive the recorded affidavit of labor from the county recorder's office I shall forward it to you.

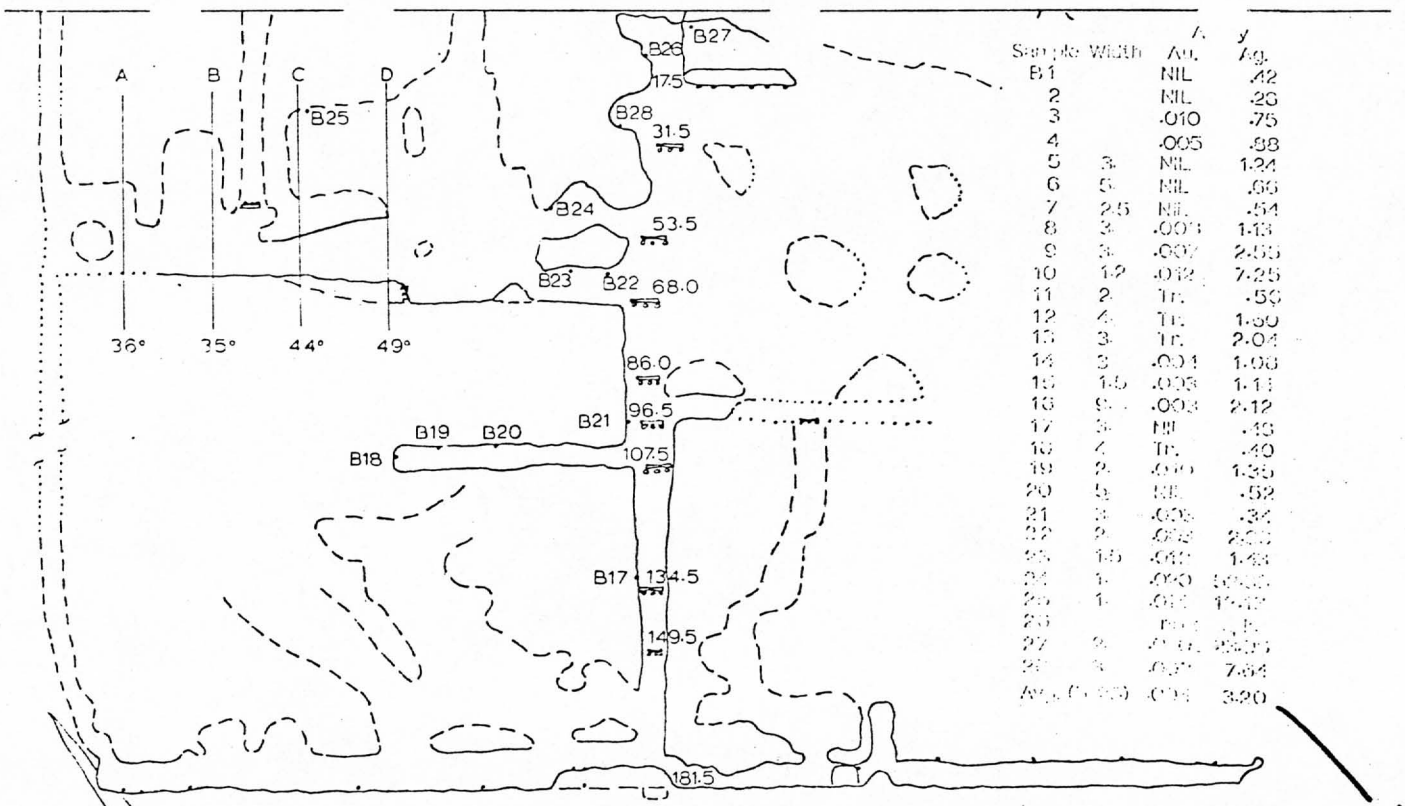
The main feature of interest delineated by the magnetic survey is an area of low magnetic susceptibility generally coincident with an anomalous IP (induced polarization) zone as determined by Nick Carouso. Because the main rock type is igneous (Uncle Sam Porphyry), low magnetic susceptibilities may indicate zones of alteration accompanying mineralization; in this case, this is probably a valid assumption, as proven by the sulphides encountered in the validation hole put down by Austral Oil Company. Of course only pyrite was drilled, but deepening of this hole would certainly be of prime importance to determine whether or not substantial silver values might occur along with the pyrite at depth. The area to be tested extends from the southeast corner of Amy #14 to the southwest corner of Amy #9, which would represent the approximate centerline of the anomalous zone; the zone appears to vary from 1,500 feet to 2,000 feet in width. Since the apparent dip of the IP anomaly (line #3) is to the north, initial drilling should be somewhere along line A-A' on the enclosed map, and preferably along the most pronounced portion of the low (Amy #12, #13, or #14).

The geochemical survey indicated extremely weak values in both silver and molybdenum. This does not detract from the property, however, because similar low values were obtained on the ground to the north and good ore was mined from the Chance-Bonanza and State of Maine mines.

Best regards,

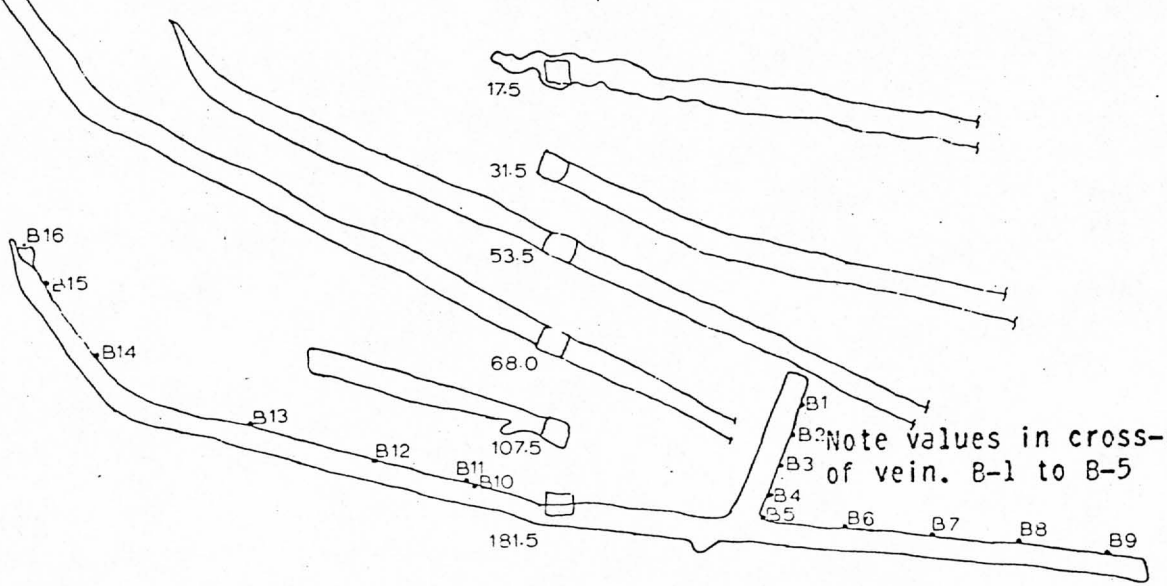
William Lundby
Geologist, Austral Oil Company Incorporated


SEC. 16
VERTICAL INTENSITY MAGNETOMETER SURVEY
CASKAMIA #661.3721
CM & PHAR
AMY GROUP / SECTION 16
T-20-S, R-22-E
1" = 400 FT.
1000 MAGNETIC CONTOUR
TRUE VALUES = + 19,000 GAMMAS
1-31-70 R BROWN
Escapule Lease
Ses. 16
20 S 22 E
Amy
SEC. 21
N



Sample	Width	Au.	Ag.
B1		NIL	.42
2		NIL	.28
3		.010	.75
4		.005	.88
5	3.	NIL	1.24
6	5.	NIL	.66
7	2.5	NIL	.54
8	3.	.008	1.13
9	3.	.007	2.55
10	1.2	.012	7.25
11	2.	Tr.	.56
12	4.	Tr.	1.60
13	3.	Tr.	2.04
14	3.	.004	1.08
15	1.5	.003	1.14
16	9.	.003	2.12
17	3.	NIL	.48
18	4.	Tr.	.40
19	2.	.010	1.35
20	5.	NIL	.52
21	3.	.003	.34
22	2.	.003	2.86
23	1.5	.012	1.43
24	1.	.020	52.38
25	1.	.014	12.13
26		no sample	
27	2.	.020	23.08
28	3.	.008	7.64
Avg. (1-25)		.004	3.20

Same



Note values in cross-cut, out of vein. B-1 to B-5

Sample	Width	Assay Au.	Assay Ag.
B1		NIL	.42
2		NIL	.28
3		.010	.75
4		.005	.88
5	3.	NIL	1.24
6	5.	NIL	.66
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9	3.	.007	2.55
10	1.2	.012	7.25
11	2.	Tr.	.56
12	4.	Tr.	1.60
13	3.	Tr.	2.04
14	3.	.004	1.08
15	1.5	.003	1.14
16	9.	.003	2.12
17	3.	NIL	.48
18	4.	Tr.	.40
19	2.	.010	1.35
20	5.	NIL	.52
21	3.	.003	.34
22	2.	.003	2.86
23	1.5	.012	1.43
24	1.	.020	52.38
25	1.	.014	12.13
26		no sample	
27	2.	.020	23.08
28	3.	.008	7.64

REPORT ON THE GRACE & COLVIN MINING PROPERTY

MAY 1, 1970

By: RICHARD D. BROWN
Consultant
Tucson, Arizona

-457-3865-

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2. MINING LAWS	2
3. TOMBSTONE PAST PRODUCTION	3
4. GEOLOGY OF THE AREA	4
5. SAMPLING RESULTS	5
6. GEOPHYSICAL INFORMATION	6
7. CONCLUSIONS AND RECOMMENDATIONS	6

APPENDED MATERIAL

LOCATION AND STATUS MAP

GEOLOGICAL MAP

INDUCED POLARIZATION REPORT & MAP by Nicholas H. Carouso

MAGNETOMETER MAP

ASSAY & LAB REPORTS

GENERAL INFORMATION

W. W. Grace and T. J. Colvin are the owners of approximately 800 acres of mining property consisting of 18 Federal unpatented claims, 420 acres of State Mineral Rights and one patented claim known as the "CHANCE". The property is located in Sections 16 and 21 in Township 21 South and Range 22 East, Cochise County, Arizona. The property is easly accessible by paved road and is two miles Southwest of Tombstone, Arizona on the road to Charleston.

The history of Tombstone mining is as exciting and colorful as the town itself, the reason for the town was because of the mines. Many books have been written about Tombstone, so I will leave that to the experts.

The region defined as the Tombstone Mining District is one of relatively moderate relief, the elevation at the San Pedro river, approximately nine miles to the south, is 3,900 feet. The country rises rapidly over a partially developed erosional sedimentary slope. Among the highest of the hills in the area is the Uncle Sam Hill with a summit of 4,831 feet, Mays Hill 5,727 feet, Military Hill 5,301 feet. The country is traversed by a system of washes and open passes which makes the ground easily accessable and all drainage is to the San Pedro River. The climate of the area is ideal, being mild winters and nice summers.

MINING LAWS

The purpose of these short paragraphs is to introduce to the reader a resume of the laws governing Federal as well as State Mineral Rights. Excerpts are taken from "Laws and Regulations Governing Mineral Rights in Arizona" by Victor H. Verity, 6th Addition, Revised June, 1965. Quote " the intent of of the mining laws and the leasing acts, both State and Federal, is the development of the mineral resources on public domain and State land. The law and the public sentiment are on the side of the bona fide mining locator who stakes a claim with serious intention of prospecting for minerals. The

best way to demonstrate this good faith is to properly locate the claims and to maintain and work it in full accordance with all legal requirements."

WHO MAY LOCATE

"Any citizen of the United States, or anyone who has declared his intention to become a citizen, an association of citizens or a qualified corporation may locate a mining claim upon public domain of the United States." " The statutes of Arizona provide that a mining claim may be located upon State land by any citizen of the United States, partnership, association or corporation organized under the laws of the United States or any State or Territory thereof." "There is no limitation on the number of mining locations that can be made by a qualified locator on Federal or State lands within Arizona."

To carry the information further in this discussion would defeat the purpose for which these paragraphs are intended. It is therefore recommended that any further broadening of scope be carried on by consulting the applicable laws - both Federal and State. A simple field guide is published under the Department of Mineral Resources, State of Arizona, titled "Laws and Regulations Governing Mineral Roghts in Arizona" by Victor H. Verity.

TOMBSTONE PAST PRODUCTION

Extracted from MELLGREN REPORT by C. J. Sarle, PhD.

"When an analysis of production is made, on the output of mines in the Western Area, where several millions of dollars has been produced in high grade ores, with no attention being paid to the low grade milling ores, and this taken in connection with the magnitude of the mineralization area, containing virgin and unblocked ore bodies, it becomes one of the most attractive commercial mining propositions possible."

"The Eastern Area which has had proper financing for development of mining has yielded $79,000,000.00." The Western Area of which Grace & Colvin property covers a substantial part and without proper financing and

equipment, has yielded the past owners approximately $6,000,000.00 bringing the total past production in the Tombstone District to about $ 85,000,000.00 based on 1928 figures of $1.00 per ounce for silver and $20.67 per ounce for gold.

GEOLOGY

Geologically, Section 21 is fairly simple: A sill-like mass of intrusive Uncle Sam Porphry (Tertiary quartz latite) has intruded the Cretaceous Bisbee formation which consist of mudstone and sandstone quartzite with a few thin beds of limestone.

Because the geophysical (IP) and Magnetic anomalies are probably caused by alteration and mineralization of the Uncle Sam Porphyry, it is probable that these features will be stronger in the underlying Bisbee formation and chances for an economic deposit are good.

A vertical intensity magnetometer survey of all State land in sections 16 & 21, T20S, R22E (held by Grace & Colvin) was made using a McPhar vertical intensity flux-gate magnetometer (No.6513). The vertical intensity at the base station was 19,950 gammas (absolute).

Three areas of interest can be seen on the magnetic map:

(1) The area of low magnetic intensity approximately centered in Federal claims, Amy #12 & #13. The relatively low readings (950 gammas, based on 1,000 gammas at base station) cover an area about 600 feet wide and 2,000 feet long. This area ties in with the previous work; an I.P. survey showed sulphides at depth and a hole at the east end of the anomaly encountered sulphides at depth. This evidence points toward a large disseminated mass of sulphides.

(2) The second area of interest is at the northwest corner of section 21 and the southwest corner of section 16. Here, the magnetic lows, which are elongate for 4,000 feet are definately along the north-north easterly trending lineament seen on aerial photos. Also visible on the photos are cross faulting

and shearing leading into this area. Previous I.P. work has delineated definate metallic anomalies along this strike and the area should not be overlooked.

(3) Another area of interest lies just north of Amy #3, in Section 16, and is an anomalous magnetic low also, apparently accociated with a northeasterly trending fault; this fault (and vein) has been worked at the north end in past years.

All in all, there are two major anomalies which should be explored and a minor one along the fault zone north of Amy #3. Therefore, it is my recommendation that a drilling program should be initiated to check out the possibility of silver in the anomalous lineament and copper-silver in the broad, magnetically low zone.

SAMPLING

A comprehensive study of the ground held by Grace and Colvin was made. This work invloved a chemical survey of the area, sampling and assaying of the dumps and drilling and assaying of the core and cuttings, the results of this study is as follows: (Metcon Report) (Appended Material)

Additional geo-chemical sampling was performed at a later date on the north 1/2 of Section 21, (Amy Claims), the results drawn there were inconclusive, and no additional work of this nature was made. The assay report is included in the Appended Material.

Underground sampling was performed in an area just north of the "Chance" claim on the Bonanza vein by the writer while employed for Austral Oil Co., the results of the sampling and a map are included in the Appended Material.

INDUCED POLARAZATION INFORMATION

Mr. Bill Lundby, geologist for Austral Oil Co. instructed Mr. Nicholas H. Carouso, Consultant, to undertake a study of the area, part of which is the Grace and Colvin property, the results of that study is included with

the Appended Material.

Mr. C. T. Henderson, a part owner of the ground to the south of the Amy (Grace & Colvin) claims, also requested Mr. Carouso to undertake an induced polarization survey of their ground, since the lines run, cover a portion of the ground held by Grace and Colvin, that report is also included in the Appended Material.

GEOPHYSICAL INFORMATION

The fundamental principals of magnetics and the background of the magnetics method of geophysical prospecting has much in common with that of the gravitation method. Both are "potential" methods, having their fundamentals in potential theory. Just as the gravitational force in a given direction is the derivative, or rate of change, in that direction of the gravitational potential, so also the magnetic force in a given direction is the derivative in that direction of the magnetic potential.

CONCLUSIONS AND RECOMMENDATIONS

Because of the vast store of information that has been collected, concerning the property of Grace and Colvin, I feel extremely justified in making a recommendation of one of "proceed with haste, but deligently". These are some of the conclusions I have drawn. Geologic speaking, it goes without saying the "Tombstone District" has been one of the best producers of silver in the nation and I know the wealth to be extracted yet from this area makes the Grace and Colvin holdings one of the most promising in the state.

From a Geophysical sense of the word, it has been demonstrated by Carouso in his I.P. surveys, definite anomalous zones of metalics. These metalics being mostly iron pyrites but never the less are indictive of a large disseminated sulphide body.(See magnetic report, attached) In the work carried out by the author (magnetics) it also has been demonstrated the magnetics and

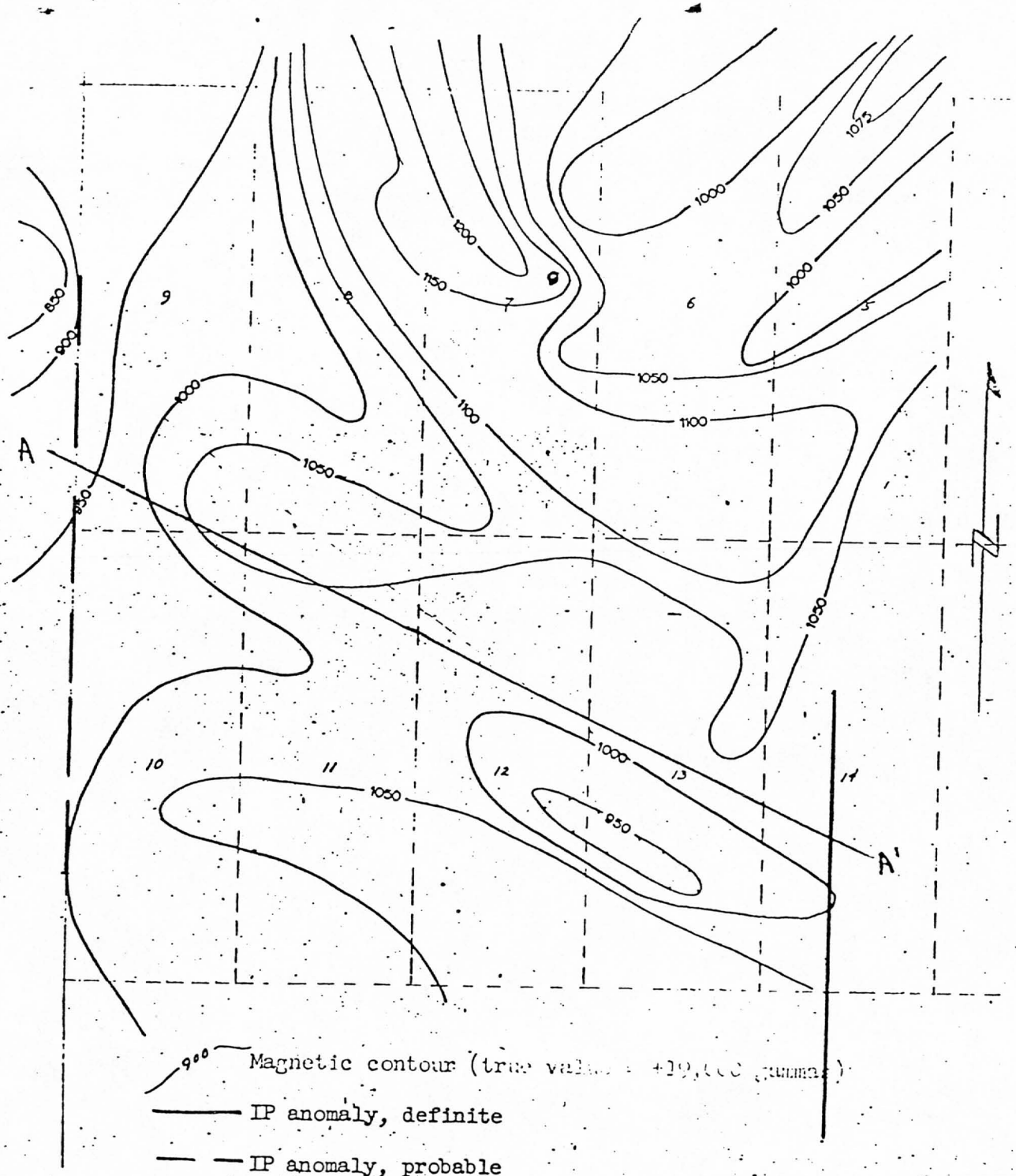
I.P. results are co-incident. This leads to the conclusion that both sets of results ie. (Magnetics & I.P.) are valid sense one has been checked against the other.

It is the writers professional opinion that the Grace & Colvin holdings offer excellent oppertunities because of its combination of favorable features.

(a) Past production with similar paragenesis
(b) Magnetics and I.P. results delineate potential ore zones
(c) Residual silver ore of mineable grades

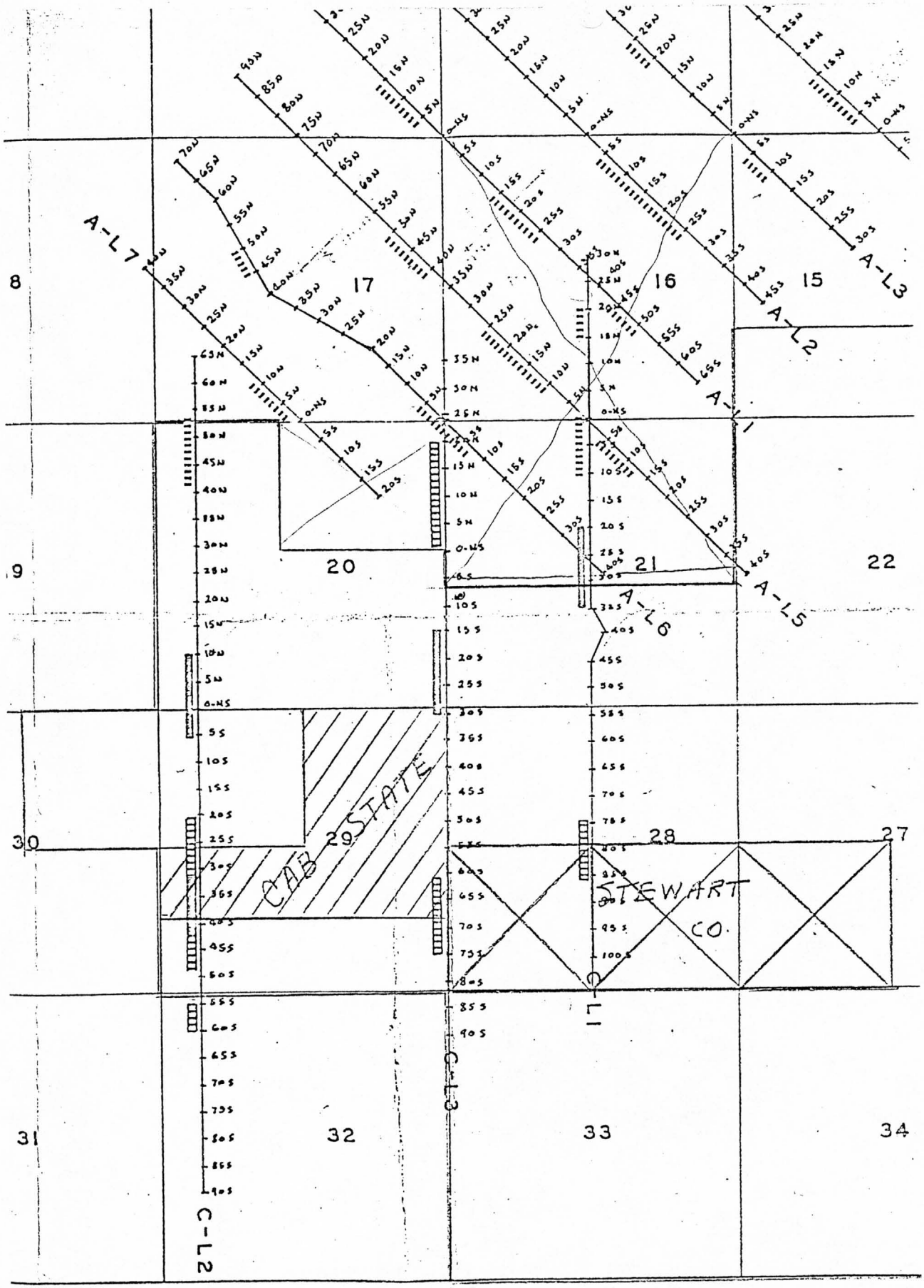
Respectfully submitted

Richard D. Brown
Consultant



VERTICAL INTENSITY MAGNETOMETER SURVEY
(Askania #661,372)

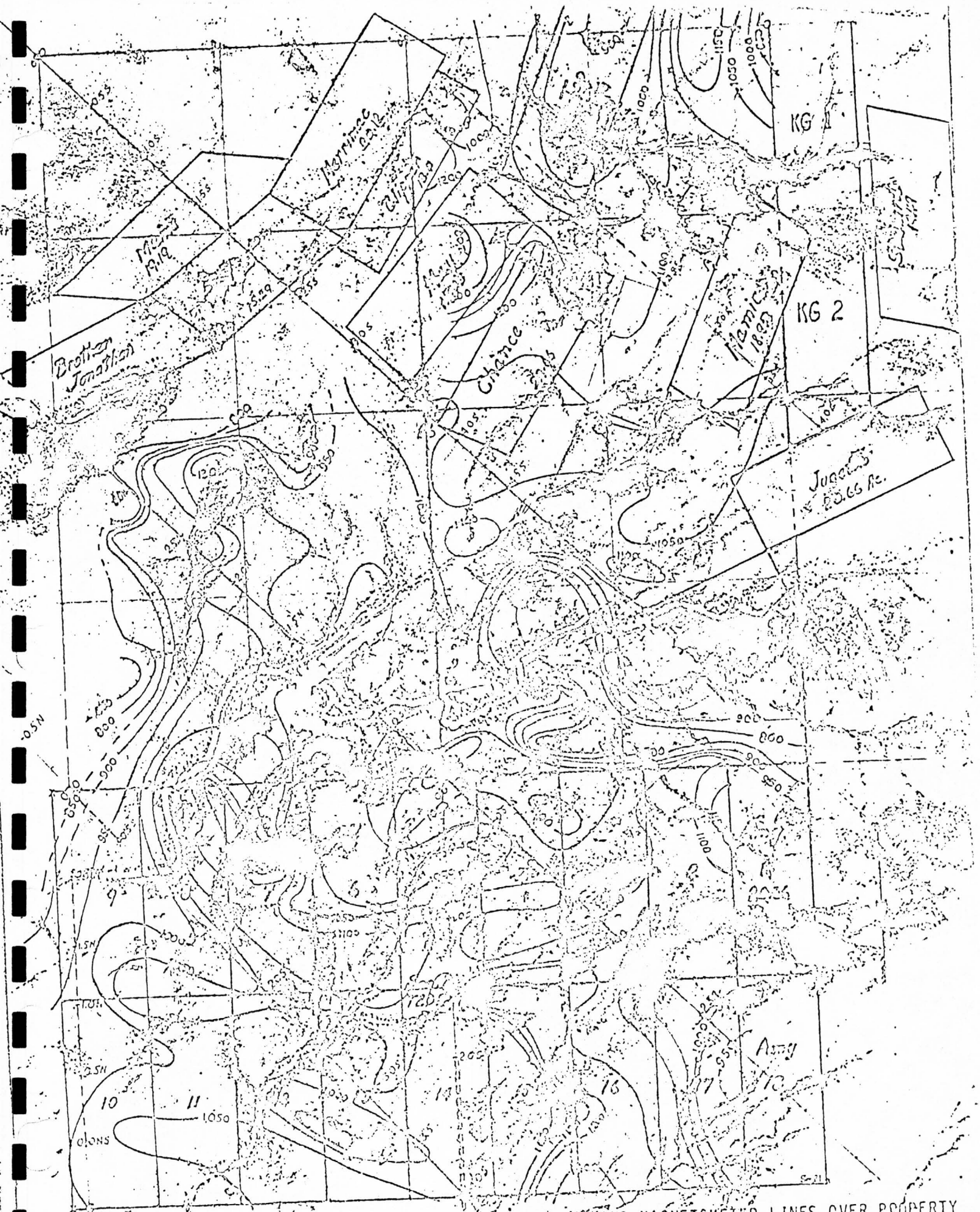
AMY GROUP
Cochise County, Arizona
Section 21; T-20-S, R-22-E
1" = 533'
9-30-69 W. Landry



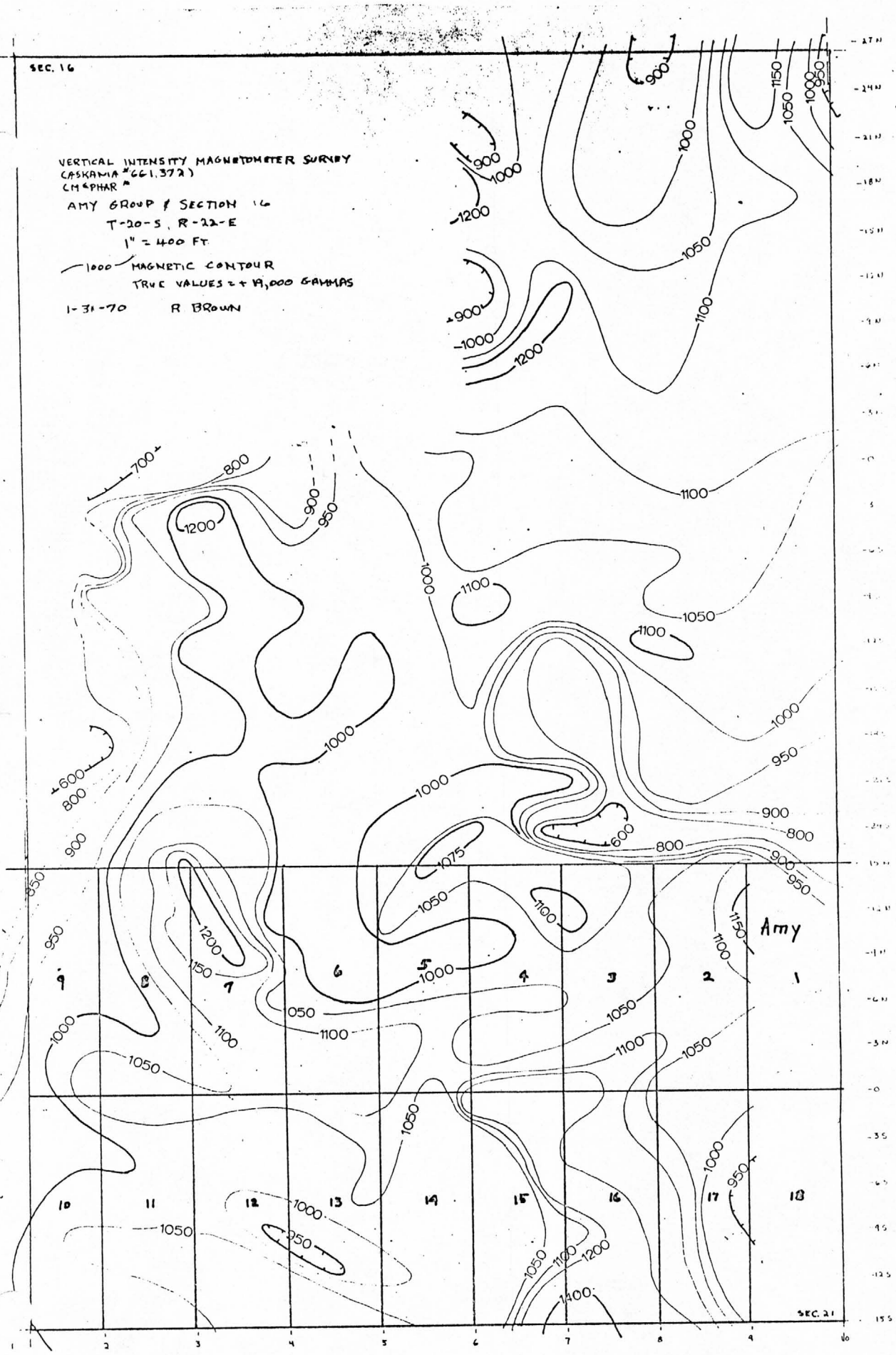
INDUCED POLARIZATION AND RESISTIVITY SURVEY
COMPOSITE OF CAB AND AUSTRAL SURVEYS
TOMBSTONE AREA, COCHISE COUNTY, ARIZONA
SCALE 1:24000

CTION
S. ZONES

I. P.
A = A
C = C



GRACE AND COLVIN PROPERTY SHOWING I.P. LINES AND MAGNETOMETER LINES OVER PROPERTY


SEC. 16
VERTICAL INTENSITY MAGNETOMETER SURVEY
CASKANIA #661.372)
CM&PHAR
AMY GROUP & SECTION 16
T-20-S, R-22-E
1" = 400 FT.
1000 MAGNETIC CONTOUR
TRUE VALUES = + 19,000 GAMMAS
1-31-70 R BROWN
Amy
SEC. 21

8840 Wrightstown Road
Tucson, Arizona
October 1, 1969

Mr. T. J. Colvin
Box 162
Tombstone, Arizona

Mr. W. W. Grace
Scottsdale, Arizona

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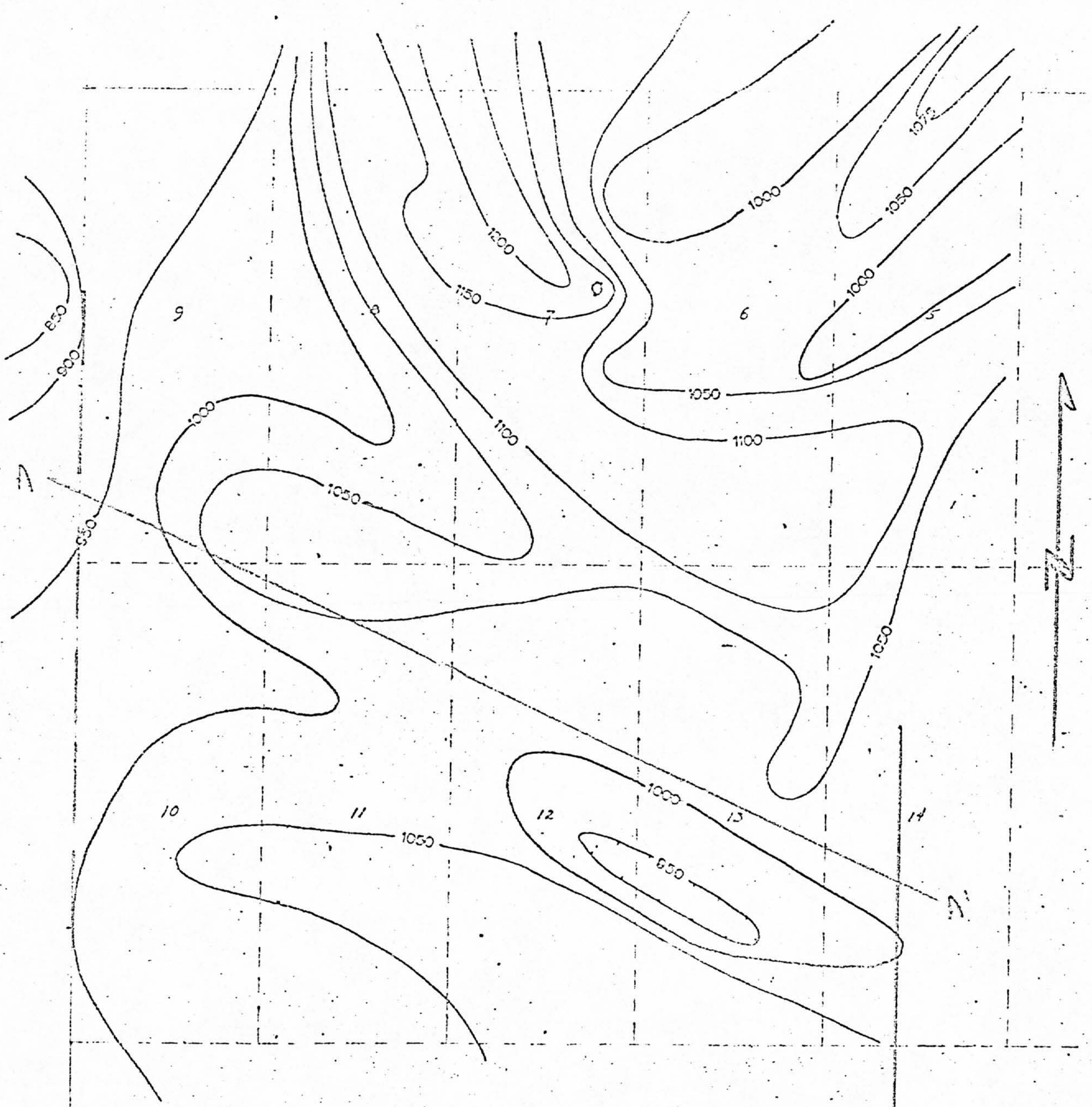
Geologist, Austral Oil Company Incorporated



VERTICAL INTENSITY MAGNETOMETER SURVEY
(Askania #661,372)

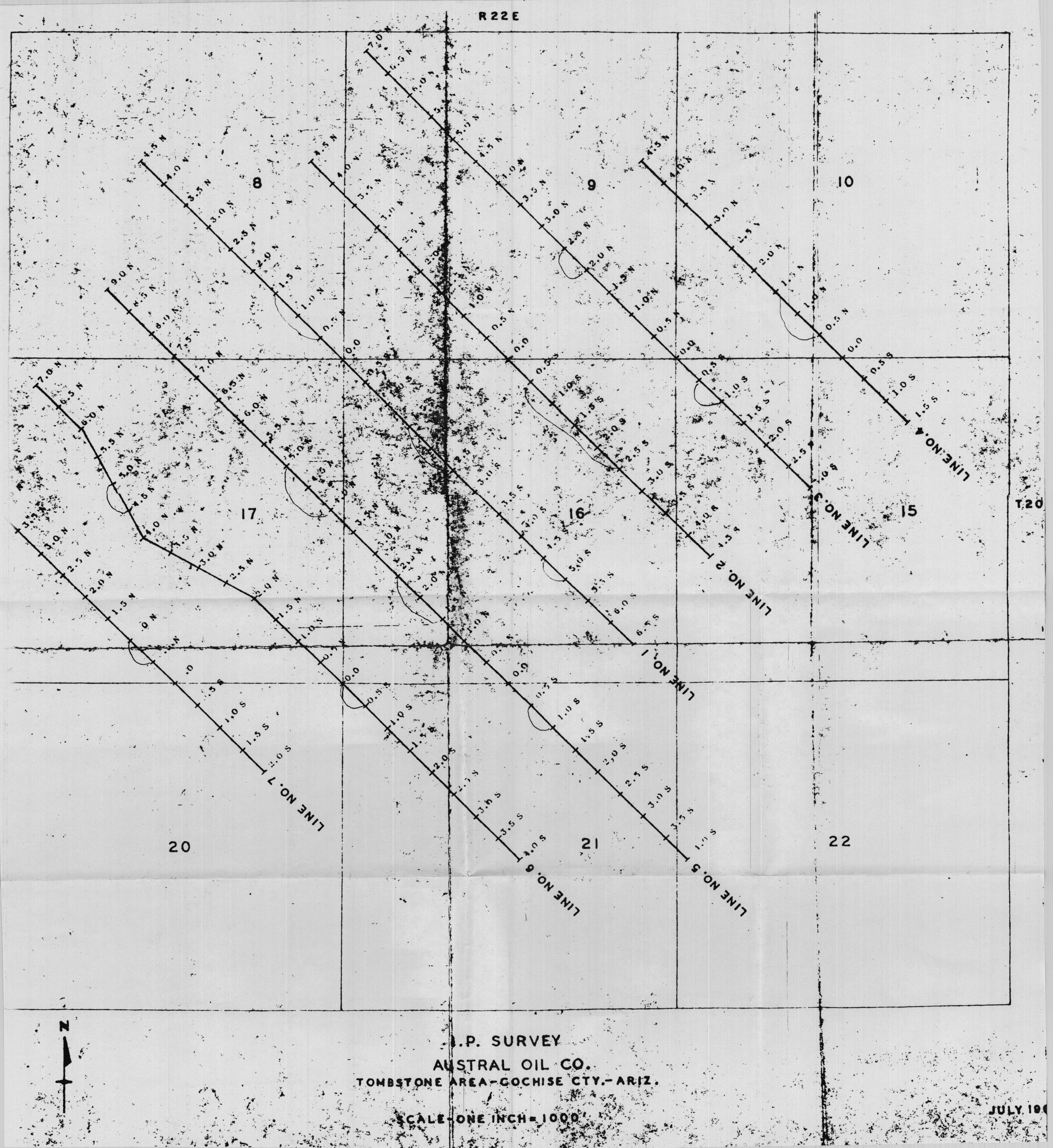
AMY GROUP
Cochise County, Arizona
Section 21; T-20-S, R-22-E
1" = 533'

9-30-69 W. Lundby

Magnetic contour (true value = +19,000 gammas)

IP anomaly, definite

IP anomaly, probable


R22E
T20
8
9
10
17
16
15
20
21
22
LINE NO. 1
LINE NO. 2
LINE NO. 3
LINE NO. 4
LINE NO. 5
LINE NO. 6
LINE NO. 7
N
I.P. SURVEY
AUSTRAL OIL CO.
TOMBSTONE AREA-COCHISE CTY.-ARIZ.
SCALE-ONE INCH=1000'
JULY 19