

REPORT NO. 2
INTERPRETATION OF AEROMAGNETIC SURVEY
OF
BLOCK I , NORTHWEST TERRITORIES, CANADA
AEROMAGNETIC SURVEYS, LIMITED
AND ASSOCIATES
JULY 24, 1953

GRAVITY METER EXPLORATION COMPANY
Houston, Texas

SUMMARY

Report No. II covers the interpretation of the aeromagnetic survey of that portion of Block I, Northwest Territories, included within longitudes 122° W - 123° W latitudes 60° N and 60° 40' N. This includes Sheets 5 through 8 of the entire survey of sixteen individual sheets.

The interpretation provides a structural map of the basement surface, showing the regional configuration of that surface, contoured at an interval of 2000 ft from estimates of the sedimentary thickness calculated from the magnetic data. Local areas of interest, indicative of local relief of the basement surface are also shown.

The regional basement map develops a generally westward dipping basement, indicated in Report No. I for the easternmost area of that report. The basement surface dips from approximately -10,000 ft to -16,000 ft across the area of this report with two prominent positive nosings, one in the northern portion of Sheet 6 and the second in the northern portion of Sheet 8, where the 10,000 ft level of the basement is projected abnormally westward.

The local features are very low-graded principally because of the sharp (shallow?) disturbances in the observed magnetic data. These seriously handicap dependable resolution of local basement anomalies. Two of the three good anomalies are in Sheet 5, namely 22G and 27G where the basement is estimated to be between -8000 and -10,000 ft.

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MAPS

- 1. Observed Aeromagnetic Map, with local anomalies superimposed, Sheets 5 through 8, scale 1" = 1 mile; observed data contoured at interval, 10 gammas; residual anomalies contoured at interval, 5 gammas.
- 2. Second Vertical Derivative Aeromagnetic Map, with outlines of local areas of interest superimposed, Sheets 5 through 8, scale 1" = 1 mile, contour interval 2×10^{-15} cgs.
- 3. Structural Contour Map on the Basement Surface, preliminary, with structural basement contours (interval, 2000 ft; datum, sea level) individual magnetic depth estimates, and local areas of interest superimposed on a composite of the sixteen observed magnetic maps, scale 1" = 3 mile.

not to be used

INTRODUCTION

This report, No. 2, continues the interpretation of the aeromagnetic data of Block 1, Northwest Territories. Report No. 1 was submitted on February 26, 1953, and covered Sheets 1 through 4 of the 16 sheets comprising the survey. This report covers Sheets 5 through 8. Reference should be made to Report No. 1 for the general concepts upon which the interpretation is based and for a description of the method of presenting the results.

THE OBSERVED AEROMAGNETIC MAPS (Sheets 5 through 8)

The observed magnetic data, contoured at an interval of 10 gammas, is dominated by a generally westward decreasing gradient. This general trend is extremely disturbed by a positive nosing in Sheet 8 with an amplitude of approximately 400 gammas and by a smaller nosing in the NW/4 of Sheet 6 with an amplitude of less than 200 gammas. Both of these positive magnetic noses are also the location of regional basement noses on the Basement Structural Contour Map.

The observed data are conspicuously disturbed by sharp anomalies distributed at random over the entire area. These are especially apparent in Sheets 5 through 7 where the observed data are of low relief. Examination of these data shows that these distortions originate from near-surface effects and also apparently from turbulence during the flying operations, either of the air or of the magnetic field itself. The near-surface effects are attributed to inhomogeneities of the glacial cover. Many of the shallow effects can be correlated with systems of rivers as shown on the observed map.

The residual magnetic features are superimposed on the observed magnetic maps and will be discussed in a later section.

SECOND VERTICAL DERIVATIVE AEROMAGNETIC MAP (Sheets 5 through 8)

This map is seriously influenced by the sharp disturbances discussed in the previous section. These almost completely mask basement magnetic effects with the exception of Sheet 8 where the large observed magnetic positive anomaly is strong enough to be represented on the derivative map.

The outlines of the local areas of interest are shown on the derivative map. The small degree of correlation of the outlines with the derivative pattern is evidence of the serious effect of the sharp distortions of the observed data on the derivative calculations.

THE STRUCTURAL CONTOUR MAP ON THE BASEMENT SURFACE

This report carries the basement contours from Sheets 1 through 4 into Sheets 5 through 8. These results are presented on a composite of the sixteen individual sheets, scale 1" = 3 miles. The basement is mapped at an interval of 2000 ft. below datum. The basement depth estimates upon which the contours are based are shown underlined by three, two and one underlines for good, fair and poor dependability. A fourth category is followed by the letter "U" which indicates that the estimate was made with the assumption that a local basement uplift was present. In addition the local basement features have been added to show their relationship to the regional basement configuration.

In general the basement has a gentle westward dip from a level of -10,000 ft on the east to -16,000 ft on the west. This gradient is distorted in the northern part of the area by a general rising in the northern portion of Sheet 6 north of which the basement is contoured with a northeast strike. The basement is approximately at -6000 ft at the northern limit of the strip. Also the general westward dip is distorted by a prominent

noting on the large observed anomaly of Sheet 8 where the basement is shown at -10,000 ft as compared to approximately -16,000 ft in the southwest corner of Sheet 8.

THE RESIDUAL MAGNETIC ANOMALIES (Sheets 5 through 8)

The residual magnetic anomalies are superimposed on the observed magnetic data and contoured at an interval of 5 gammas. In addition to the contours, the outline of the related area of interest is shown. This outline is the periphery of the postulated basement relief that could cause the anomaly. Again, the anomalies are graded "G", "F", and "P" for "Good", "Fair", and "Poor". The outlines of the local areas of interest are also shown on the Second Vertical Derivative Aeromagnetic Map, and the following table contains comments on each of the anomalies after consideration of their residual and derivative appearances.

Table 1: Residual Anomalies

<u>No.</u>	<u>Location</u>	<u>Remarks</u>
17P	Sheet 5	The relief of the anomaly is 25 gammas. However, it is on the northern boundary of the survey and cannot be highly graded because it is incomplete.
18P	Sheet 5	Fault, downthrown to the northeast, indicated by a magnetic anomaly of approximately 30 gammas. Its high amplitude results in an excellent derivative representation.
19P	Sheet 5	A fault complementary to 18P, downthrown to the southwest, with a magnetic anomaly of approximately 15 gammas. This is graded poor because of the relatively weak magnetic anomaly.
20P & 21P	Sheet 5	Both of these anomalies have an amplitude of about 10 gammas and are oriented northeast, perpendicular to the general regional strike.


"G", "F", and "P", Good, Fair and Poor

<u>No.</u>	<u>Location</u>	<u>Remarks</u>
22G	Sheet 5	Probably the best anomaly of the group with an excellent corresponding derivative anomaly. The basement is estimated to be at approximately -8800 ft by estimates made on this feature.
23F	Sheet 5	A small fault indication approximately continuous with the southern flank of 22G.
24F	Sheet 5	This anomaly is downgraded to poor because it has good possibilities of being an intrabasement feature.
25F	Sheet 5	A fault anomaly with an amplitude of 25 gammas. The fault is downdropped to the north. It has an excellent derivative representation.
26F	Sheet 5	Fault, downdropped to the north and northeast.
27G	Sheet 5	Probably the second best residual feature with northwest orientation, a corresponding derivative anomaly, and consistent indications on the observed magnetic data.
28F	Sheet 5	A small fault, down to the north, of minor significance.
29F	Sheet 6	Probably the best of the fair anomalies. The basement is estimated to be at -8600 ft on this anomaly.
30F	Sheet 6	A poor indication of a fault, downdropped to the southwest, probably caused by surface effects related to the Mateo River drainage system.
31F	Sheet 6	The poor derivative expression is suggestive of the inconsistent evidence of this anomaly on the observed data.
32F, 33F, 34F, 35G, 36F, 37F, and 11F	Sheet 6	A series of anomalies which approximately follow the trend of the Llano River and are, therefore, probably caused by near-surface effects. No. 36F has a depth estimate of -2500 ft. One of the anomalies, namely 35G, is broad and very well developed and is expected to have the highest degree of reliability of this group.
36F	Sheet 6	A small fault, downdropped to the south-southwest, which continues the southern flank of 12G.
37F	Sheet 6	A rather good fault anomaly with a fault, downdropped to the south, along which depth estimates of -12,700 ft have been made.

<u>No.</u>	<u>Location</u>	<u>Remarks</u>
40P	Sheet 6	A fault anomaly which is included to show the relationship of some of the residual magnetic effects to river patterns. A depth estimate of -4000 ft was made on this anomaly.
41P	Sheet 6	Another indication of faulting, downdropped to the south and toward a major river, which is included to illustrate the possible correlation between rivers and shallow anomalies. However, a depth estimate of -11,000 ft was made on this anomaly, which does not confirm the river correlation.
42P	Sheet 7	A rather continuous indication of faulting, down to the southwest and south, with an amplitude of approximately 15 gammas. No surface correlation is indicated.
43P	Sheet 7	This anomaly is inconsistently represented by the observed magnetic data. It has a good derivative expression and abnormal depth estimates of -9,000 ft.
44P	Sheet 7	An extremely weak magnetic anomaly of 5 gamma amplitude.
45P	Sheet 7	A small fault, downdropped to the north, with the basement estimated at -10,800 ft.
46P	Sheet 7	The anomaly has good orientation but is very inconsistently expressed.
47P	Sheet 7	This is a weak anomaly, best developed in its southeast portion where, however, it is roughly parallel to a major river.
48P	Sheet 7	A weak fault indication with the downdropped side to the south. The related magnetic anomaly has an amplitude of about 15 gammas.
49P & 51P	Sheets 7 & 8	Two fault traces, both downdropped to the northeast, both rather continuous but with weak magnetic anomalies of approximately 10 gammas. They may be sympathetic to the regional high to the south.
50P	Sheet 8	This is another poor anomaly included to show the correlation between residual anomaly and a major river.

<u>No.</u>	<u>Location</u>	<u>Remarks</u>
52P	Sheet 8	This is on the western end of a regional basement high. The sharper east flank of the anomaly occurs over a river and seriously disfavors the anomaly.
53P	Sheet 8	A fault, downdropped to the south, suggested by a magnetic anomaly of 20 gamma relief which is apparent on the observed data.
54P	Sheet 8	This anomaly must be downgraded because of its location on the boundary of the survey.
55F	Sheet 7	This is the beginning of an anomaly which occurs mostly on Sheet 11. The basement was estimated to be at -9700 ft.

GRAVITY METER EXPLORATION COMPANY



Nelson C. Steenland



589-0-4-2

SECOND VERTICAL DERIVATIVE MAP

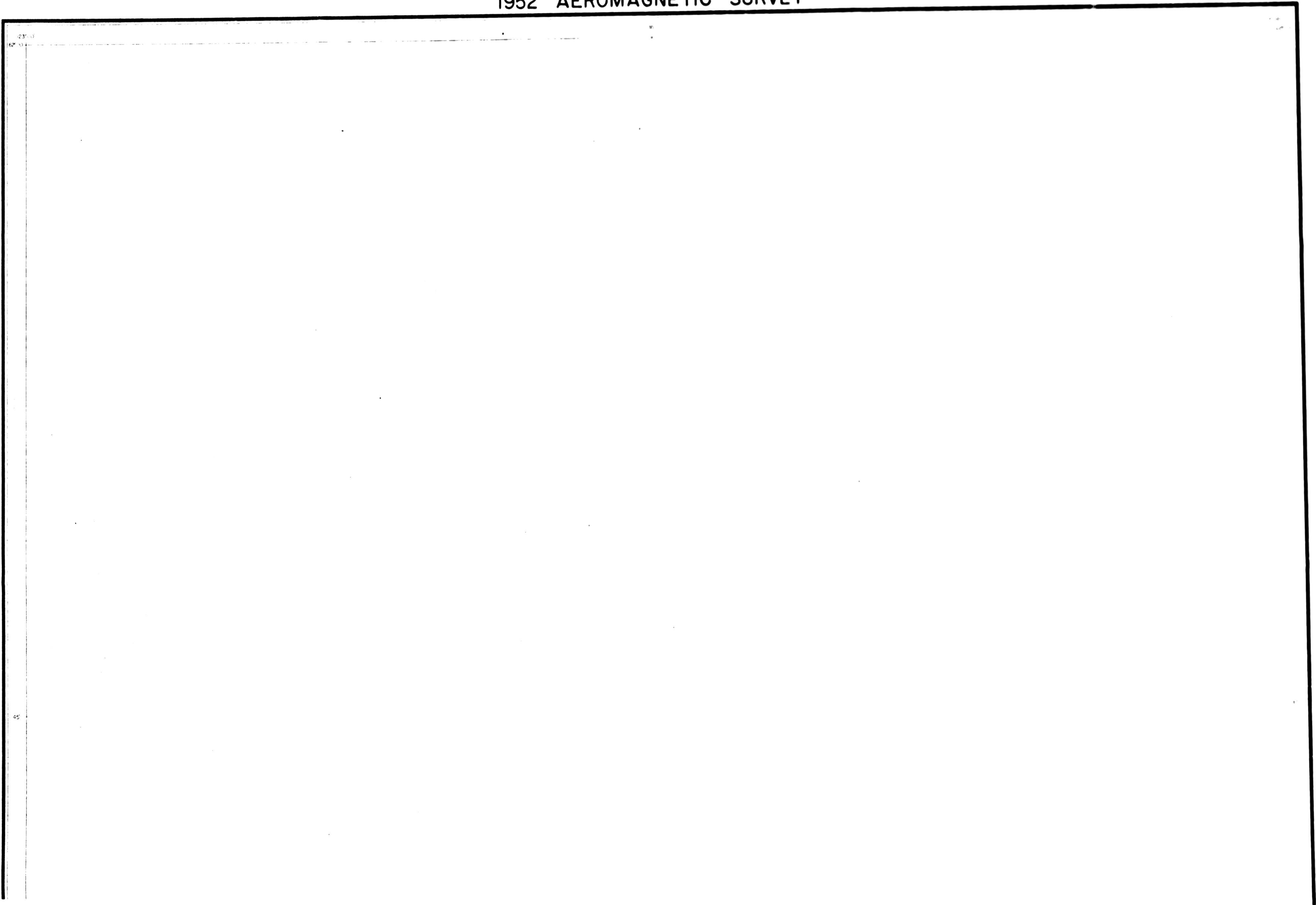
CONTOUR INTERVAL 2×10^5 CGS

CALCULATED BY
GRAVITY METER EXPLORATION COMPANY
HOUSTON, TEXAS
REPORT July 26, 1963

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2	6	10	14
3	7	11	15
4	8	12	16

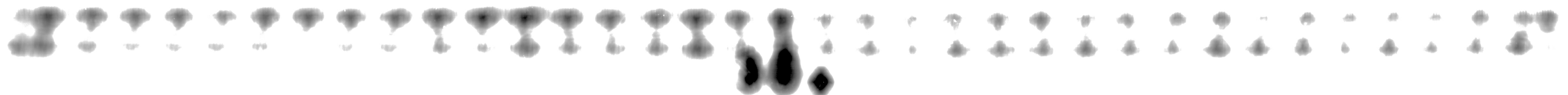
SIMPSON - LIARD AREA, N.W.T
1952 AEROMAGNETIC SURVEY

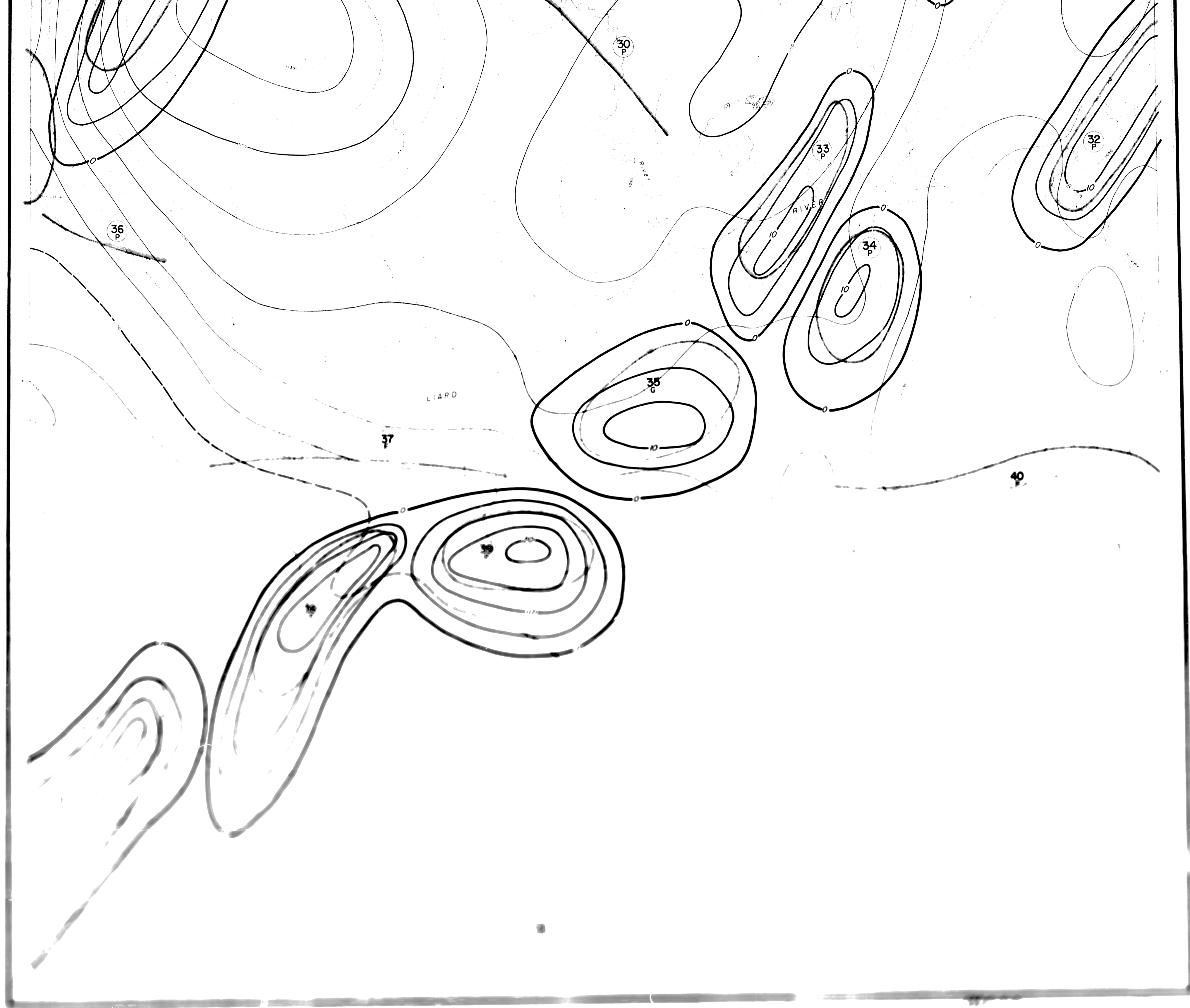


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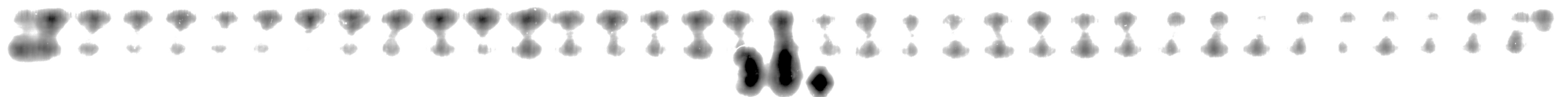
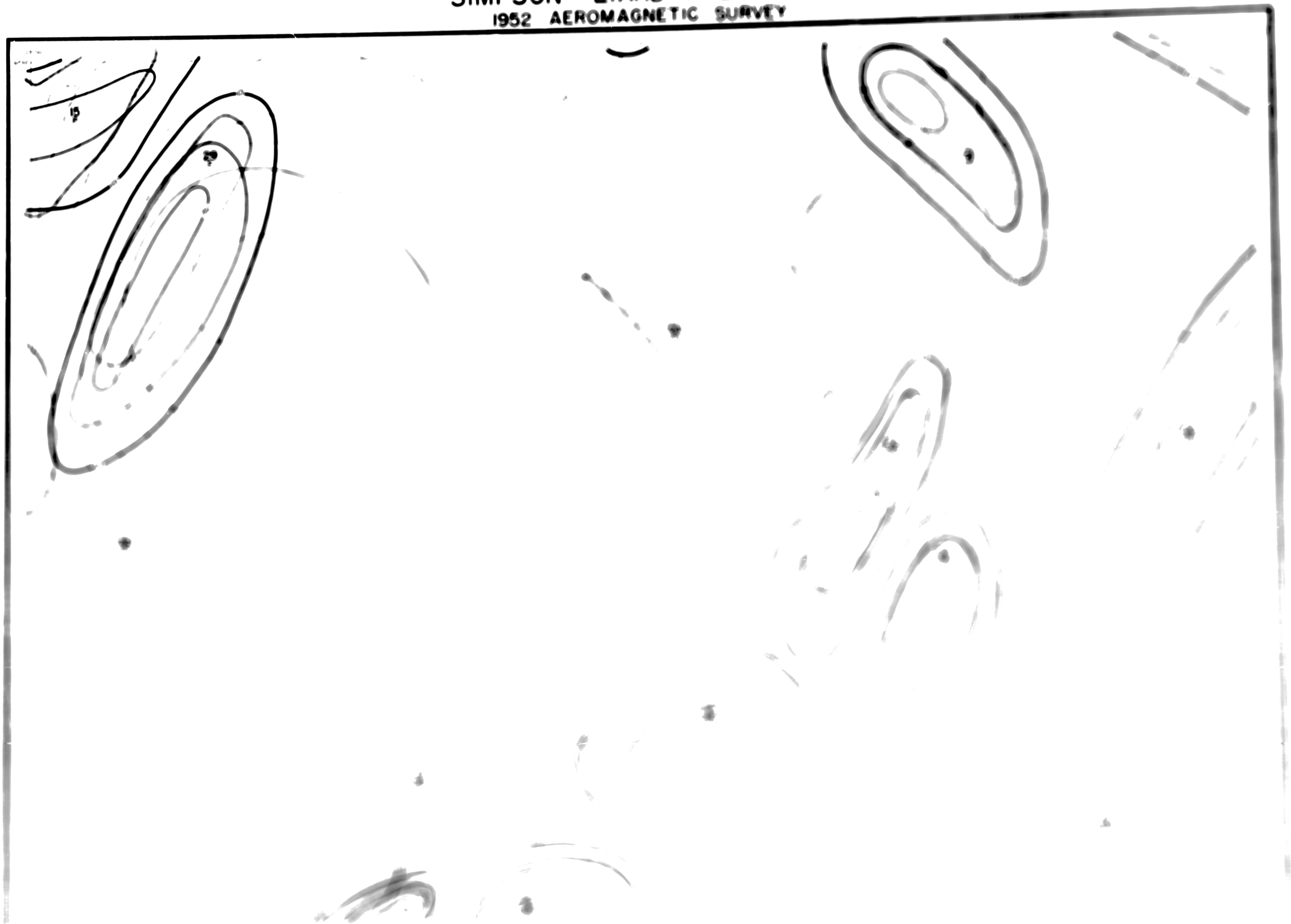
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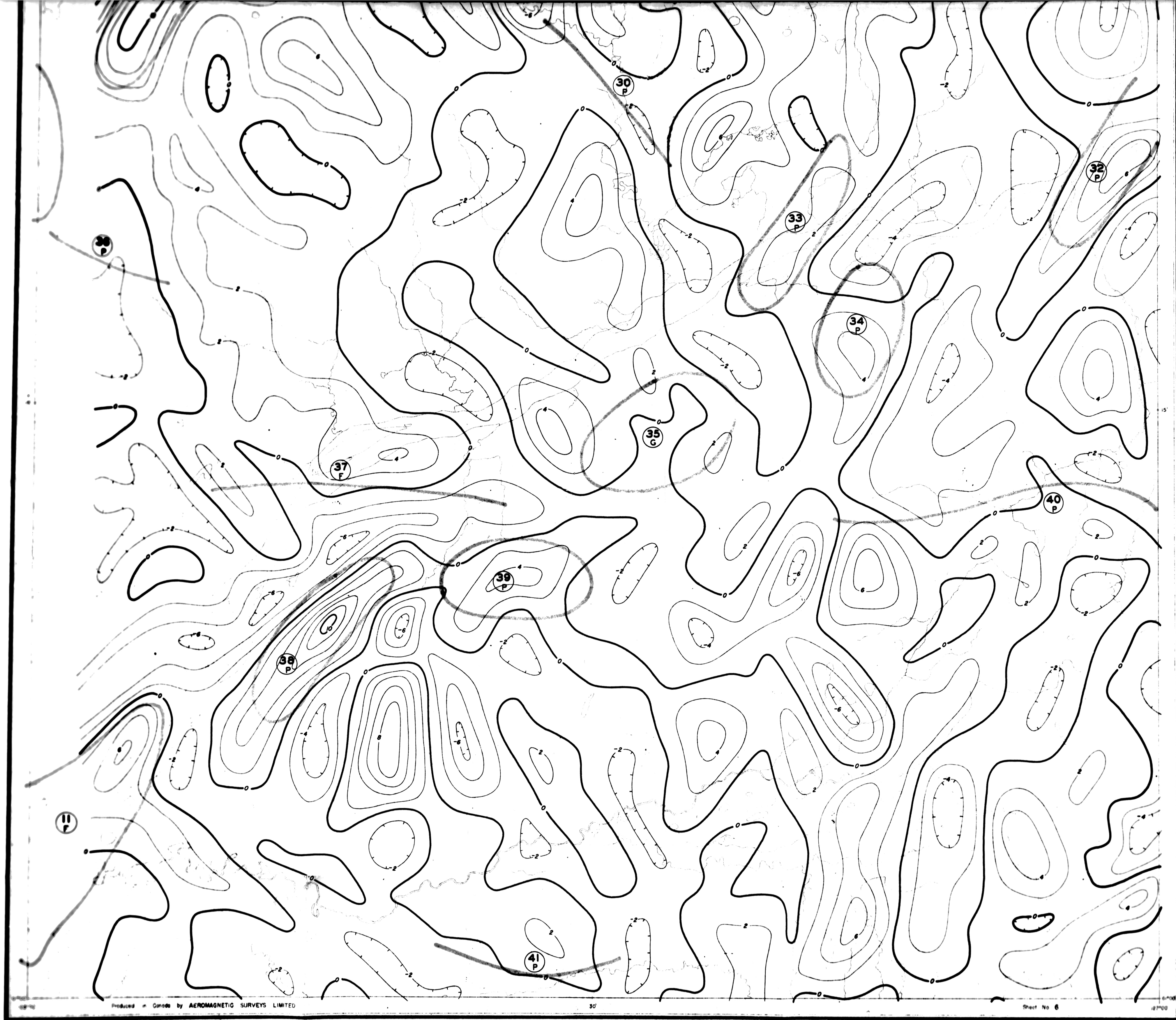
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SIMPSON - LIARD AREA. NWT
1952 AEROMAGNETIC SURVEY





589-5-4-2

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1:600,000

1:800,000

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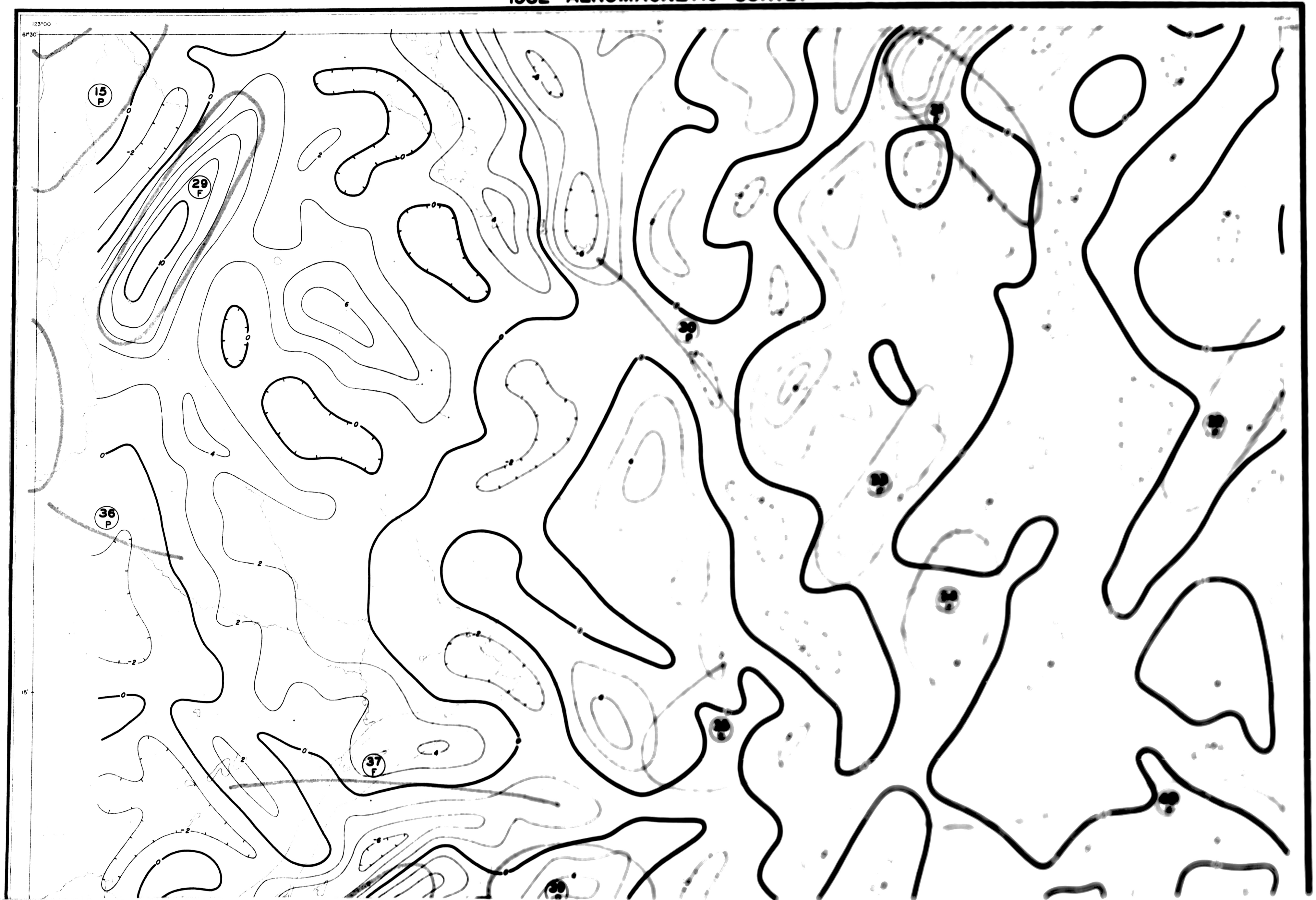
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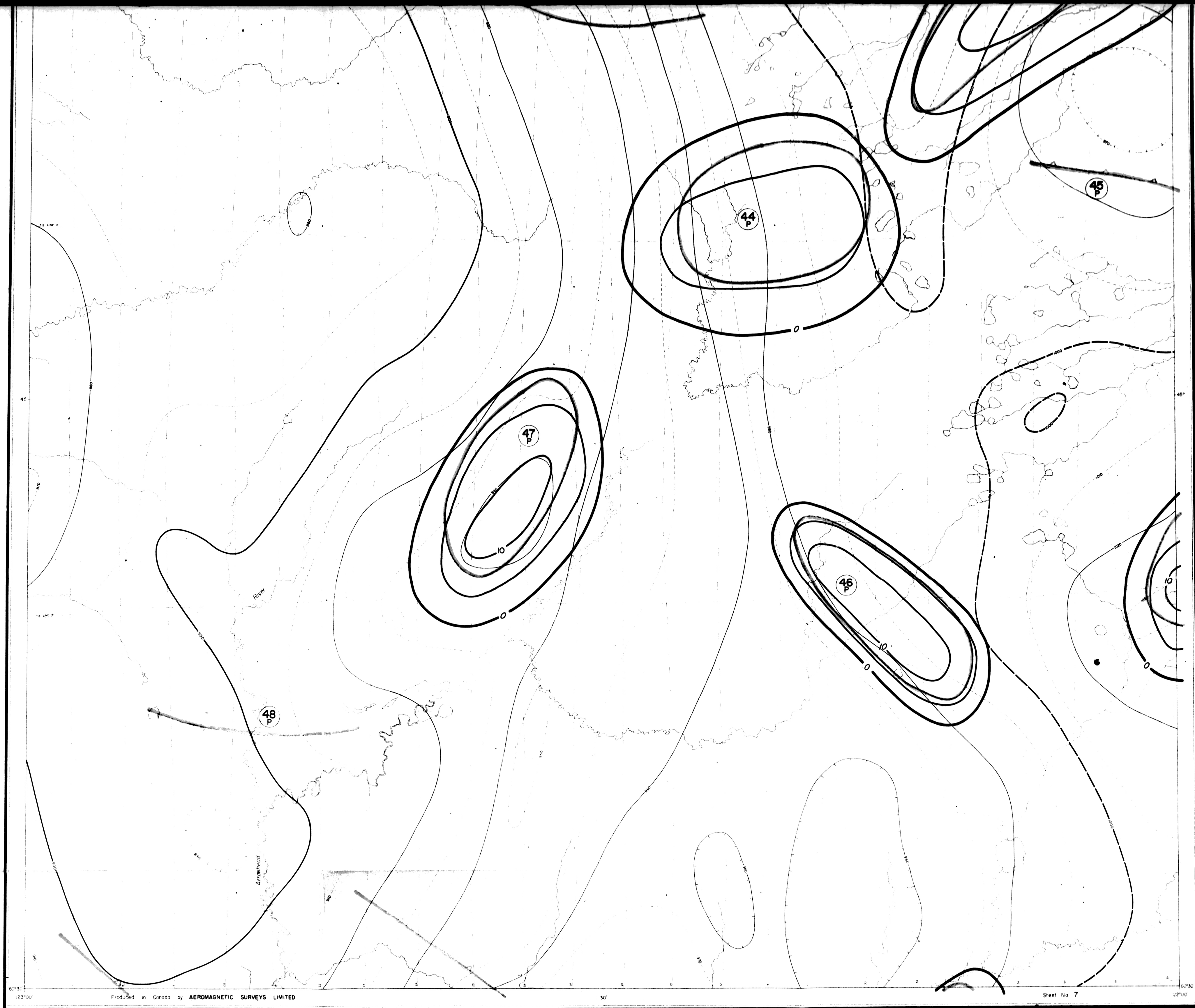
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SIMPSON - LIARD AREA, N.W.T.
1952 AEROMAGNETIC SURVEY





MEAN FLIGHT LINE SPACING 1/4 MILES
 ALTITUDE 3500 FEET ABOVE SEA LEVEL
 500 GAMMA CONTOUR
 100 GAMMA CONTOUR
 20 GAMMA CONTOUR
 10 GAMMA CONTOUR
 MAGNETIC LOW
 FLIGHT LINES

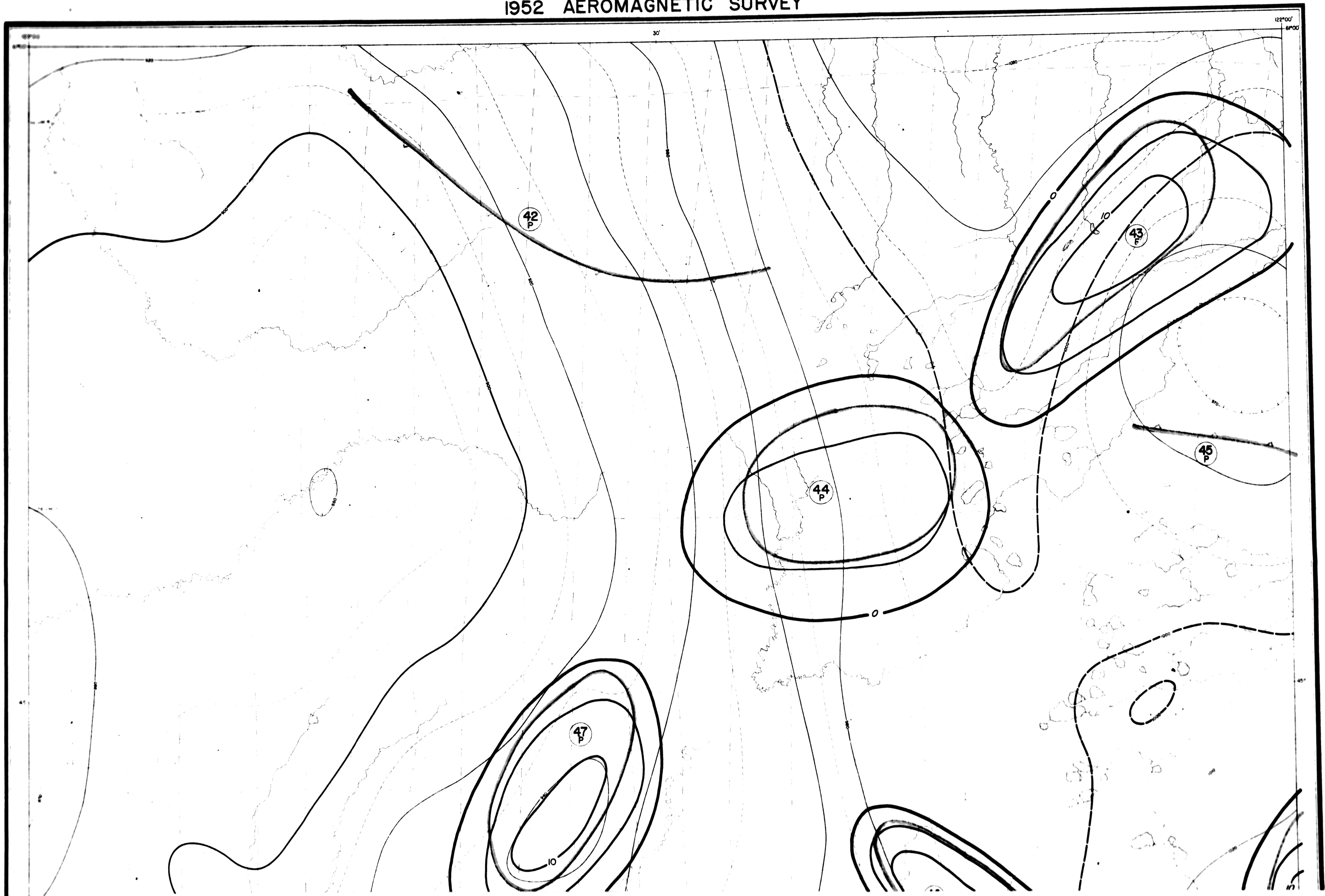
SCALE
 1 Inch to 1 Mile
 MILES

571-6-1-2
 RESIDUAL MAGNETIC ANOMALIES
 CONTOUR INTERVAL 5 GAMMAS
 LOCAL AREA OF INTEREST
 FAULT
 INTERPRETED BY
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 HOUSTON, TEXAS
 REPORT: JULY 24, 1963

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SIMPSON - LIARD AREA, N.W.T.
1952 AEROMAGNETIC SURVEY

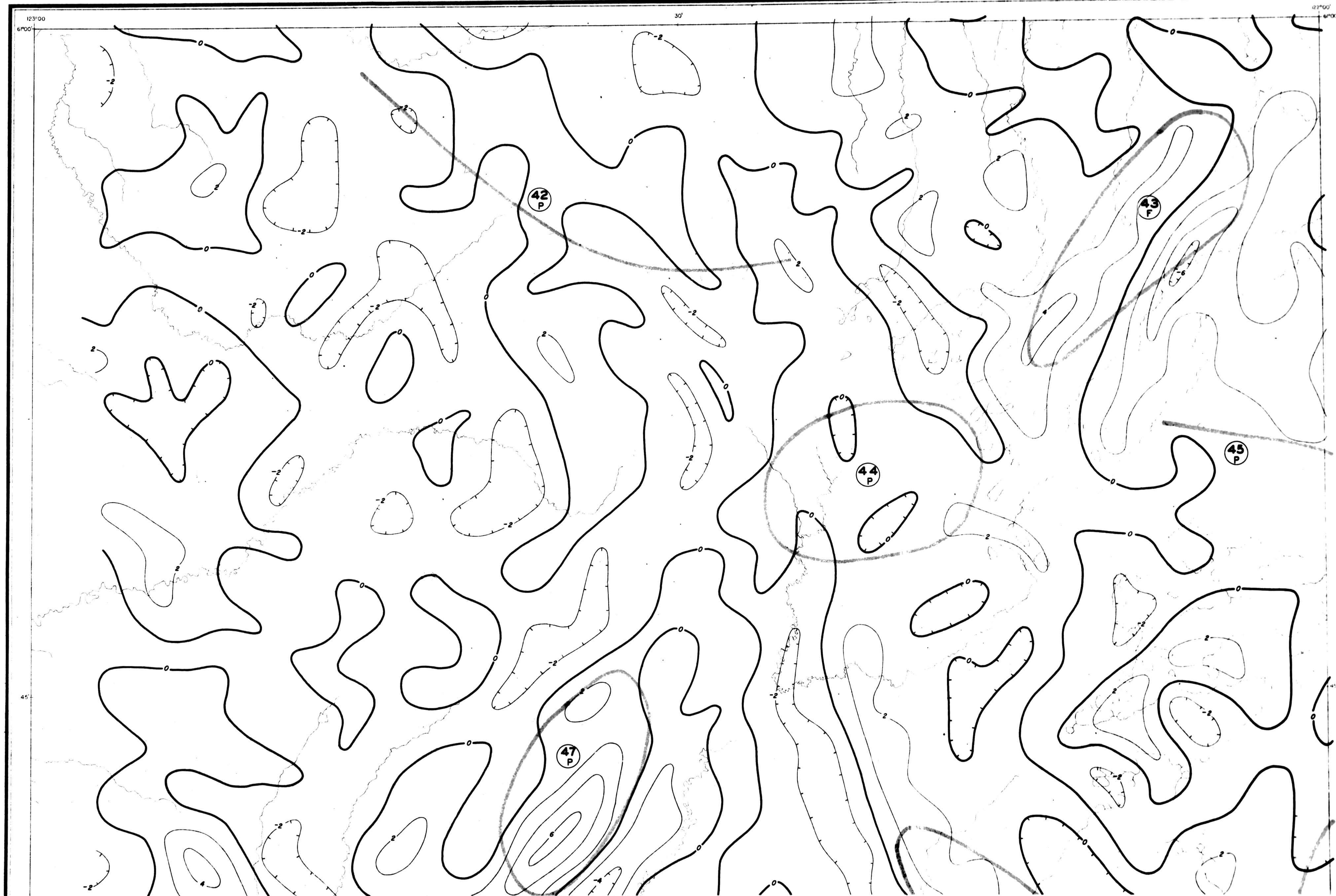


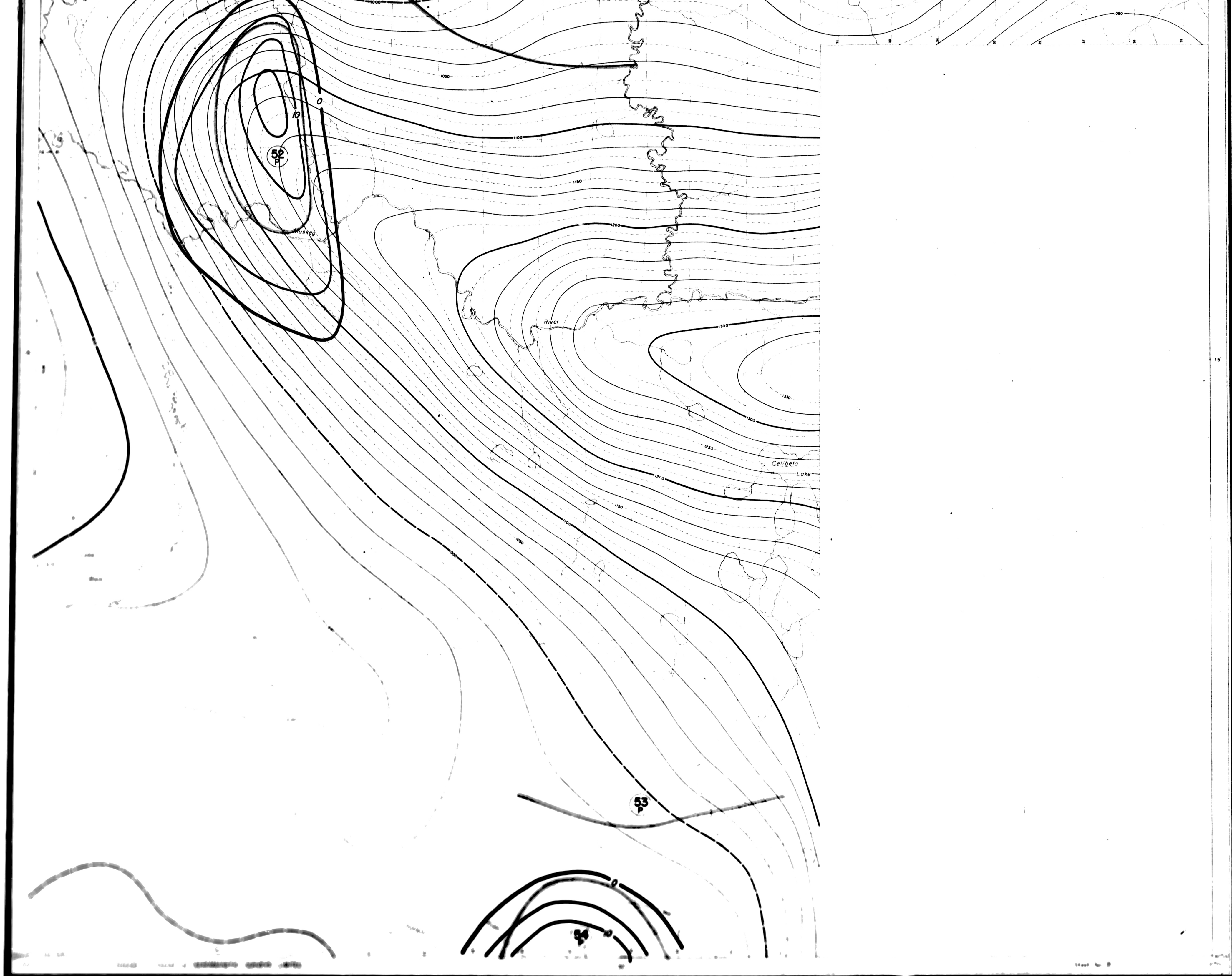


MEAN FLIGHT LINE SPACING ... 1 1/2 MILES
 ALTITUDE ... 3000 FEET ABOVE SEA LEVEL
 500 GAMMA CONTOUR ...
 100 GAMMA CONTOUR ...
 20 GAMMA CONTOUR ...
 10 GAMMA CONTOUR ...
 MAGNETIC LOW ...

AEROMAGNETIC SURVEY

SIMPSON - LIARD AREA, N.W.T.
1952 AEROMAGNETIC SURVEY





57-8-0-2
RESIDUAL MAGNETIC ANOMALIES
CONTOUR INTERVAL 5 GAMMAS
LOCAL AREA OF INTEREST
MAP
INTERPRETED BY
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MUSKOGEE, OKLA. 74451
NOV 68

SIMPSON - LIARD AREA, NWT
1952 AEROMAGNETIC SURVEY

