GEOPHYSICAL RESEARCH PTY. LTD.

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REPORT ON A

SURVEY

AT

YORKTOWN - TASMANIA

for

NICKELTON MINING PTY LTD

YORKTOWN – TASMANIA

AREA NORTH OF

EL 5/71

by

R.J.G. Lewis, Ph.D

Mona Vale, N.S.W.   May, 1972.

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INTRODUCTION

This report discusses the results of a vertical component magnetic survey carried out in the second quarter of 1971 by Mr. C.J. Maclean. The area lies to the north of EL 5/71 and the survey was undertaken to examine in detail the northern-most anomaly detected in the aeromagnetic survey flown by B.H.P. (Lewis, 1971).

The survey consisted of two traverses whose locations are shown on figure 1. In this figure the topographic detail is traced from aerial photograph T380-56 of Beaconsfield-Quamby run 4.

RESULTS AND INTERPRETATION

The two traverses clearly detected the anomaly profiles of which are appended. The station interval on these sections is 50 meters. Interpretation was made using a modification of the computer curve matching technique described by McGrath and Hood (1970). The input data, details of the convergence and the final results are appended. The details of the best fit are taken as the interpretation assuming an infinite sheet source. The stated equivalent magnetite content is based on an empirical relationship due to Balsley and Buddington (1958).

The southern traverse yields a good fit to this model with an RMS error of 24γ in an anomaly of amplitude factor 849γ. The depth to the top is shown as 320 meters which is substantially greater than the depth estimated from the aeromagnetics. This estimate is more accurate and is to be

preferred. Assuming that the source is a sheet it is about 275 meters wide and dips at about 77° to 240° magnetic.

The northern anomaly gives a relatively poor fit with an RMS error of 82γ in an anomaly with an amplitude factor of 385γ. This is partly to be expected as the traverse (see Figure 1 for extended coversge) shows a subsidiary minimum on the opposite side to the main anomaly. This may indicate that the sheet is a poor choice of model and that perhaps a horizontal cylinder or a depth limited sheet would be better approximations. The indicated depth is much less than on the other profile - about 40 meters. In view of the above considerations the depth estimate is likely to be too shallow. Even so it is likely that the depth to the source here is substantially less than on the other profile. The estimated thickness and dip (280 meters, 61° to 240°) are quite comparable with the estimates on the southern traverse.

CONCLUSIONS

The anomaly source appears to be variable in depth with the central portion considerably deeper than expected from the aeromagnetics. The discrepancy probably stems from the extreme simplifications made in interpreting the airborne data. In view of this and the ubiquitous gravel cover which is exposed in places to a depth of 20 feet *6 m* and is probably much thicker the property should be relinquished.

R Lewis

R.J.G. Lewis

Mona Vale, N.S.W.   May, 1972.

REFERENCES

1. Balsley, J.R., & Buddington, A.F., Iron-Titanium Oxide Minerals, Rocks, and Aeromagnetic Anomalies of the Adirondack Area, New York, Econ. Geology, 53, pp. 777-805, 1958.

2. Lewis, R.J.G., Review of an Aeromagnetic Survey, Beaconsfield, Tasmania (EL 5/71) on Behalf of Nickelton Mining Pty Ltd, 1971.

3. McGrath, P.H., & Hood, P.J., The Dipping Dyke Case: A Computer Curve Matching Method of Magnetic Interpretation, Geophysics, 35, pp. 831-848, 1970.

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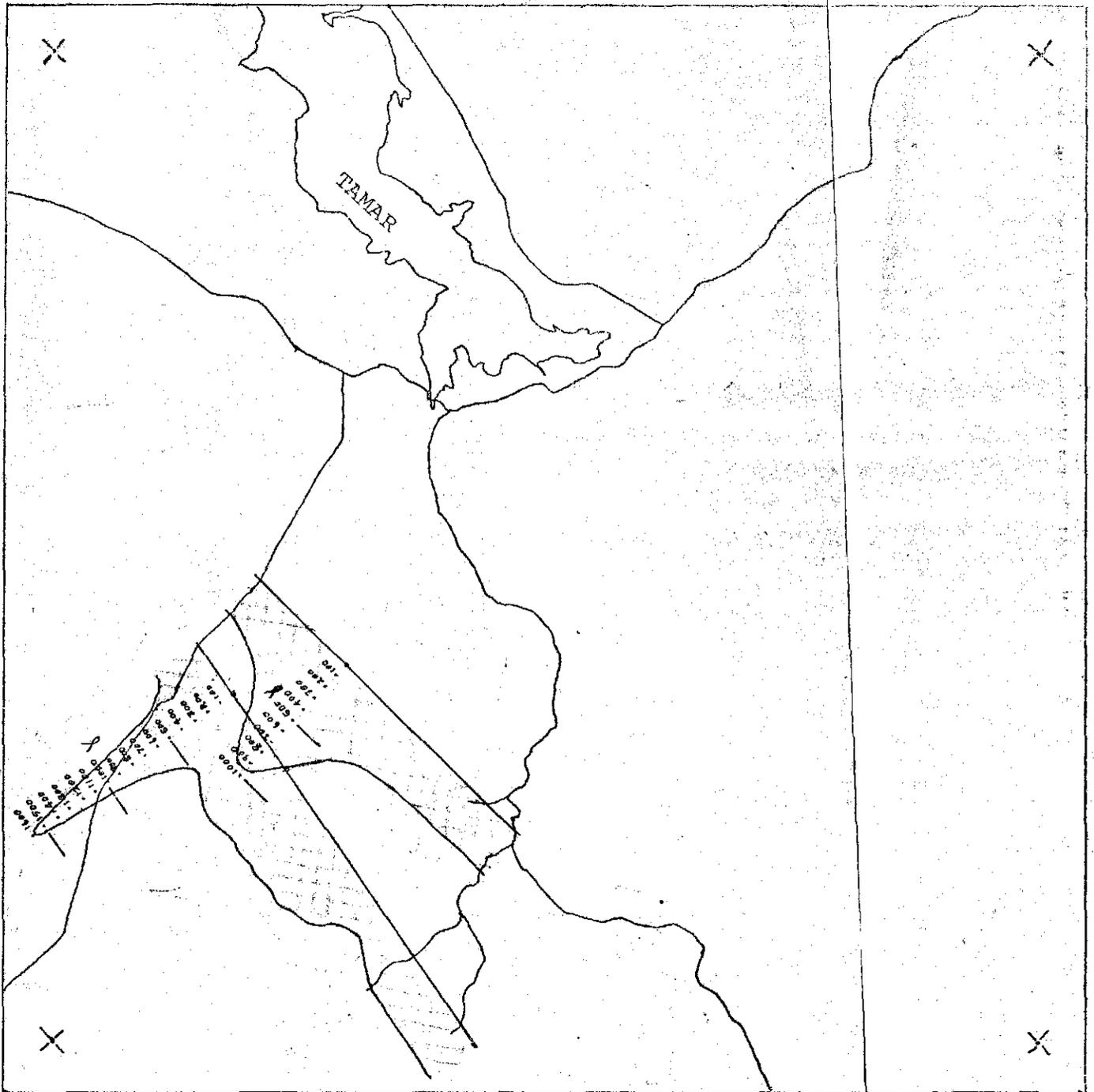Figure 1.   Position of Traverses on photograph T380-56
(Beaconsfield-Quamby, Run 4)
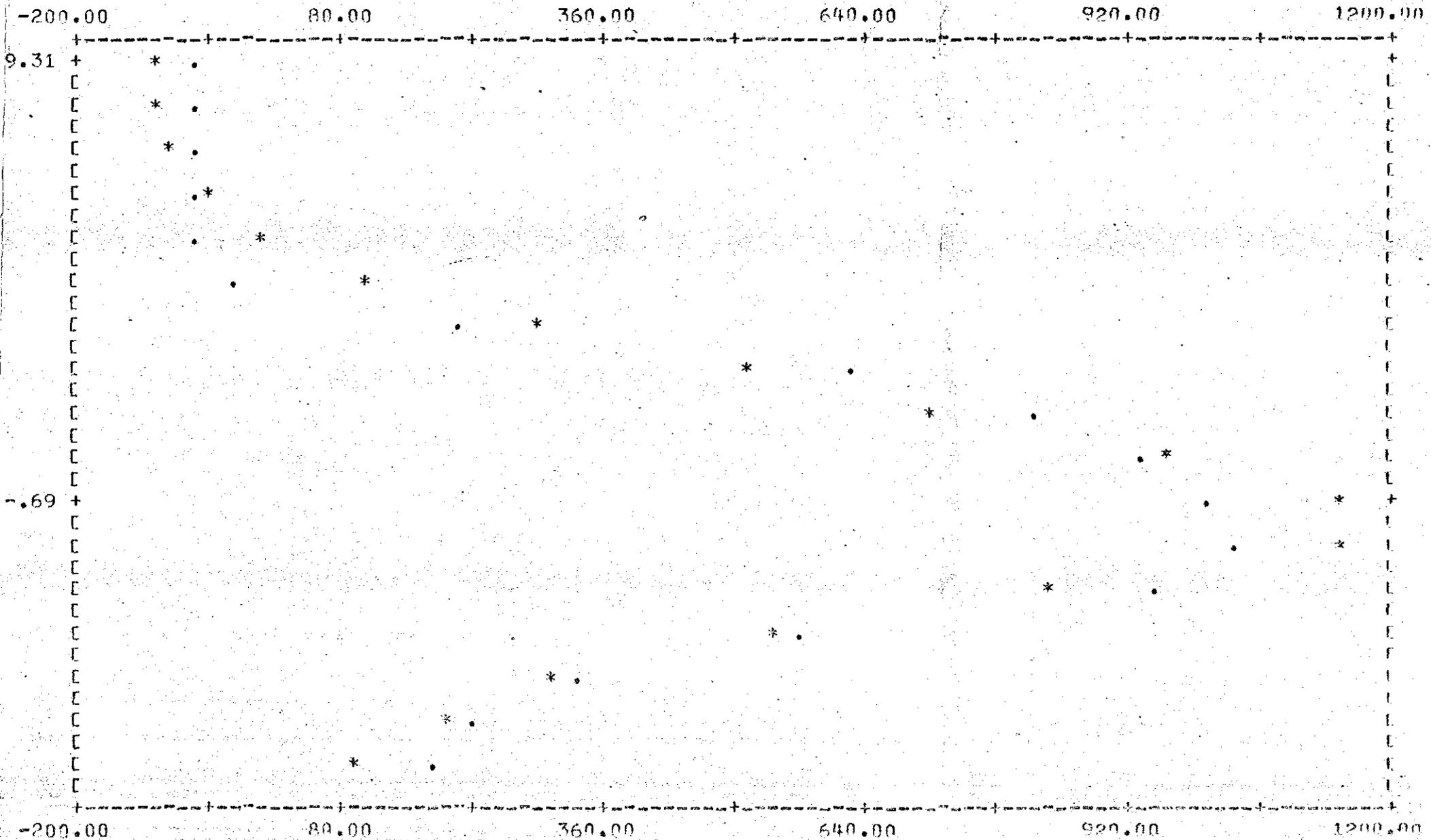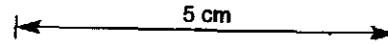
YORKTOWN GROUND MAGNETICS   NORTHERN TRAVERSE

A PLOT OF THE INPUT AND MATCHED DATA REDUCED TO A COMMON BASE LEVEL

INPUT PLOTTED AS   *
MATCHED DATA AS   .
COINCIDENT POINTS AS 0

|←——————— 5 cm ———————→|

```
       -200.00              80.00              360.00              640.00              920.00             1200.00
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
  9.31 +       *    .                                                                                        +
       [                                                                                                     [
       [         *     .                                                                                     [
       [                                                                                                     [
       [        *    .                                                                                       [
       [                                                                                                     [
       [          .  *                                                                                        [
       [                                                                                                     [
       [             *                                                                                       [
       [            .     *                                                                                   [
       [                .      *                                                                              [
       [                          *     .                                                                     [
       [                               *    .                                                                 [
       [                                         *   .                                                        [
       [                                                 .  *                                                 [
  -.69 +                                                        .          *                                +
       [                                                                .        *                           [
       [                                                                     *        .                      [
       [                                                  *   .                                              [
       [                                        *  .                                                         [
       [                          *  .                                                                       [
       [                *   .                                                                                [
       [           *   .                                                                                     [
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
       -200.00              80.00              360.00              640.00              920.00             1200.00
```

008

718009 72-911

DATA TO BE MATCHED

345.00	350.00	357.50	400.00	450.00
575.00	750.00	975.00	1175.00	1425.00
1600.00	1605.00	1300.00	1000.00	765.00
650.00	550.00			

INITIAL FIT PARAMETERS

```
TOTAL AMBIENT FIELD IN GAMMAS =     62400.0
FIELD INCLINATION IN DEGREES =   -71.0
THE STATION INTERVAL IN METERS =        50.00
THE ANGLE BETWEEN MAG NORTH AND THE X AXIS =      60.0
THE ANGLE BETWEEN THE DATA PROFILE AND DIP =      -.0
THE NUMBER OF DATA POINTS =       17
THE INITIAL BASE LEVEL IN GAMMAS =     450.00
THE MINIMAX DISTANCE (IN STATION INTERVALS) =       11.0
THE DISTANCE FROM THE INITIAL POINT TO XMAX =       11.0
THE INITIAL VALUE OF ALPHA =     45.0
```

ITERATIONS

ERROR	DEPTH	ALPHA	HALFWIDTH	MINIMAX
92.91	46.80	77.60	167.74	11.0
105.09	50.16	80.56	170.04	14.0
82.00	41.35	69.72	160.53	8.0
81.94	40.18	70.63	159.14	8.0
82.32	41.49	72.53	161.41	8.5
82.84	38.14	68.35	156.43	7.5
81.94	40.33	71.15	159.52	8.1

BEST FIT RESULTS

```
THE ANGLE ALPHA IN DEGREES =     71.1
THE BASE LEVEL OF THE ANOMALY IN GAMMAS =        453.7
THE MINIMAX DISTANCE IN METERS =     405.1
THE ERROR OF FIT IN GAMMAS =    81.94
THE DIP OF THE DYKE IN DEGREES =   61.4 TO 240.0 MAGNETIC
THE HALF-WIDTH IN METERS =      159.52
TRUE WIDTH IN METERS =     280.06
THE DEPTH TO THE TOP IN METERS =      40.33
THE CENTER IS       15.58 METERS S OF STATION   10
THE AMPLITUDE FACTOR =     384.52
THE SUSCEPTIBILITY CONTRAST =   .0036583 CGS
EQUIVALENT MAGNETITE CONTENT =.     1.29%
```

LEAST SQUARES FIT   *** VERTICAL COMPONENT ANOMALY

STATION	POSITION	INPUT	CALCULATED	ERROR
1	9.31	-108.66	-63.68	-44.99
2	8.31	-103.66	-67.93	-35.73
3	7.31	-96.16	-71.80	-24.36
4	6.31	-53.66	-73.52	19.86
5	5.31	-3.66	-66.83	63.17
6	4.31	121.34	-22.97	144.31
7	3.31	296.34	213.58	82.76
8	2.31	521.34	628.75	-107.41
9	1.31	721.34	831.09	-109.75
10	.31	971.34	938.54	32.79
11	-.69	1146.34	1006.05	140.28
12	-1.69	1151.34	1036.53	114.81
13	-2.69	846.34	952.13	-105.79
14	-3.69	546.34	574.92	-28.58
15	-4.69	311.34	333.69	-22.35
16	-5.69	196.34	232.59	-36.26
17	-6.69	96.34	179.00	-82.66

718 12

25.08	248.21	85.36	229.99	123.0
24.99	250.63	85.42	227.86	126.0
24.89	253.06	85.49	225.69	129.0
24.80	255.49	85.55	223.47	132.0
24.72	257.94	85.61	221.21	135.0
24.64	260.40	85.66	218.89	138.0
24.56	262.88	85.72	216.49	141.0
24.48	265.39	85.76	214.03	144.0
24.41	267.93	85.81	211.49	147.0
24.34	270.50	85.86	208.86	150.0
24.27	273.11	85.90	206.14	153.0
24.21	275.77	85.94	203.30	156.0
24.15	278.48	85.98	200.34	159.0
24.10	281.25	86.01	197.25	162.0
24.04	284.08	86.05	194.00	165.0
24.00	286.99	86.08	190.57	168.0
23.14	296.61	86.69	177.29	205.6
23.29	308.48	86.57	160.91	206.1
23.30	307.97	86.56	161.69	205.1
23.55	320.65	86.42	141.36	205.7

BEST FIT RESULTS

THE ANGLE ALPHA IN DEGREES =   86.4
THE BASE LEVEL OF THE ANOMALY IN GAMMAS =   251.4
THE MINIMAX DISTANCE IN METERS = 10282.7
THE ERROR OF FIT IN GAMMAS =   23.55
THE DIP OF THE DYKE IN DEGREES =   76.7 TO 240.0 MAGNETIC
THE HALF-WIDTH IN METERS =   141.36
TRUE WIDTH IN METERS =   275.08
THE DEPTH TO THE TOP IN METERS =   320.65
THE CENTER IS   38.04 METERS S OF STATION 21
THE AMPLITUDE FACTOR =   848.98
THE SUSCEPTIBILITY CONTRAST =   .0072872 CGS
EQUIVALENT MAGNETITE CONTENT =   2.17%

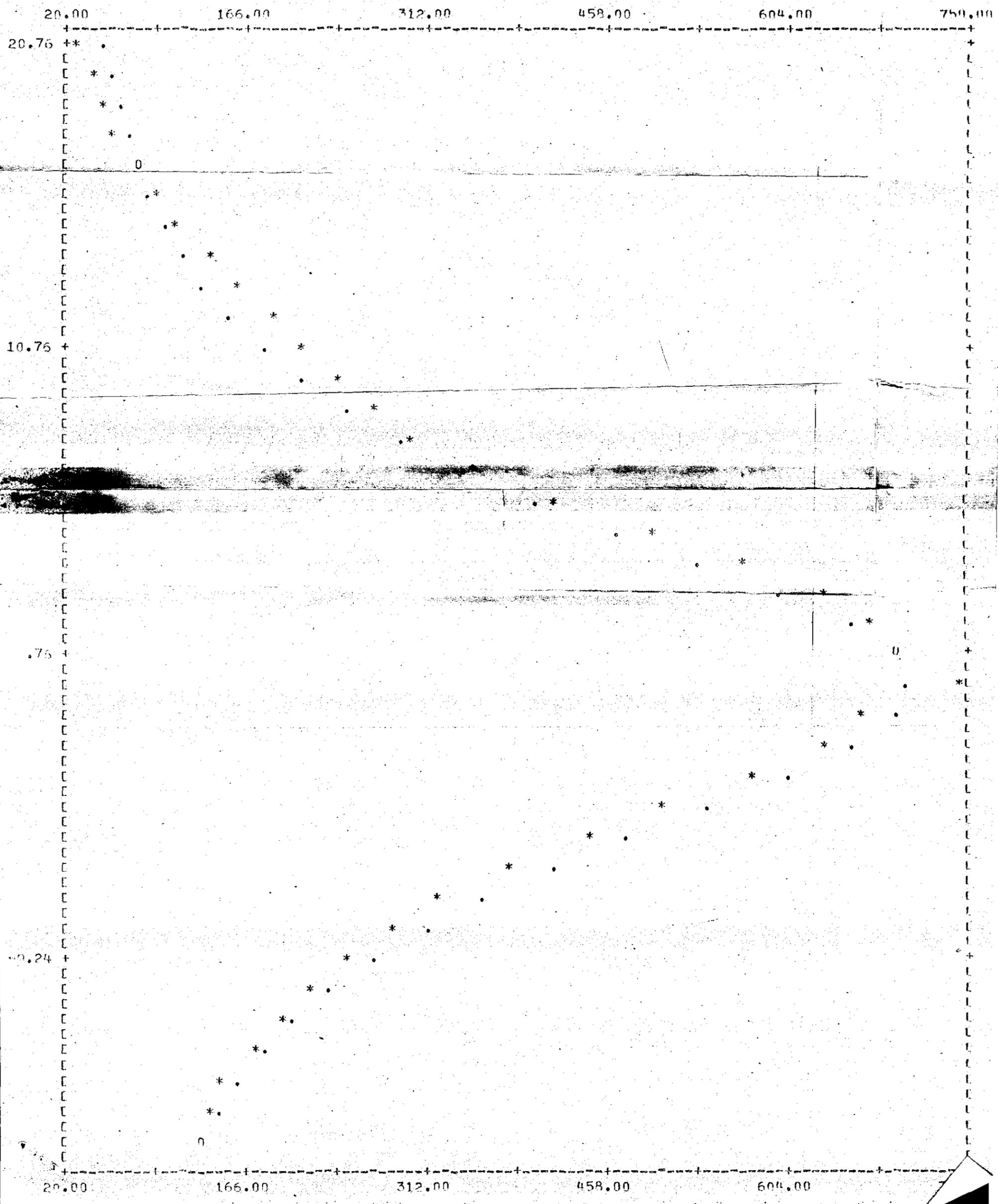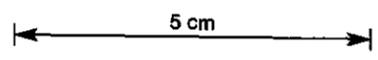LEAST SQUARES FIT   *** VERTICAL COMPONENT ANOMALY

A PLOT OF THE INPUT AND MATCHED DATA REDUCED TO A COMMON BASE LEVEL

INPUT PLOTTED AS   *
MATCHED DATA AS   .
COINCIDENT POINTS AS 0

|←——— 5 cm ———→|

DATA TO BE MATCHED   718014

285.00	295.00	305.00	315.00	335.00
350.00	365.00	390.00	415.00	440.00
465.00	495.00	525.00	555.00	600.00
670.00	750.00	820.00	890.00	925.00
945.00	995.00	920.00	885.00	830.00
760.00	700.00	635.00	575.00	535.00
500.00	470.00	450.00	425.00	400.00
390.00	385.00			

013

INITIAL FIT PARAMETERS

TOTAL AMBIENT FIELD IN GAMMAS =   62400.0
FIELD INCLINATION IN DEGREES =   -71.0
THE STATION INTERVAL IN METERS =   50.00
THE ANGLE BETWEEN MAG NORTH AND THE X AXIS =   60.0
THE ANGLE BETWEEN THE DATA PROFILE AND DIP =   -.0
THE NUMBER OF DATA POINTS =   37
THE INITIAL BASE LEVEL IN GAMMAS =   300.00
THE MINIMAX DISTANCE (IN STATION INTERVALS) =   21.0
THE DISTANCE FROM THE INITIAL POINT TO XMAX =   21.0
THE INITIAL VALUE OF ALPHA =   45.0

ITERATIONS

ERROR	DEPTH	ALPHA	HALFWIDTH	MINIMAX
39.25	130.75	72.67	280.14	21.0
36.35	138.91	74.78	282.83	24.0
34.39	145.60	76.25	283.90	27.0
33.01	151.36	77.40	284.02	30.0
31.99	156.52	78.34	283.53	33.0
31.21	161.26	79.12	282.64	36.0
30.58	165.69	79.78	281.49	39.0
30.08	169.87	80.34	280.13	42.0
29.65	173.85	80.82	278.64	45.0
29.28	177.66	81.25	277.05	48.0
28.95	181.33	81.62	275.40	51.0
28.66	184.87	81.96	273.69	54.0
28.40	188.30	82.26	271.94	57.0
28.15	191.63	82.54	270.16	60.0
27.93	194.86	82.79	268.36	63.0
27.72	198.00	83.02	266.54	66.0
27.52	201.07	83.23	264.71	69.0
27.33	204.06	83.42	262.87	72.0
27.15	206.98	83.60	261.02	75.0
26.98	209.85	83.77	259.17	78.0
26.82	212.65	83.92	257.31	81.0
26.66	215.40	84.07	255.44	84.0
26.51	218.11	84.21	253.57	87.0
26.37	220.77	84.33	251.69	90.0
26.23	223.39	84.45	249.79	93.0
26.10	225.97	84.57	247.89	96.0
25.97	228.52	84.68	245.98	99.0
25.84	231.04	84.78	244.05	102.0
25.72	233.54	84.87	242.11	105.0
25.61	236.02	84.97	240.15	108.0
25.49	238.48	85.05	238.17	111.0
25.39	240.92	85.13	236.17	114.0
25.28	243.36	85.21	234.14	117.0
25.18	245.78	85.29	232.08	120.0

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718016

STATION	POSITION	INPUT	CALCULATED	ERROR
1	20.76	33.64	52.84	-19.20
2	19.76	43.64	58.59	-14.95
3	18.76	53.64	65.20	-11.56
4	17.76	63.64	72.85	-9.21
5	16.76	83.64	81.75	1.89
6	15.76	99.64	92.17	6.47
7	14.76	113.64	104.43	9.21
8	13.76	138.64	118.95	19.69
9	12.76	163.64	136.25	27.40
10	11.76	188.64	156.95	31.69
11	10.76	213.64	181.86	31.79
12	9.76	243.64	211.87	31.77
13	8.76	273.64	248.04	25.61
14	7.76	303.64	291.37	12.27
15	6.76	348.64	342.62	6.03
16	5.76	418.64	401.78	16.86
17	4.76	498.64	467.40	31.24
18	3.76	568.64	535.86	32.78
19	2.76	638.64	601.13	37.51
20	1.76	673.64	655.57	18.07
21	.76	693.64	691.73	1.91
22	-.24	743.64	704.37	39.27
23	-1.24	668.64	691.87	-23.23
24	-2.24	633.64	656.63	-22.99
25	-3.24	578.64	604.41	-25.77
26	-4.24	508.64	542.69	-34.05
27	-5.24	448.64	478.62	-29.98
28	-6.24	383.64	417.51	-33.87
29	-7.24	323.64	362.37	-38.73
30	-8.24	283.64	314.34	-30.70
31	-9.24	248.64	273.34	-24.70
32	-10.24	218.64	238.71	-20.07
33	-11.24	198.64	209.57	-10.93
34	-12.24	173.64	185.04	-11.40
35	-13.24	148.64	164.34	-15.70
36	-14.24	138.64	146.79	-8.15
37	-15.24	133.64	131.83	1.81