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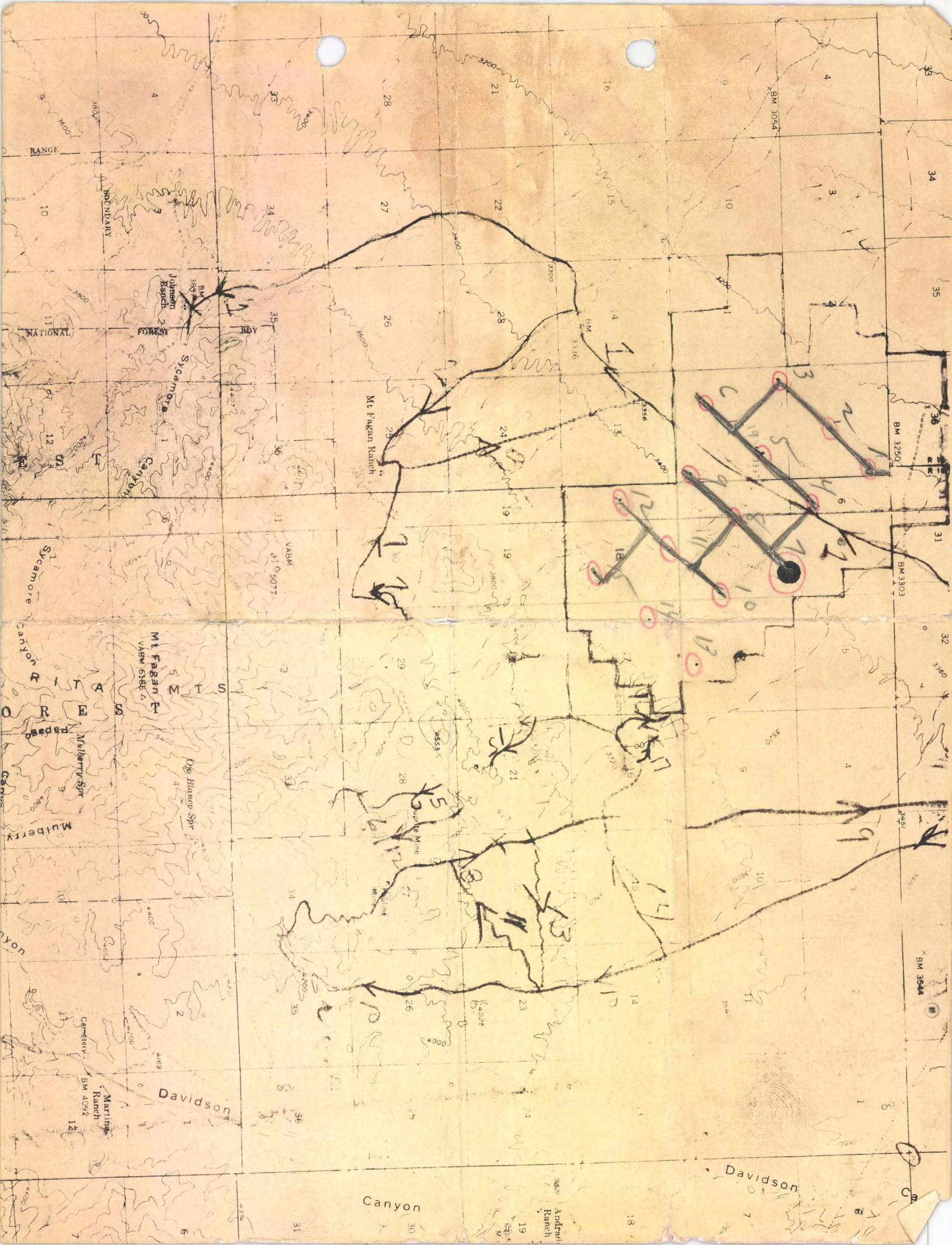
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MAGNETIC EVALUATION

(Total Intensity)

CUPRITE AREA, PIMA COUNTY, ARIZONA

by
MOBILE MAGNETOMETER

for
KERR McGee Oil Industries, Inc.

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

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MAP: Composite Location, Traverse and Magnetic
Contour-----In Pocket

ORIGINAL MAGNETIC RECORDS-----Under Separate Cover.

INTRODUCTION

After authorization on December 12, 1962 by Mr. E. E. Jones of Kerr McGee Oil Industries, Inc., Heinrichs Geoexploration Co. of Tucson, Arizona completed a magnetic evaluation of an area in Pima County, Arizona. Due to its proximity to the old Cuprite Mine the area is designated the Cuprite area and embraces parts or all of Sections 36, T 16 S, R 15 E; 31, T 16 S, R 16 E; 1, 2, 11 & 12, T 17 S, R 15 E; 6, 7, 8, 17 & 18, T 17 S, R 16 E.

The purpose was a ground check for greater detail and accuracy of location of this portion of a previous aerial magnetic survey. All field work was completed in December 1962.

CONCLUSIONS AND RECOMMENDATIONS

A good correlation was shown with the aerial results, and in general not much of new significance was disclosed. The type of anomalism is not such as to indicate near surface magnetite association with economic ore bodies of contact metamorphic types found occasionally in southern Arizona.

In as much as initial drilling has already commenced in the areas, final decisions about the property will likely be dependent upon the results of the findings and interpretations of the drill results, but if additional geophysical work is

desired to more accurately delimit mineralization, induced polarization coverage in Sections 7, 8, 17 & 18, T 17 S, R 16 E is recommended because the magnetic results apparently relate mostly to variation in rock type and depth of alluvium rather than mineralization.

MAGNETIC INTERPRETATION

Magnetic coverage was obtained in profile form on 29 records. The coverage and contoured results are shown on the map submitted with this report. Since it is not possible to show in contour form all the variations found on the profiles, the latter should be used for detail evaluations.

Three features are prominent from the results:

1. There is a broad regional low in the northwest part of the area centered on and around Section 1. This appears to represent only a thicker alluvial section.
2. There is a high in the southeast part of the area, in the southwest corner of Section 17, where the only outcrop was noted. The magnetic expression around this exposure is one of increasing alluvium and talus over bedrock. Magnetic strike is about N 30° W. Top of cause is likely 500' to 1,000' deep.
3. The closer spaced contours, with relatively sudden drops in profile on the records in this part of the area, and the adjacent low, all tend to indicate a structural change which is interpreted as a fault and/or a bedrock scarp

crossing Section 17 on the northeast side of the high. This appears to be the most significant magnetic feature disclosed by this project which might be related to mineral or ore potential.

Some other comments about the character of the records may be made, relative to minor deviations. We know that the rocks in the area contain erratic variations in magnetite and this is shown in the different character as between Record #14 for example which is over relatively shallow bedrock, and Record #7 which is over relatively deep alluvium. Also, the alluvium contains local concentrations of black sands and this is particularly noted in crossing drainages in the area. Many of the washes are steep sided ditches, rough to cross, and which cause some momentary effects on the magnetometer orientors thus giving anomalous spots on the records which should be ignored.

In summation, Section 17 is the only apparent center of interest magnetically.

METHODS AND PROCEDURES

Magnetic coverage was obtained using the mobile magnetometer which is a unit comprising a total intensity, flux-gate, Gulf licensed magnetometer housed in a boom extending from a mounting on a Dodge Powerwagon which contains the power supply, electronic components and recorder. Variations in the earth's total magnetic field are continuously recorded on chart paper in a recorder geared to the vehicle drive. Record was made at whatever speed

the vehicle could be driven, according to terrain conditions.

The instrument was positioned, for this project, to record on a sensitivity of 100 gammas per half inch of chart vertically, thus giving 1,000 gammas across the total width of the chart. This type of recorder allows for 10 effective chart widths by letting the trace cross the paper and continue again from the other side as necessary. The charts, as run, read looking lengthwise from the start of the record with higher values to the right.

The profile trace is made by a tapper bar that can be actuated by either the drive of the vehicle or an electronic timing mechanism. In normal usage the distance function is used, as it was on this project.

For this project the instrument was positioned to record on a horizontal scale of 400 ft. to the inch.

An arbitrary base level was selected, at the start of the project, over deep alluvium in the valley north of the area and assigned a value of 1,000 gammas. This level was positioned to the middle of the chart paper and all values plotted on the records are relative to this arbitrary base. To avoid confusion, values have been marked at intervals on the records, in red pencil.

Certain natural and cultural features noted in passing were marked on the records for control. A total of approximately

45.75 miles of profile were run. The Sahuarita and Empire Mts. 15 min. topo quads were used for a base map. All records except Record # 1 were made going east, both for better ground control and also to minimize heading level changes. Instrumental drift is minimal and diurnal drift is usually negligible. Base readings are normally made several times a day, as convenient, and here some drift was noted on certain days. The geomagnetic activity index, "A" - Belvoir rating as published for CRPL Radio Warning Service at Boulder, Colorado shows moderate solar activity on several days and two days definitely disturbed during the field interval. Adjustments have been made for this by shifting the 1,000 gamma level from the center of the chart up or down as shown by a black inked line at the start of each record.

Respectfully submitted,
HEINRICHS GEOEXPLORATION CO.

J. W. Marlatt
Geologist

January 2, 1963
P. O. Box 5671
Tucson, Arizona

①

12-14-62

Cape TE Project

Transit Stadia Survey

for D.D.H. Locations

J.W.M. & F.F.H.

SE 36°

STATION	TYPE	FILE	DATE	TIME	WAVELENGTH
TP1	DDL1	TP1	27°S	71°	518
TP1	DDL1	TP1	27°S	71°	482
TP1	DDL1	TP2	225°SW	—	970
DDL1	TP2	TP3	180°SW	—	1085
TP2	TP3	DDL2	"	—	1015
TP3	DDL2	TP4	"	—	820
DDL2	TP4	TP5	"	—	835
TP4	TP5	TP6	"	—	630
TP5	TP6	DDL3	"	—	715
TP6	DDL3	TP7	90°SE	—	410
DDL3	TP7	TP8	160°SE	—	765
TP7	TP8	TP9	"	—	910
TP8	TP9	TP10	"	—	915
TP9	TP10	TP11	070°SW	—	810
TP10	TP11	DDL4	180°SW	—	690
TP11	TP12	TP12	90°NE	—	765
TP12	TP13	DDL5	180°NE	—	735
DDL5	TP13	TP13	"	—	970
TP13	TP14	TP14	"	—	920
TP14	TP15	TP15	"	—	815
TP15	DDL4	TP16	270°SE	—	435
DDL4	TP16	TP17	180°SE	—	815
TP16	TP17	TP18	"	—	770
TP17	TP18	TP19	"	—	805
TP18	TP19	TP20	91°NE	—	850
TP19	TP20	DDL7	180°NE	—	685
DDL7	TP21	TP21	270°SW	—	815
TP21	TP22	DDL8	180°SW	—	830
DDL8	TP22	TP22	"	—	670
TP22	TP23	TP23	"	—	308
TP23	TP24	TP24	"	—	342
TP24	TP25	TP25	"	—	915

②

Compt	Total
515	515
482	1000
900	900
1085	1985
1015	3000
820	3820
835	4655
630	5285
715	6000
410	410
765	1175
910	2085
915	3000
810	810
690	1500
765	765
735	1500
930	2430
820	3250
815	4065
435	8500
875	875
770	1645
805	2450
550	3000
685	685
815	1500
830	830
670	1500
308	1808
342	2450
915	3065

Info.

D.D.L. 1

D.D.L. 2

D.D.L. 3

D.D.L. 4 6

D.D.L. 5

D.D.L. 4

D.D.L. 7

D.D.L. 8

BS.	TP	FS	Angle	Dist	Station
TP 23	TP 24	TP 25	120°30'	—	8.00
TP 24	TP 25	TP 26	"	—	1.25

Seward - All 45 Rt Front

TP 26	OH 8	TP 26	45°	—	—
		TP 26	135°	—	8.15
OH 8	TP 26		315°	—	—
		TP 27	135°	—	3.92
TP 26	TP 27		315°	—	—
			135°	—	2.86
TP 27	TP 28		315°	—	—
		TP 29	135°	TP 20'	6.50
TP 28	TP 29		315°	—	6.50
		TP 30	—	+2°	8.59
TP 29	TP 30		—	—	—
		TP 31	225°	—	8.73
		TP 32	45°	+1°30'	4.94
TP 30	TP 32		45°	—	—
		DDH 10	225°	0°20'	10.06
TP 30	TP 31		45°	—	—
		DDH 11	225°	0°0'	6.27
TP 31	DDH 11		45°	—	—
		TP 33	225°	+2°0'	11.50
TP 31	TP 33		45°	—	—
		TP 34	135°	+2°10'	6.85
		TP 35	225°	6°50'	9.60
		Δ A	225°	10°	3.57
TP 33	TP 35		45°	—	—
		DDH 12	225°	10°45'	8.91

(3)

Car Dist

800

635

815

392

286

649

650

858

873

494

1000

627

1149

685

960

351

891

Total

3865

4500

815

1207

1493

649

2142

858

3000

873

494

1500

873

1500

2649

960

3609

3000

4500

Info

DDL-9

DPH = 10

TR. MK. REG. US. PAT. OFF.

Alt + from M

(C)

BS	TP	FS	H 4	V 4	Ind
TP33	TP34		315°		
		TP36	135°	1°44'	12.61
TP34	TP36		315°		
		TP37	135°	+3°40'	6.06
TP36	TP37		315°		
		TP38	135°	0°00'	4.51
TP37	TP38		315°		
		DDH#15	225°	0°00'	3.51
		TP39			5.10
TP38	TP39				
		TP40	45°	-1°28'	13.20
TP39	TP40		225°		
		DDH#14	45°	0°00'	8.20
TP40	DDH#14		225°		
		TP41	45°	+1°00'	10.00
DDH#14	TP41		225°		
		TP42	45°	0°30'	10.90
TP42	TP42				
		DDH#13	45°	+0°30'	9.10

45° + 0°15' / 4

SIGNAL CORP. 19 J. G. PARKER

LEFAX LADOLPHIA 2, PA. 2E IN U.S.A.

8

(4)

419

-68'

1260

604

451

351'

-510

-1319

-820

10.00

1090

9.10

(000
2.01)

Total

685

1945

2549

3000

~~2645~~
3000

2139

820

0.00

1000²

2090

3000

TR. MK. REG. U.S. PAT. OFF.

December 20, 1962

S T A T E M E N T

To: Kerr-McGee Oil Industries, Inc.
1637 E. 18th Street
Tucson, Arizona

Attn: Mr. J. Jones

Re: Surveying, Cuprite Area, Pima County, Arizona
December 14 - 15, 1962

Services:

2 men, 19 hrs. @ \$12.50/hr-----\$237.50

Supplies: Stakes & flagging----- 10.00

\$247.50

December 12, 1962

Kerr - McGee Oil Industries, Inc.
1637 E. 18th Street
Tucson, Arizona

Attn: Mr. E. E. Jones

Re: Magnetic Survey of portions of
T 16 & 17 S, R 15 & 16 E
G. & S.R.B. & M. Pima County
Arizona

Gentlemen:

This will confirm our recent conversations with you of the past few days.

1. At your request, we agree to conduct a magnetic survey by continuous record mobile magnetometer of the designated area shown on the attached map furnished by you.
2. It is understood that the area will be covered on lines run essentially east - west by compass bearing spaced 1/4 mile apart as determined by foot survey meter and convenient ties to the established land net and surveyed culture.
3. Results from our profile records will be compiled in contour plan at 1" = 1,000' using the U.S.G.S. topog sheets as a base and, accompanied by an appropriate report submitted in quadruplicate, but originals only of the mobile magnetic records.
4. As practical, we will keep you informed of results as obtained in order that more detail coverage might be added if desired. Such added coverage requested by you over and above a minimum coverage of 36.90 profile miles as outlined above will be charged at the equivalent rate of \$300.00 per day plus expenses or \$50.00 per profile mile.
5. Otherwise our charge is \$2,000.00, of which you agree to advance \$1,000.00 upon orders to proceed and \$1,000 upon receipt of report and final billing. We expect to complete field work by 22 December and report no later than 2 January 1963.

December 12, 1962

6. We are a licensed Arizona Corporation.

7. We shall be liable for and agree to pay any and all claims arising from injury to our employees and others and damage by reason of our actions or neglect in connection with this work. It is also understood that you will assume all liability for our trespass and surface damage to private lands and improvements, however, we agree to act as discrete and judicial as possible in this regard in your interest.

Our current insurance in force:

Body injury liability-----	\$100,000 each person
	\$300,000 each accident
and aggregate products-----	\$300,000
Public liability damage-----	\$100,000 Total

Confirmation of this is being furnished (in duplicate) by Paul H. Jones Co. Insurance, our agent, directly from them.

Your acceptance of this letter may be indicated by executing as provided below on the attached carbon and returning same to this office.

Very truly yours,

HEINRICHS GEOEXPLORATION CO.

Walter E. Heinrichs, Jr.
President & General Manager

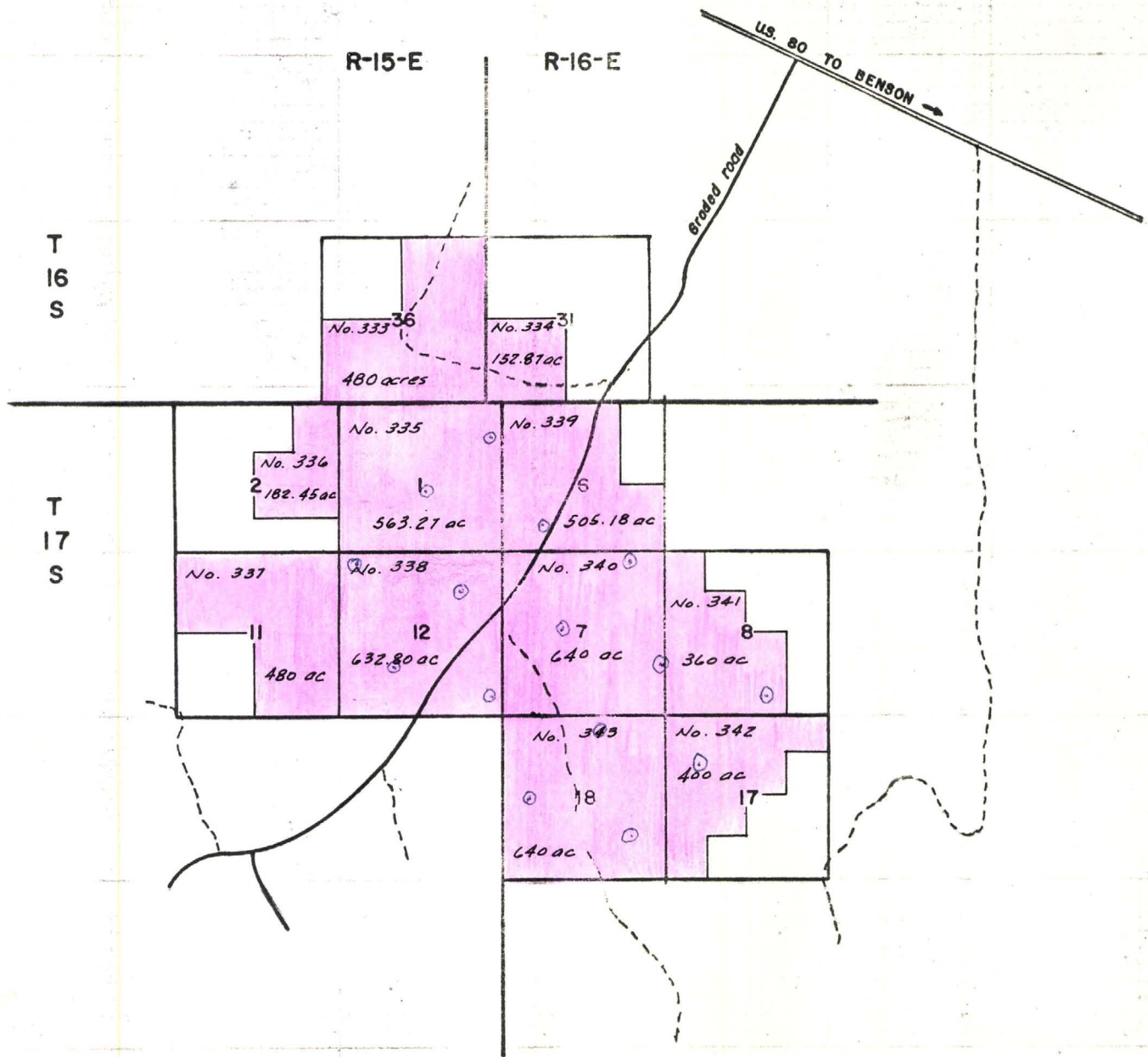
WEH:jh
cc: Extra Encl.

KERR - MCGEE OIL INDUSTRIES INC.

by: _____

Title: _____

Date: _____



G & S R. B. & M.
 12/12/62
 PIMA COUNTY, ARIZONA

December 12, 1962

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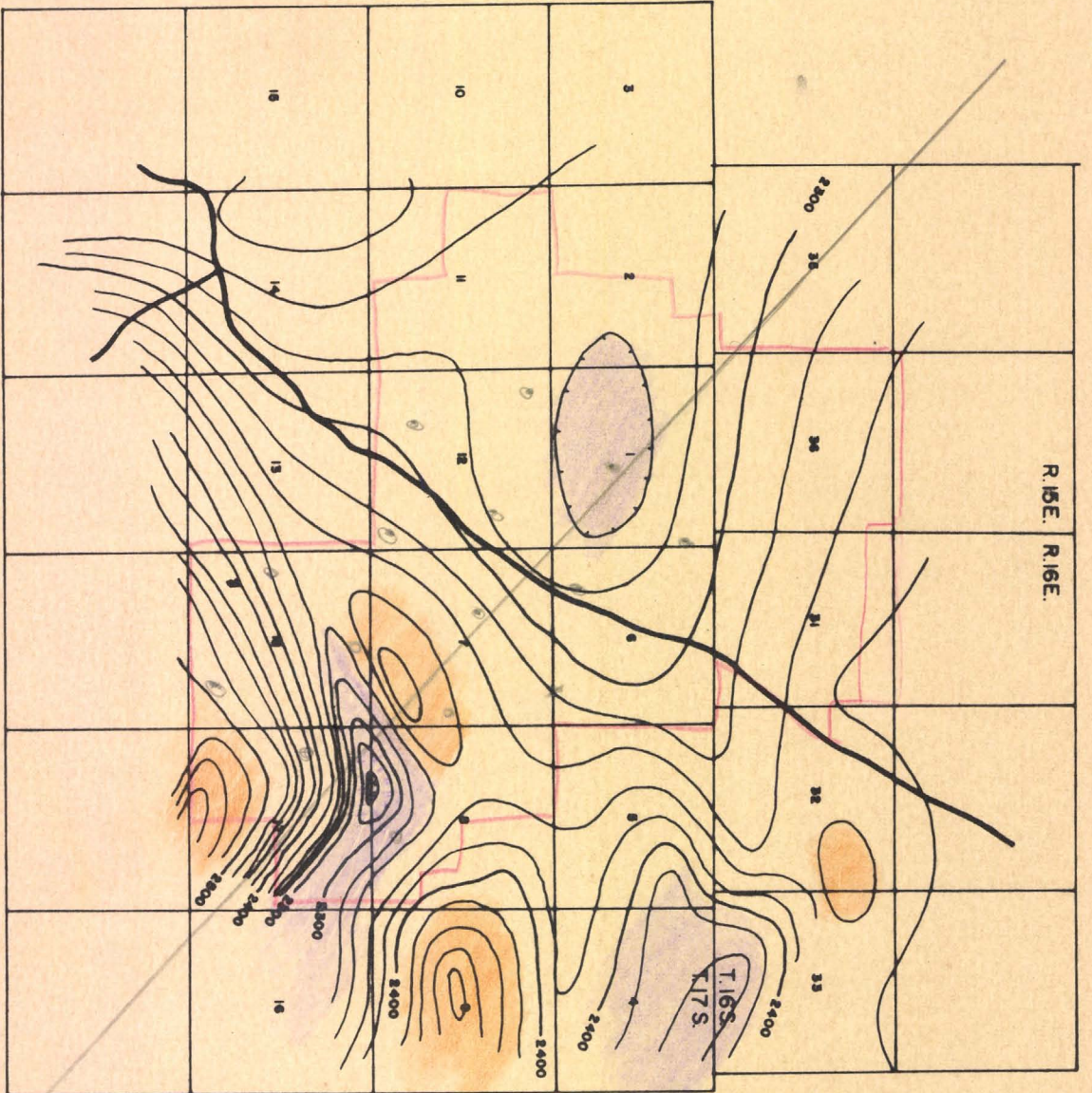
WEH:jh
cc: Extra Encl.

KERR - MCGEE OIL INDUSTRIES INC.

by: _____

Title: _____

Date: _____



HEINRICHS GEOEXPLORATION COMPANY
MINERAL ENGINEERING CONSULTANTS AND CONTRACTORS
GEOPHYSICAL, GEOLOGICAL AND ECONOMIC APPRAISALS
TUCSON, ARIZONA

WALTER E. HEINRICHS, JR.
E. GROVER HEINRICHS

PHONE: MAIN 2-4202
806-808 WEST GRANT ROAD
MAIL: P. O. Box 5671

May 28, 1959

Mr. Derwood Amonett
Chief Geophysicist
Kerr-McGee Oil Industries, Inc.
Kerr-McGee Building
Oklahoma City 2, Oklahoma

Dear Mr. Amonett:

It has now been some months since our conversation and correspondence relating to the possible use of our continuously recording mobile magnetometer on a project for you. I therefore assume that you have resorted to other methods or temporarily shelved the project. Either way, I would appreciate learning of your general reactions to our previous letter and under what conditions we might be placed in a position to be favorably considered in any of your future plans. Somehow, I am sure if we could get together under the right circumstances, that with our equipment, personnel and services, it would definitely be to our mutual advantage.

This opportunity is also taken to remind you that we are equipped and capable for most types of geophysical work and for consultation and interpretation problems. As newer methods and instruments are developed and tested, such as the recently publicized APMAG, we are active in obtaining basic and pertinent data related to them and in assuring that we are in competitive position to obtain and use such methods and instruments to the best possible benefit of our clients.

In addition to its proven mineral applications, we feel that the mobile magnetometer has a greater potential value for use in oil exploration than is generally known to date. Many producing oil fields are located in areas involving magnetic variance well within the detecting range of the instrument. Furthermore, costs are often less than airborne and usually much less than ground methods, in addition to various unique advantages over both, especially in overall usability, resolution and reliability of results.

I trust you will keep us in mind for consideration in projects where we could be of valuable assistance to you.

Sincerely yours,

Walter E. Heinrichs, Jr.

WEH:jh

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GEOPHYSICAL, GEOLOGICAL AND ECONOMIC APPRAISALS
TUCSON, ARIZONA

WALTER E. HEINRICHS, JR.
E. GROVER HEINRICHS

PHONE: MAIN 2-4202
806-808 WEST GRANT ROAD
MAIL: P. O. BOX 5671

22 January 1959

Mr. Derwood Amonett
Chief Geophysicist
Kerr-McGee Oil Industries, Inc.
Kerr-McGee Building
Oklahoma City 2, Oklahoma

Dear Mr. Amonett:

Confirming my telephone call of 20 January, we are in receipt of copies of your 13 January letter to United Geophysical Corporation and their reply to you from their Vice-President and Director of Research, Dr. Raymond A. Peterson, on 15 January 1959.

On the basis of the information you gave me over the phone, with no minimum number of days of work guaranteed, our daily charge would be \$500.00 per mobile magnetometer operating day, \$225.00 per day from Tucson to job base location and return for travel, and personnel per diem expenses at \$10.00 per man day from Tucson to Tucson.

In lieu of more details as to location, culture, terrain, and your desires, the above includes an estimated requirement of 5 men and 1 auxiliary vehicle and a 5 day mobile magnetometer operating week. Usually a 5 day week is desirable to allow for required maintenance and office work in order to provide the client maximum over all profile mile efficiency. Normally, this considers a ten hour personnel day allowing for eight hours mobile magnetometer operation plus one hour travel each way from place of accommodation to and from actual job location, or in other words, 40 hours operating and 10 hours travel time per week. Definition of a mobile magnetometer operating day is a minimum of 8 hours of instrument use beginning with the initial observation or recording, and ending with the final one for each day. Breakdown and malfunction time is at our own expense, or will be made up at no additional charge. Requested mobile magnetometer operating time in excess of 8 hours per day or 40 hours per week would be \$90.00 per hour. Client requested delay or stand-by, and/or delay due to extended extremes in weather, or other factors not normally contractors responsibility is \$250.00 per day.

22 January 1959

The above takes into account furnishing you with reasonable-standard scale, reproducible, contoured plan maps of the results obtained, together with the profile records appropriately indexed and labeled. Permit expenses would be extra and charged at cost. It is our understanding that you would prefer the contractor to handle most of the permitting. We also understand that you would furnish good scale verticle aerial photographs, land plats, possibly topographic maps, and some base control points to facilitate navigation and base map preparation.

For obvious reasons I have tried to be conservative in all of the above estimates. In order to compete and maintain our business it is naturally mandatory that we obtain for our clients the lowest possible cost per profile mile of magnetic coverage available anywhere today and that would be our desire in your case. Minimum operational handicaps due to weather is a considerable advantage, in addition, the aid of continuous profiling in your problem would seem very important.

Enclosed is another copy of our brochure. Please let us know if any further information would be of use in your considerations. We are always happy to discuss potential mutual interests, even in the abstract or hypothetical sense. In any event we would appreciate learning more about your problems and how we might be of service.

Very truly yours,

HEINRICHS GEOEXPLORATION COMPANY

By: _____

Walter E. Heinrichs, Jr.
President & General Manager

weh/jh

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For obvious reasons I have tried to be conservative in all of the above estimates. In order to compete and maintain our business it is naturally mandatory that we obtain for our clients the lowest possible cost per profile mile of magnetic coverage available anywhere today and that would be our desire in your case. Minimum operational handicaps due to weather is a considerable advantage, in addition, the aid of continuous profiling in your problem would seem very important.

Enclosed is another copy of our brochure. Please let us know if any further information would be of use in your considerations. We are always happy to discuss potential mutual interests, even in the abstract or hypothetical sense. In any event we would appreciate learning more about your problems and how we might be of service.

Very truly yours,

HEINRICH'S GEOEXPLORATION COMPANY

By: _____

Walter E. Heinrichs, Jr.
President & General Manager

weh/jh

22 January 1959

Mr. Derwood Amonett
Chief Geophysicist
Kerr-McGee Oil Industries, Inc.
Kerr-McGee Building
Oklahoma City 2, Oklahoma

Dear Mr. Amonett:

Confirming my telephone call of 20 January, we are in receipt of copies of your 13 January letter to United Geophysical Corporation and their reply to you from their Vice-President and Director of Research, Dr. Raymond A. Peterson, on 15 January 1959.

On the basis of the information you gave me over the phone, with no minimum number of days of work guaranteed, our daily charge would be \$500.00 per mobile magnetometer operating day, \$225.00 per day from Tucson to job base location and return for travel, and personnel per diem expenses at \$10.00 per man day from Tucson to Tucson.

In lieu of more details as to location, culture, terrain, and your desires, the above includes an estimated requirement of 5 men and 1 auxiliary vehicle and a 5 day mobile magnetometer operating week. Usually a 5 day week is desirable to allow for required maintenance and office work in order to provide the client maximum over all profile mile efficiency. Normally, this considers a ten hour personnel day allowing for eight hours mobile magnetometer operation plus one hour travel each way from place of accommodation to and from actual job location, or in other words, 40 hours operating and 10 hours travel time per week. Definition of a mobile magnetometer operating day is a minimum of 8 hours of instrument use beginning with the initial observation or recording, and ending with the final one for each day. Breakdown and malfunction time is at our own expense, or will be made up at no additional charge. Requested mobile magnetometer operating time in excess of 8 hours per day or 40 hours per week would be \$90.00 per hour. Client requested delay or stand-by, and/or delay due to extended extremes in weather, or other factors not normally contractors responsibility is \$250.00 per day.

22 January 1959

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Very truly yours,

HEINRICHS GEOEXPLORATION COMPANY

By: _____

Walter E. Heinrichs, Jr.
President & General Manager

weh/jh



LEGEND

- +— Section corner located in field
- x BM 302 Bench Mark
- x Windmill
- ==== Road
-> Rec. 4..... Mobile Magnetometer Traverse
- Δ Triangulation Station - U.S.G.S.

HEINRICH'S GEOEXPLORATION COMPANY		
P.O. Box 5671 Tucson, Arizona		
MAGNETIC SURVEY		
(Total Intensity)		
FOR		
KERR Mc GEE OIL INDUSTRIES INC.		
CUPRITE AREA		
PIMA COUNTY, ARIZONA		
SCALE: 1"=1000'	CONTOUR INTERVAL: 50'	REVISIONS
DATE: Dec. 1962	DATA BY: J.W.M.	
DRAWN BY: I.B.	SHEET OF	
	DRAWING NO.: 1	FILE: