REINTERPRETATION
GRAVITY AND AEROMAGNETIC SURVEYS

O.P. 63

for

ALLIANCE PETROLEUM
AUSTRALIA N.L.

by

L. J. STARKEY
INDUSTRIAL GEOPHYSICAL SURVEYS PTY. LIMITED.

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INTRODUCTION :

The area covered in this report consists mostly of Tobermory 4 mile sheet and approximately a third of Sandover River 4 mile sheet extending from longitude 136° 40' E to 138° 00' E and from latitude 21° 40' S to 23° 00' S.

The aim of this study is to correlate all the geophysics that has been carried out in the permit and to recommend areas for further geophysical surveying.

GEOLOGY :

This section has been obtained from a geophysical report of the area written by R.B. Wilson of Geosurveys of Australia Limited, December, 1963. The Geological map of the area at 4 mile to the inch is at Plate 1.

The area consists of two sections ; First, the Pre-Cambrian Metamorphic and igneous rocks, and secondly ; A sedimentary sequence ranging from Upper Proterozoic to Cainozoic. The south western margin of the area contains a Palaezoic sequence of sediments ranging from Cambrian to Upper Devonian times, while the northern section of the area contains sediments of Cambro-Ordovician ages. Thin veneers of Mesozoic sediments are found preserved throughout OP 63. Vast areas of OP 63 are covered by sand plains with some minor dune developments.

STRATIGRAPHY

1) Pre Cambrian Metamorphic and Igneous Rocks.

Outcrops of Archean Metamorphics are confined to two areas within OP 63, one east of the Tarlton Fault and the other approximately seven miles north west of Craigee Dam. The rocks consist of steeply dipping mica schist, meta quartzite and various types of gneiss including granite gneiss injected with granite and pigmatites. Lower Proterozoic granite and pigmatites and quartz reefs intrude metasediments of the Arunta complex west of Tarlton fault.

2. Sedimentary Rocks - Upper Proterozoic.

The upper Proterozoic has been subdivided into two main formations, the lower most Field River Beds and the Grant Bluff Formation.

The Field River beds consist of greenish siltstones, tillite, arkose, sandstone and dolomite. The measured section of the Field River beds varied from 500 to 2,200 feet.

The Grant Bluff Formation is greenish, flaggy, medium grained sandstones and siltstone. The thickness of the section measured at Keepeera Ridge totals some 1,500 feet.

Palaezoic.

a) Cambrian - The Cambrian beds have been divided into two sections ; the Marqua beds and the Arrinthrunga Formation. The Marqua Beds are the oldest outcropping fossiliferous Palaezoic sequence in OP 63. The section 542 feet consists of Limestone, sandstone with shales and chert. The Arrinthrunga Formation is a thick carbonate sequence and its thickness varies from 248 feet to 3552 feet. It consists of Marls, Calcarenite and Calcenous sandstones.

b) Cambro Ordovician - This has been divided into two formations ; the Nimaroo Formation and the Tomahawk Beds. This is a group of essentially carbonate rocks. The Nimaroo formation consists of approximately 200 feet of thin bedded friable medium grained, glauconitic sandstone containing rich trilobite fauna overlaid by a carbonate sequence of thick and current bedded dolarenites and calcarenites. A thickness of 818 feet has been recorded.

The Tomahawk beds consist essentially of massive dolomite, dolarenite and calcarenite with interbedded fine grained laminated sandstones. A thickness of 300 feet has been seen.

c) Ordovician : The Ordovician is divided into the Kelly Creek Formation, the Coolibah Formation, the Nora Formation, Carlo Sandstone and the Mithaka formation.

The Kelly and Coolibah formations are of lower Ordovician age. The Kelly formation consists of a prominent sandstone overlain by calcomites and dolarenites with chert. At one section at least 588 feet of section has been exposed.

The Coolibah Formation consists of medium to thick sets of dense calcilutite with marly limestone bands. A section of 34 feet has been measured and this varies to 100 feet.

The remaining Nora Formation, Carlo Sandstone and Mithaka Formation are of Middle Ordovician age.

The Nora formation is composed of soft and silty beds, thin bedded fine grained sandstone and siltstone, above which are thin bedded siltstones and sandstones. A thickness of 200 feet has been recorded.

The Carlo Sandstone conformably overlies the Nora Formation and consists of thick and current bedded, medium grained clean white sandstone. Thicknesses of 100 feet to 200 feet have been recorded.

The Mithaka Formation consists of 25 feet of fine grained yellow well bedded sandstone above which we have gysiferous siltstones and interbedded fossiliferous sandstones. There is evidence of Upper Devonian sediments occuring in the permit, however, their position is not very clear.

d) Mesozoic and Cainozoic sediments - A relatively thin group of sediments of Mesozoic and Cainozoic age has been studied and discussed in the report by R.B. Wilson.

STRUCTURE:

The structure of the permit has been studied in fine detail by R.B. Wilson (as mentioned previously). The upper Proterozoic and lower Palaezoic are only broadly deformed except in the vicinity of a number of faults and monoclines. The major part of the faulting is to be found in the southern half of the Tobermory four mile sheet. Here the Toomba, Marqua, Crargie and Tarlton Faults are located. These faults tend in a north westerly fashion. In the Toko Range area are located another series of minor faults which tend east west.

The major broad structure of OP 63 is the Toko Range syncline, the axis of which tends north west. Dips on the western edge are steep while the eastern edge is only gently dipping. Minor trending anticlines and synclines are associated with this.

A very broad regional syncline is found in the Tarlton Ranges. Dips to the north and the south west have been found indicating a very broad but a poorly defined syncline.

A well defined east west trending anticline passes near Beautree and Mulger Bores. Other minor folds have been located and are marked on the geological map. Plate 1.

GRAVITY :

TYPE OF SURVEY : There are two types of survey studied in the area. The major survey was carried out by helicopter readings every five miles along a grid pattern. The minor survey consisted of a land survey along the major tracks. With the helicopter survey, heights were obtained from Micro-barometer. With the land survey levels were obtained by surveying. In the appendix for the principal facts the land survey values will be indicated as such.

SURVEY CORRECTIONS :

1) Latitude Corrections :

The latitude of each station was scaled off on the appropriate four mile sheet. They were estimated to 4 seconds of arc. The corresponding theoretical values were then obtained from the tables based upon the international Ellipsoid of 1938. The same method was used for both helicopter and ground surveys.

2) Height Corrections :

As mentioned previously there were two methods of height measurement, one by levelling and the other by micro-barometer. The height of the land survey station was obtained to a tenth of a foot while the helicopter values, although read to the nearest foot, would be accurate only to plus or minus 5 feet. On the original maps a Bouguer density factor of 0.0622 was used. Accompanying this report are two maps, one on a Bouguer density of 2.2 gm/cc and the other on a density of 2.4 gm/cc.

ACCURACY :

The accuracy of the results would be:

for Helicopter Stations

$$(c)^2 = \sqrt{(0.05)^2 + (1.2)^2 + (0.8)^2}$$

$$\therefore c = 1.2$$

for Ground Stations

$$(c)^2 = \sqrt{(0.05)^2 + (0.06)^2 + (0.08)^2}$$

$$\therefore c = 0.3$$

If further land work was completed the helicopter results would not be included in the new interpretation as the results would be of too low an accuracy. The knowledge that can be obtained from the helicopter work is only on a regional scale and small structures will be obscured or not show up at all.

RESULTS :

The results of the gravity surveys by the Bureau of Mineral Resources have been produced on Plates 2, 3 and 4. Plates 5 and 6 have the regional and residual values while text figure 6 has the depth contours as obtained from gravity calculations.

The Bouguer density map of 2.4 gm/cc will be used as the reference map. The remaining maps of 2.2 gm/cc and 1.9 gm/cc Bouguer density show minor mirroring of ground height.

This is noticed in two ways, firstly, as an error introduced by the wrong height estimation, and secondly, as an uncovered bouguer density factor. Figure 1 shows the relationship of the Bouguer density value with correction factor plotted against height. It is seen that to the west of station D 304 the gravity does not conform to the height. However, to the east there can be seen a relationship between height and Bouguer value. To evaluate this, let us take the height difference between stations D 307 and D 309. This amounts to 70 feet. This could not account for the size of the gravity anomaly, as at a density of 3.0 the anomaly would be 2.67 milligals. Therefore, an assumption would be that these high density sediments continue to sea level. The density contrast in this case is 1 gm/cc. If we assume a thick ordovician section, the Bouguer anomaly would then be reduced by 11 milligals. However, if this anomalous density occurs above sea level, it will likely occur to a depth roughly corresponding to the thickness of carbonaceous material. The gravity high even after this reduction still occurs at station D 309. The results are therefore interpreted on the basis of 2.4 Bouguer density.

Comparing the gravity profile with the geological section it is found that the Marshall River Low corresponds to the outcropping schists. The presence of the granite was not indicated and it is thought that the combination of the higher density carbonates plus the Field River bed gives a density of 2.66 gm/cc. Since geologically, a thin section of upper and middle Cambrian is expected, it is thought that the Field River beds are of higher density than the Archean schists. The results are studied on a basis of a Bouguer density of 2.4 gm/cc. A reduction of results with a Bouguer density of 2.66 gm/cc would add approximately 2.65 milligals to the readings. The zero base line of the residual would be moved slightly to the south and the residual gravity values over the middle and lower cover Cambrian sediments would have approximately zero residual anomaly. This emphasises the fact that the granite and the Field River beds have similar densities as well as the Upper and the Lower Cambrian sediments. The equivalent thickness for this density difference will be added to the depths to allow for the corrections when the density varies from the Bouguer density value of 2.4. For example, over the limestones or Ordovician age in the northern section of the Permit, this correction will be added because of the high density carbonates, while the section on the Toko Range will have no correction because of the presence of the low density Toko Beds. The Archean Basement depth has been calculated on the basis of the density contrast between the Field River Beds and the Archean schists. The Regional map indicates that the Archean Bedrock has an anomaly of minus 35 milligals. The depth to the schists increases as we approach the Toko Range syncline. It is estimated that there is about 12,000 feet of section above the schist. As we proceed north from the Toko Range, the section decreases to 6,000 feet in the Tobermory area. At Manner's Creek, still further north, the section increases to 8,000 feet. It again thins to 6,000 feet at the northern edge of the Permit.

The section has a depth of 5,000 feet in the Lucy Creek area. This then thickens to 12,000 feet four miles north of latitude 22° 15' S. on the western border. A basement ridge at a depth of 2,000 feet is found south east of Mount Hogarth running north east. An increase in section to 6,000 feet is found in the Maynards Dud Bore Area.

From the above interpretation the residual map will give the variation in thickness of Lower Ordovician limestones or the section with the greater amount of limestone present. However, to achieve an anomaly of + 14 milligals the section would have to be quite thick. It is therefore thought that the Nimaroo and Tomahawke Formations have a higher percentage of limestone and that the residual value therefore gives the thickness of this section. These sections have been completed using the above interpretation. These are indicated on the four mile maps as A.B.C.

OP 63 has two ridges of gravity high cutting the permit in an east west direction. The southern ridge consists of the gravity high in the Toko Range area and a thin gravity high in the Marshall River region. The Toko Range gravity high reaches a value of 0 milligals while the Marshall River high has a value of minus 15 milligals. Below the Marshall River high there is a region of low gravity. The lowest value being minus 30 milligals.

The northern gravity ridge crosses from Lucy Creek in the west to Manner's Creek in the east. There are four gravity closures along this ridge. One is situated at Lucy Creek, others at Stations D 368, D385 and one at Manner's Creek. Of these, Lucy Creek and D385 have the highest values.

Separating these two ridges we have a closed low east of Tarlton Downs and another closure at Tobermory. The values achieved in these two lows are minus 25 milligals and minus 20 milligals, respectively.

Residual Map : The residual map has been obtained by smoothing and removing the suggested regional trend. The smoothing was done visually and therefore admits off a limited personal bias. However, the accuracy of the helicopter stations do not warrant a mathematical estimation of the regional field. The main residual feature is a high which runs south west, from Embulka Waterhole to a point twelve miles north west of Tarlton Downs. The residual value is about 13 milligals to the north west. To the north east the gravity values fall. The gravity low paralleling the high was to the north west of the major feature. A minus ten milligal feature is found approximately four miles north of Lucy Creek.

An arch is found running east-west along the southern boundry of the permit. This region is a gravity low. To the south of Maynards Dud Bore is located a residual gravity high.

INTERPRETATION :

Density Contrasts :

From the geology as given on Page 2 it can be seen that we have at least two possible density contrasts. The first contrast would be between the Archean basement and the Upper Proterozoic Field River Beds. The second density contrast would be between the shales and sandstones of Upper Proterozoic age, and the Cambrian and Devonian carbonates. A possible contact could be found between the Archean schist and granite.

The lithology of the Archean sediments indicates that the density of 2.66 gm/cc for the granite and 2.64 gm/cc for the schist would not be unreasonable. From the pattern of gravity it is thought that the Upper Proterozoic should have a density of 2.66 gm/cc and a density of 2.8 gm/cc is assumed for the carbonate.

Qualitative :

The gravity low found on the south west corner of the permit coincides with outcropping Archean sediments. The gravity pattern increases from here towards the Toko Range. If we assume that the basement is dipping eastwards as indicated by the geology then the Field River beds of Upper Proterozoic age must have a higher density. As we reach Marqua Creek, the carbonates are found and the gravity profile changes to an increasing gradient.

Over the Field River beds, the Marqua beds and Arrinthrunga Formation, there are values on the residual map here which are negative. These anomalies could not occur if the residual anomaly was showing variation of thickness of the Nimaroo or Tomahawke Formations. It is thought that the negative anomaly occurs when part or all of the Arrinthunga and Marqua beds are removed from the sequences where the residual low or structural highs occur.

AEROMAGNETIC :

Corrections : The aeromagnetic profiles have been tied in by flying across the map every fifteen minutes of arc in a North South direction and (also flying) the edges of the four mile sheets. The actual reduced 4 mile to the inch charts were then plotted on a map with a vertical scale of 2 miles to the inch and a horizontal scale of 4 miles to one inch.

The profiles were also corrected for a south component of regional variation on total intensity of 9 gammas per mile on a direction of 187°08' S.W. There has been no mention of drift. However, this would have been reduced by rotating the profile to correct for the tie-in points.

The flight lines were plotted on a four mile sheet with a probable error of plus or minus one quarter of a mile per station.

RESULTS :

MAGNETIC PROFILES

The corrections that were applied by the Bureau of Mineral Resources have been indicated in the section on corrections.

Tobermory Sheet : We shall first discuss lines 97 to 106. Along these lines are noticed two types of anomalies. Text figure 7 shows the residual anomalies found on the western end of the lines discussed. On plate 8 can be seen residual anomalies associated with the centre and eastern ends of the lines. The anomalies found on the western end are small in size and anomaly (100 gammas). The anomalies located on figure 8 are broader, smoother and reach a higher anomaly value.

Along the lines the average magnetic value of the region is lower on the western edge. It increases to the east. This is a distinctive feature of the profiles.

Along line 95 the magnetic profiles are disturbed in the north west region of the sheet and the disturbance decreases as we approach the east.

A shallow dipping induced magnetic anomaly has been located on line 84 at approximately 137°00' S. latitude. This is quite different to general types of anomaly in the areas. The general magnetic anomaly can be regarded as a slightly dipping dipole with the southern pole at great depth. With the unusual anomaly the lower pole is not at great depth and has a marked influence on the magnetic pattern.

The magnetic anomalies generally do not carry through to the next flight line. This indicates that the anomalies are trending east-west.

The magnetic anomaly profiles are similar except for the region in the south-west corner of the Tobermory Sheet.

Sandover River Sheet : OP63 which is the area we are considering incorporates the lower third of the Sandover River four mile sheet.

The profiles indicate that the region can be separated into two sections - a section with large anomalies to the west and a section with a lower number of anomalies to the east. The dividing line is quite distinct as there is a large increase in the general background magnetic value.

MAGNETIC CONTOUR MAP

The magnetic anomaly map can be divided into five sections.

Zone 1. This zone is found along the southern border of the permit centred around the longitude line of $136^{o}30'$ East. The contours are long and without local closure. The closure of the contours occurs along an east-west direction. A branch of this high is located approximately 8 miles south-west of Centenary Bore. The gradients associated with this magnetic high are not as steep as found on the major high. Within this region the trend of contours is to a high closure point along the southern boundary of the permit. The highs are approximately 1,700 gammas above the lowest value in section 2.

Zone 2. This zone is characterised by two features. Firstly the change in gradient value from zone 1, and secondly the low magnetic values obtained. The magnetic low stretches from the western border just south of Marshall and Hay Rivers junction to the eastern border in the vicinity of the Toko Range. The northern extension of the low is approximately latitude $22^{o}30'$ S, which is slightly north of Tarlton Downs Homestead. As with Zone 1, the trends are east-west.

The eastern edge of contact between zone 2 and 3 lies to the south of Tobermory Homestead.

Zone 3. **This zone is characterised by three features.** Firstly the gradients are steep, however, these become more moderate as we approach the eastern border. Secondly it is a zone of high magnetic values.

Finally, the zone has a larger number of anomalies than found in either zones 1 or 2.

The zone extends across the permit dividing the permit into two sections. Anomalies up to 1,900 gammas are located on the western section of the high.

A possible connection between zones 3 and 5 is indicated by the presence of the sharp anomaly in the vicinity of Floodout Waterhole.

As mentioned previously in this paragraph, the gradient along this high decreases as we move to the east. The gradients in this region around Tobermory are indistinguishable from those of zones 2 and 3. However, the presence of the high anomaly values in the region indicate a zone difference.

Zone 4. Zone 4 is an area of low gradients and low magnetic values. The number of magnetic anomalies are greatly reduced and the anomalies that do exist are broader and larger than those existing in zones 3 and 5.

This area is located on the north-east section of the permit and extends across the permit in a south-westerly direction, decreasing in size as it progresses. The lowest anomaly value would be approximately 700 gammas.

Zone 5. Within the zone which is located at the north-west corner of the permit are a large number of magnetic anomalies having sharp gradients. The anomalies are orientated east-west since there is a sharper change north-south than there is east-west. The highest values are above 2,100 gammas.

INTERPRETATION :

The interpretation of the magnetic results will be done in two fashions. Firstly it will be interpreted qualitatively and secondly quantitatively. In the quantitative section two methods of interpretation will be used, namely Peter's and Vacquer's methods. The applicability of the techniques and their limitations will also be discussed. At the completion a correlation of the two sections will be undertaken.

QUALITATIVE.

The low magnetic anomalies of the south-west corner correspond to outcropping, Archean sediments. This is the south western section of zone 2. The decrease of regional magnetic anomaly as indicated on the profiles means that the disseminated magnetic susceptibility in Zone 2 is lower than zone 1.

Zone 1 corresponds to outcropping lower Proterozoic sediments, while zones 2 and 4 represent areas of deep sedimentation or bedrock changes. In zone 3 the shallowed section should be to the west as the gradients on this zone get less steep as we approach the east.

There are two reasons which will cause a slight change in the above theory. Firstly the anomalies of zones 3 and 5 are comparable with the anomalies found over the lower Proterozoic and secondly the gradients are steeper than those obtained over Archean bedrock. It is thought that we have a change of background magnetic susceptibility as we move northwards. However, it is thought Zones 2 and 4 are associated with depth rather than magnetic basement changes.

The Toko Range syncline is represented by a small magnetic anomaly on the south east corner of the permit. The magnetic high represents the presence of such beds. The limit of the lower Proterozoic is taken to be roughly the extent of Zone 1.

The presence of Zone 2 could be taken to mean a zone of deep sedimentation. The shallowed gradients being an indication of depth. It is also thought that there is a basement change from lower Proterozoic to Archean bedrock.

Therefore it is thought that Zones 3 and 5 represent areas of shallow sedimentation. The actual extent of the structural low is larger than the magnetic anomaly because of the change of basement in the Tobermory area.

QUANTITATIVE.

The magnetic anomalies have been studied using both Peter's Method and Vacquer's et al method. Both methods give the same general variation but due to the corrrection factors could give variations in depth, by a roughly constant amount.

A discussion of the magnetic anomalies found for depth determinations will have to be undertaken. Magnetic anomalies do not necessarily have to correspond to the surface of bedrock and so can vary in size and magnetic susceptibility contrasts. One method of obtaining a bedrock contour map is to use only the shallowest anomalies found. However, this could lead to the neglect of anomalies which are deeper due to structure.

To aid in this, the anomalies have been distributed according to what zones they occur in. Previously, they had been treated all together. An example of this is figure 17. The anomalies do fall in a vague sort of zone as indicated. The average value over the four thousand foot interval has been plotted on figure 18.

The small anomalies over the Archean bedrock are left by themselves. A decrease of anomaly height against depth of anomaly is found for anomalies with a maximum depth of less than 16,000 feet. Above these we have two discontinuities. These discontinuities are produced by a product (IT) change. If the size of the anomalies are similar the magnetic susceptibility varies by a factor of from two to nine.

Therefore, in plotting of the results, only the anomalies in the range of 0 - 16,000 (Vacquer's et al method) and 0 - 12,000 feet (Peter's method) have been used.

For Peter's method a factor of 1.5 has been used. Strictly speaking this factor is for north-south trending anomalies and therefore since the anomalies are east-west an orientation factor should be required. However, the orientation has been taken into account in Vacquer's method and Peter's method has not been modified. Under these conditions, Peter's method should yield a minimum depth and Vacquer's method a possible maximum.

A depth contour map has been constructed on a zone base plant, (plate 10). The contour map indicates that the zones found on the aeromagnetic contour map are basement types and not as such directly associated with depth.

The Archean bedrock is clearly outlined. The depth of the anomaly plane is generally above mean sea level. In the bottom half of Permit OP63 there are two areas of deep sedimentation. One is the extension of the Toko Syncline and the other extends through the Tarlton Downs area. The bulge in the Zone 1 contours has probably been produced by the sedimentation of Upper Proterozoic in this area.

There are three basement highs in the south half of the permit. These are located at Stations D351, D318 and D337. The magnetic basement high at Station D 351 is 4,000 feet below Mean Sea Level and the high at Station D318 is 3,000 feet below Mean Sea Level. At station D337 the high is 4,000 feet below Mean Sea Level. This forms a ridge across the permit.

In the vicinty of Lucy Creek we have another high which has a value of 2,000 feet below M.S.L. A ridge runs north-east south of Mt. Hogarth. This area has two highs one at M.S.L. and the other at 4,000 feet below M.S.L. Another is around B.M.R. Station 2621 and has a depth of 2,000 feet below M.S.L. The remainder of the north east section of the area is a low area. The value in this region would be 8,000 feet below M.S.L.

CORRELATION OF AEROMAGNETIC & GRAVITY DATA :

The agreement between the gravity basement contour map Text figure 6 and the aeromagnetic basement contour map is good. The following points arise from the study of the two maps :-

a) The basement trends are the same on both maps.

b) The aeromagnetic map shows more detail as there are greater numbers of points to contour. Since the gravity map does not provide a simple picture for conversion to depth it has far less points for control. Also the gravity in this case is far less sensitive to local changes as it has been obtained from the regional curve. The residual gravity has to be studied with the regional depth map.

c) The depth values obtained from the regional gravity are very similar to those obtained from the aeromagnetic survey.

These conclusions therefore suggest the following :-

a) From the gravity interpretation, that the Field River beds disappear as we move into the Toko syncline. The possible extent of the Upper Proterozoic is closely indicated by zone 1 of the aeromagnetic interpretation.

b) Zones 2, 3, 4 and 5 of the aeromagnetic section are changes in the general magnetic susceptibility in the Archean bedrock. This may be associated with changes of lithology, for example the presence of Meta sediments or granite.

c) The high on the regional gravity map associated with Lucy Creek had gradients which were not generally found on the map. Therefore these gradients were suspect. However, the aeromagnetic map suggests that those gradients were in-correct and they were produced not by sudden change of

c) cont'd. level of bedrock, but by a decrease in depth to bedrock instead of an increase. Zone 4 could therefore be granite. It would have a density very similar to the Toko River Beds.

d) The correspondence of gravity and magnetic depth values around Mt. Hogarth indicate that there was a basement changefrom the Lucy Creek area. This is taken to be normal Archean sediments.

A comparison of the residual gravity and aeromagnetic depth contours indicates :-

a) Contours of residual structures do not compare with the aeromagnetic contour map.

b) The east-west trends of the Zones in the southern section of the permit are indicated by an east-west residual trend.

The anomaly of station 61-4 east of Tobermory is both a high on the regional curve, a high on the aeromagnetic contours and a high on the residual curve.

On the western border, west of Tobermory high, both gravity highs and lows correspond to the aeromagnetic basement high. It is thought that the resultant high line running north-east is due to a thickness of carbonates and does not correspond to a structural high.

On the north-east corner of OP 63, the anomaly variati on is one quarter of what it is at other points. It is thought that in this region besides being associated with depth, the percentage of carbonate in the stratigraphic sequence is varying.

CONCLUSIONS :

The geophysical evidence indicates that the depth of sediment varies in permit OP63 from M.S.L. to approximately 10,000 to 12,000 feet below M.S.L.

The north-west and south-west corners of the Permit have bedrock at shallow depth while the north-east and south-east areas have the greatest amount of section.

Across the permit at a depth of approximately 4,000 feet below M.S.L. we have a basement ridge.

There are indications that the basement changes from Field River sediment to Archean sediments south-east of Tarlton Downs Homestead.

There are changes within the Archean Bedrock. This is of importance in the Lucy Creek area.

RECOMMENDATIONS:

The following three areas are recommended for more detailed study.

1. The aeromagnetic and gravity structure centred around gravity station 61-4. Basement is expected at a depth of 4,000 feet below sea level under this structure.

2. The aeromagnetic and gravity structures around gravity station D346. Basement is again expected at a depth of 4,000 feet below sea level.

3. The area north of Tobermory Homestead. The depth to basement in this area is expected to have increased to 8,000 feet below sea level.

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VACQUERS V.	Interpretation of Aeromagnetic maps Geological Society of America Memoir 47 of 1951.
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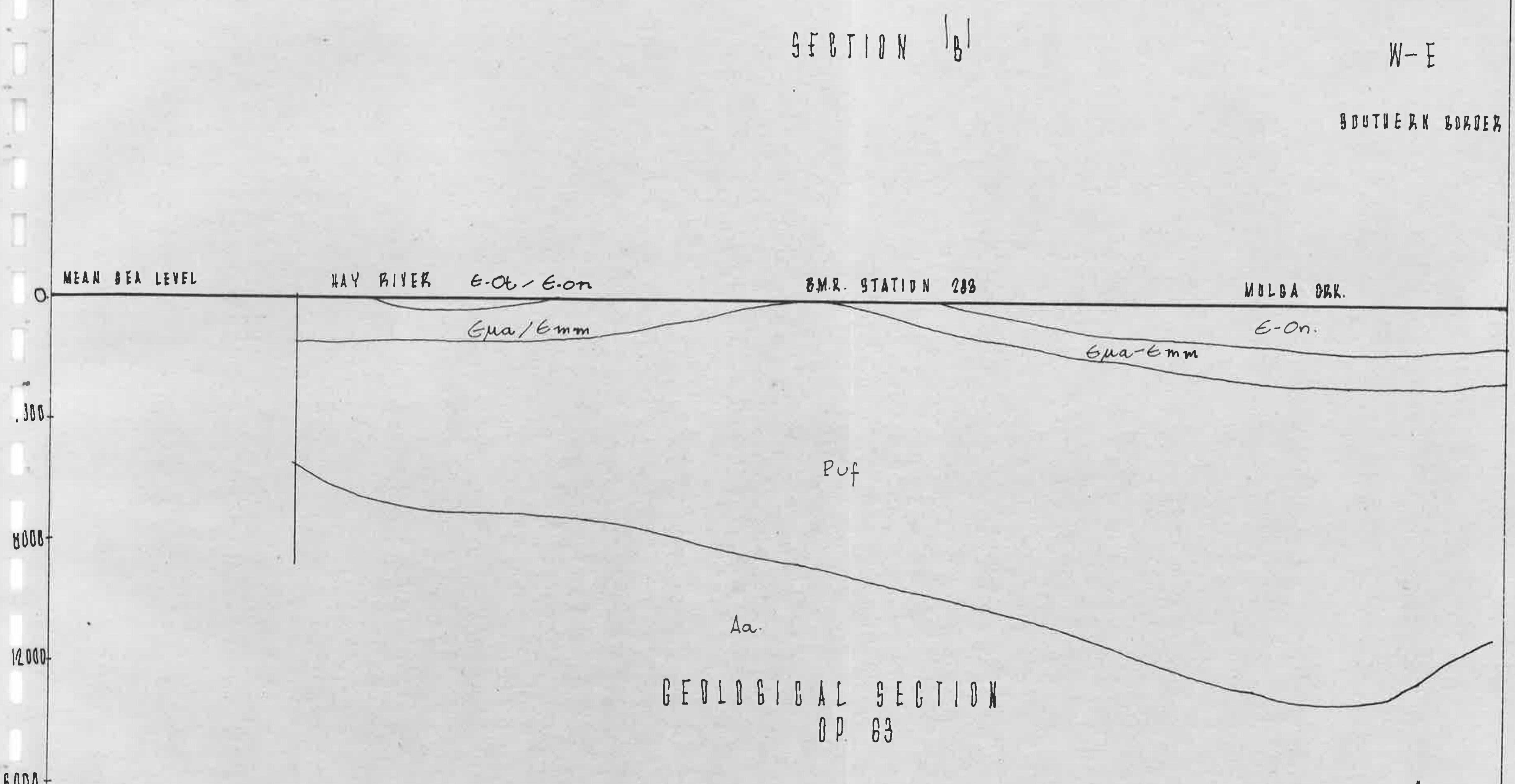
FIGURE 4



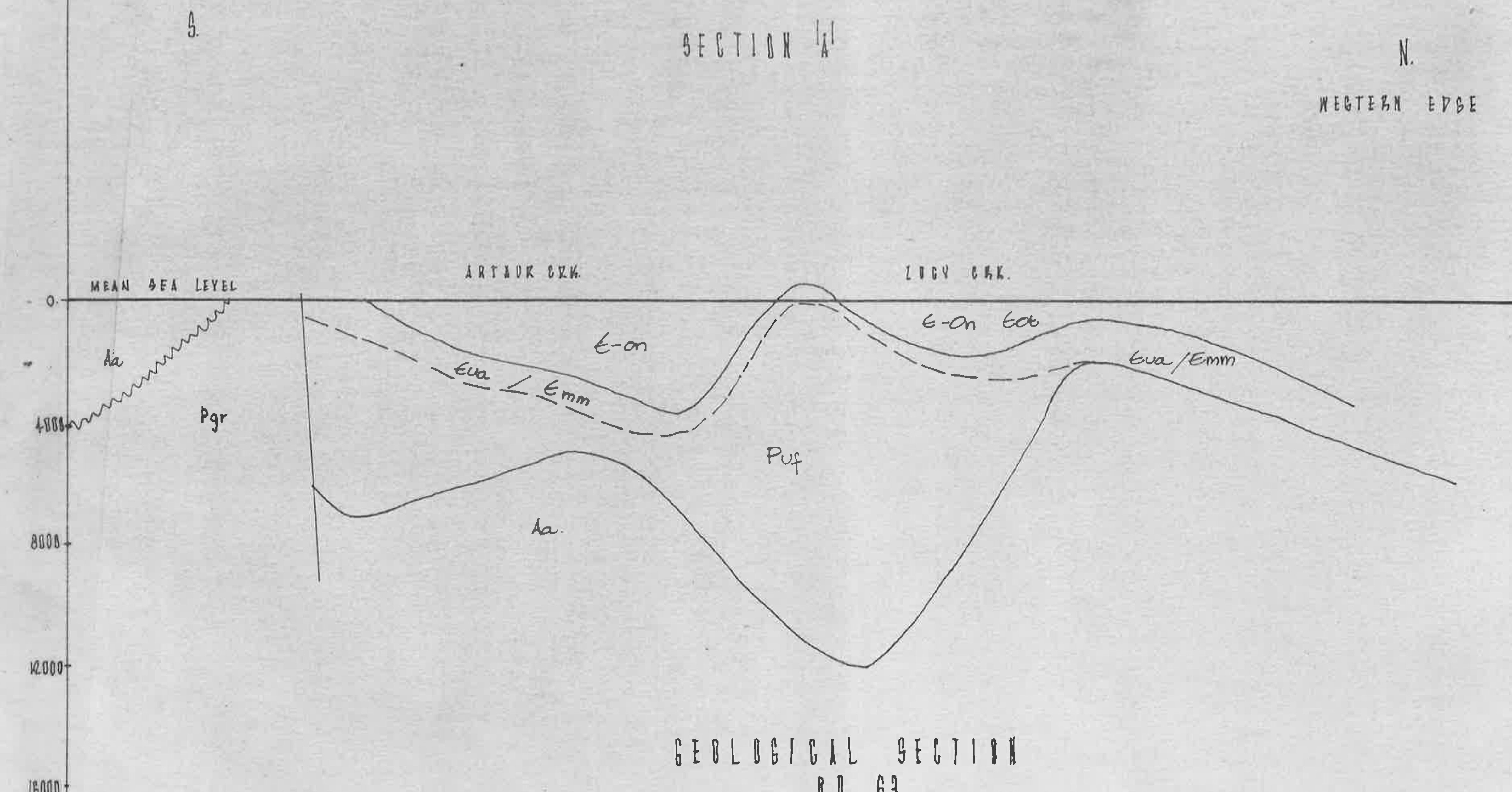
GEOLOGICAL SECTION
OP 63

AS CONSTRUCTED FROM REGIONAL GRAVITY

LOCATION W-E SOUTHERN BOUNDARY 4 PERMIT

SCALE HOR 1" = 8 MILES
VERT 1" = 4000 FT.

FIGURE 3



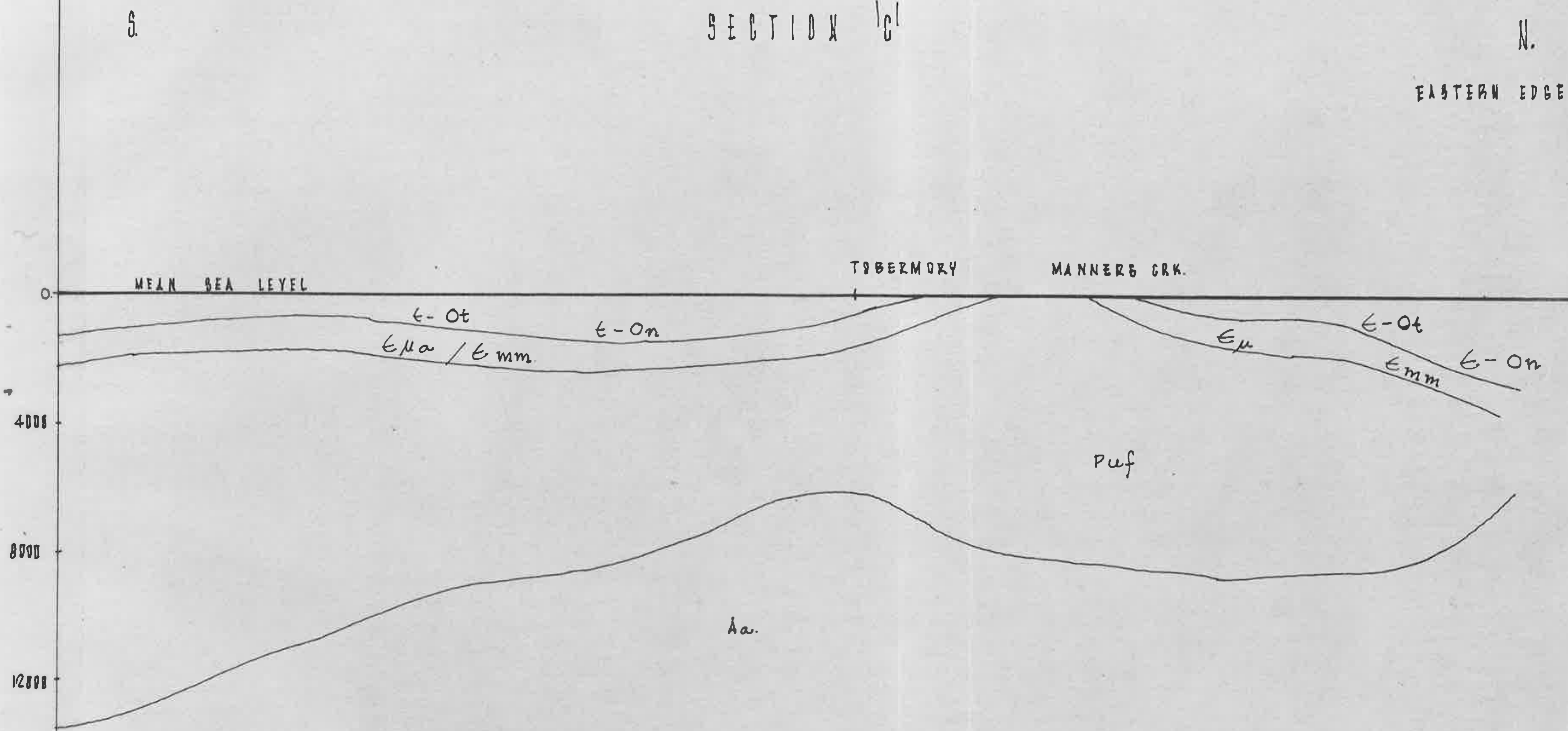
GEOLOGICAL SECTION
BP 63

AS CONSTRUCTED FROM REGIONAL GRAVITY

SCALE HOR. 1" = 8 MILES. VERT. 1" = 4000 FT.

LOCATION N-S WESTERN BOUNDARY. 4 PERMIT

FIGURE 5



GEOLOGICAL SECTION
OP 63

AS CONSTRUCTED FROM REGIONAL GRAVITY

LOCATION N-S EASTERN BOUNDARY OF PERMIT

SCALE HOR. 1" = 8 MILES.
VERT 1" = 4000 FT.

FIGURE 6

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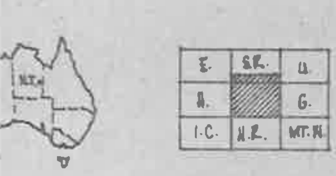
SEPT. 1964.

DEPTH CONTOUR FROM REGIONAL GRAVITY ANOMALIES

ALLIANCE OIL DEVELOPMENT N.L.

PERMIT OP 63



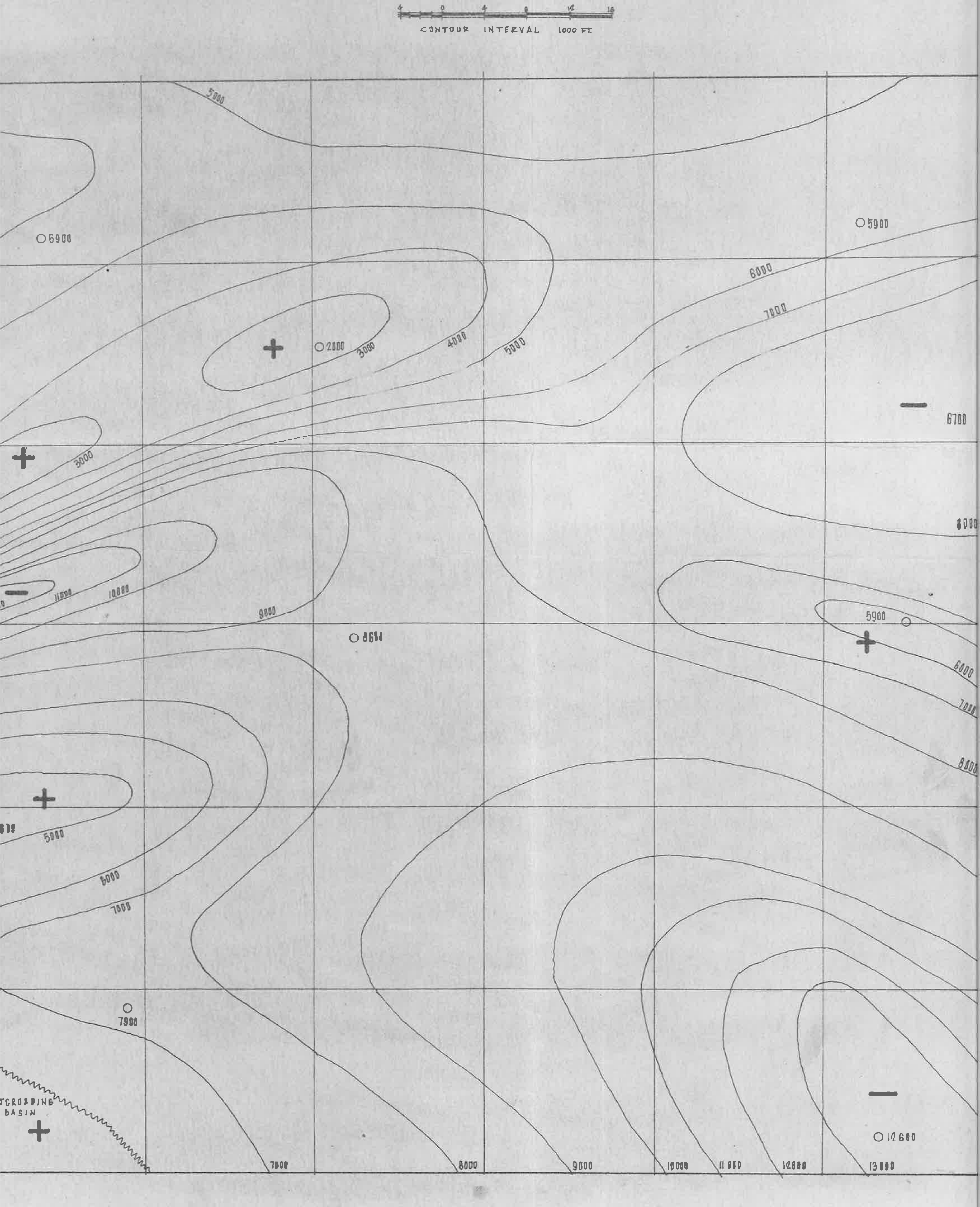


FIGURE 7

RESIDUAL MAGNETIC ANOMALIES
ZONE 1

Horizontal Scale 4 miles to an inch.

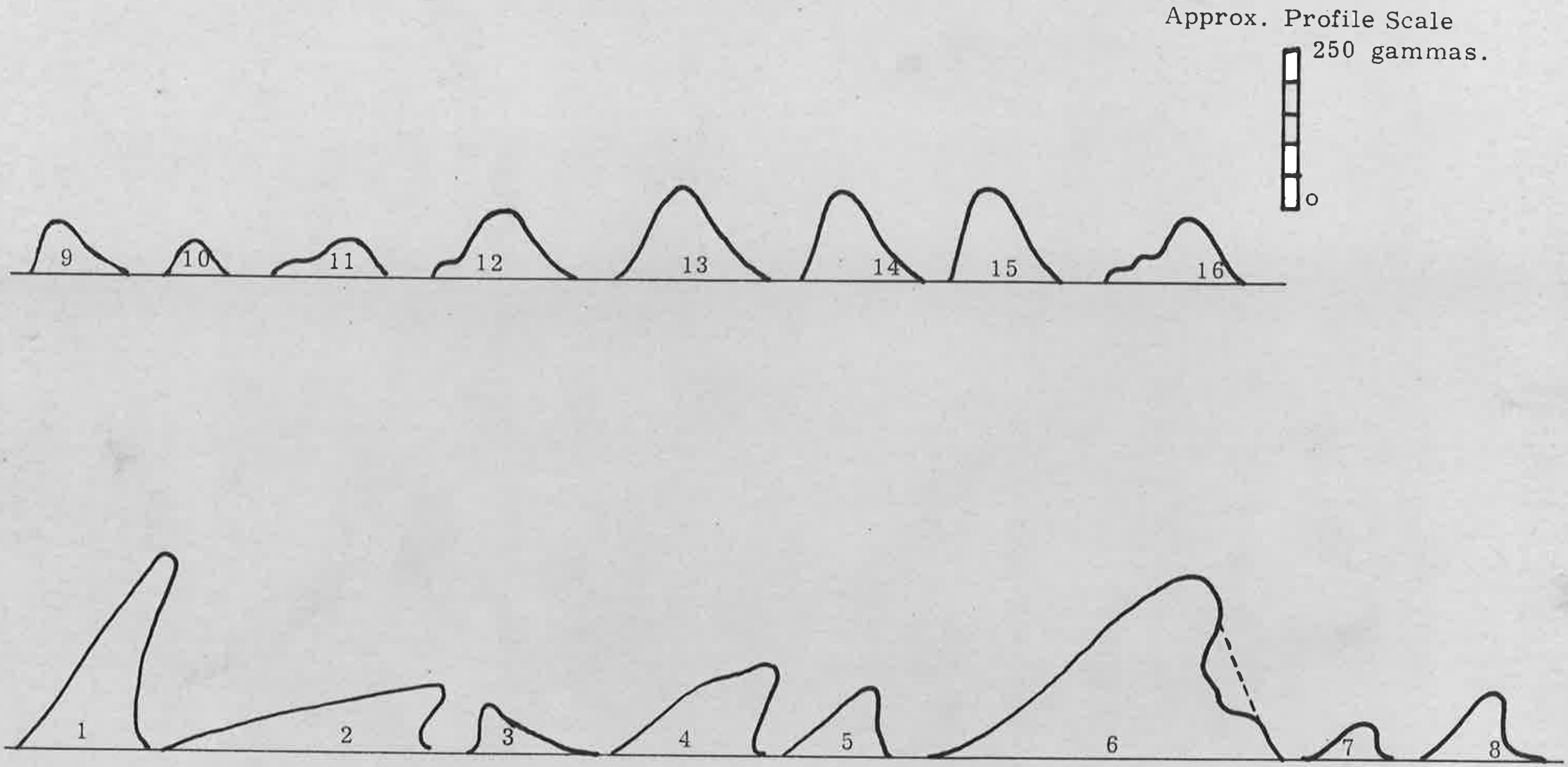


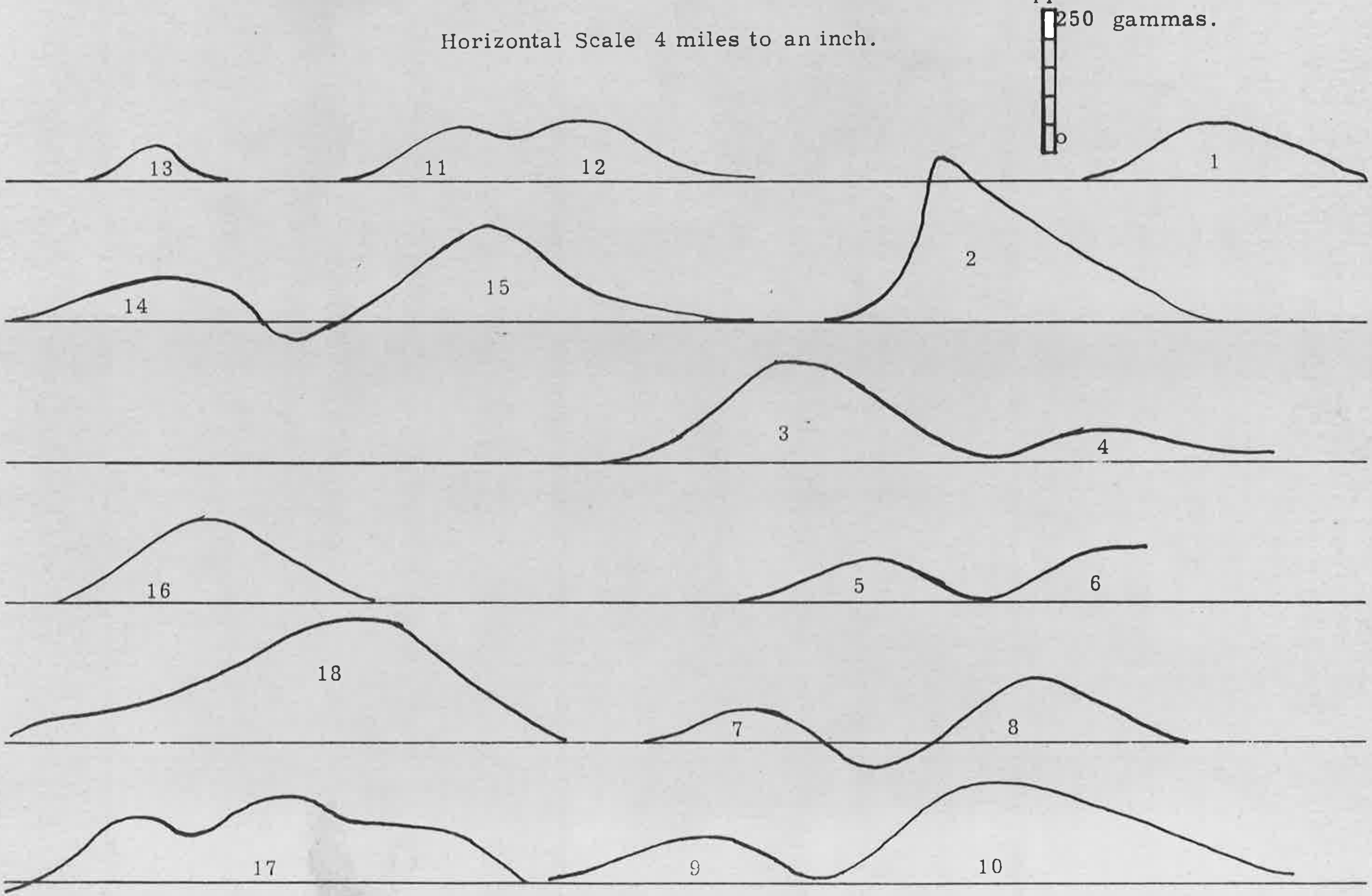
FIGURE 8

Figure 8

RESIDUAL MAGNETIC ANOMALIES

Horizontal Scale 4 miles to an inch.

Approx. Profile Scale



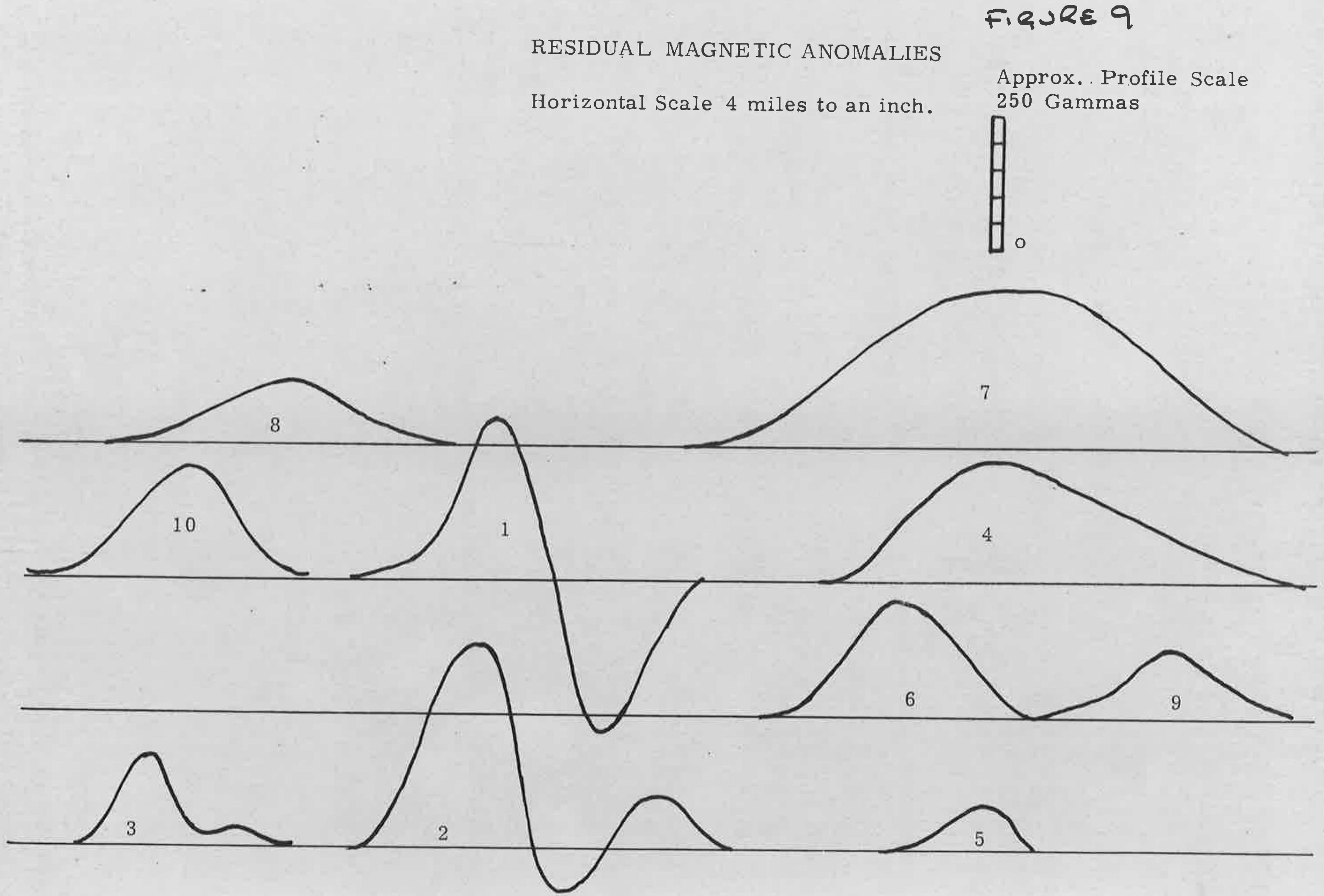


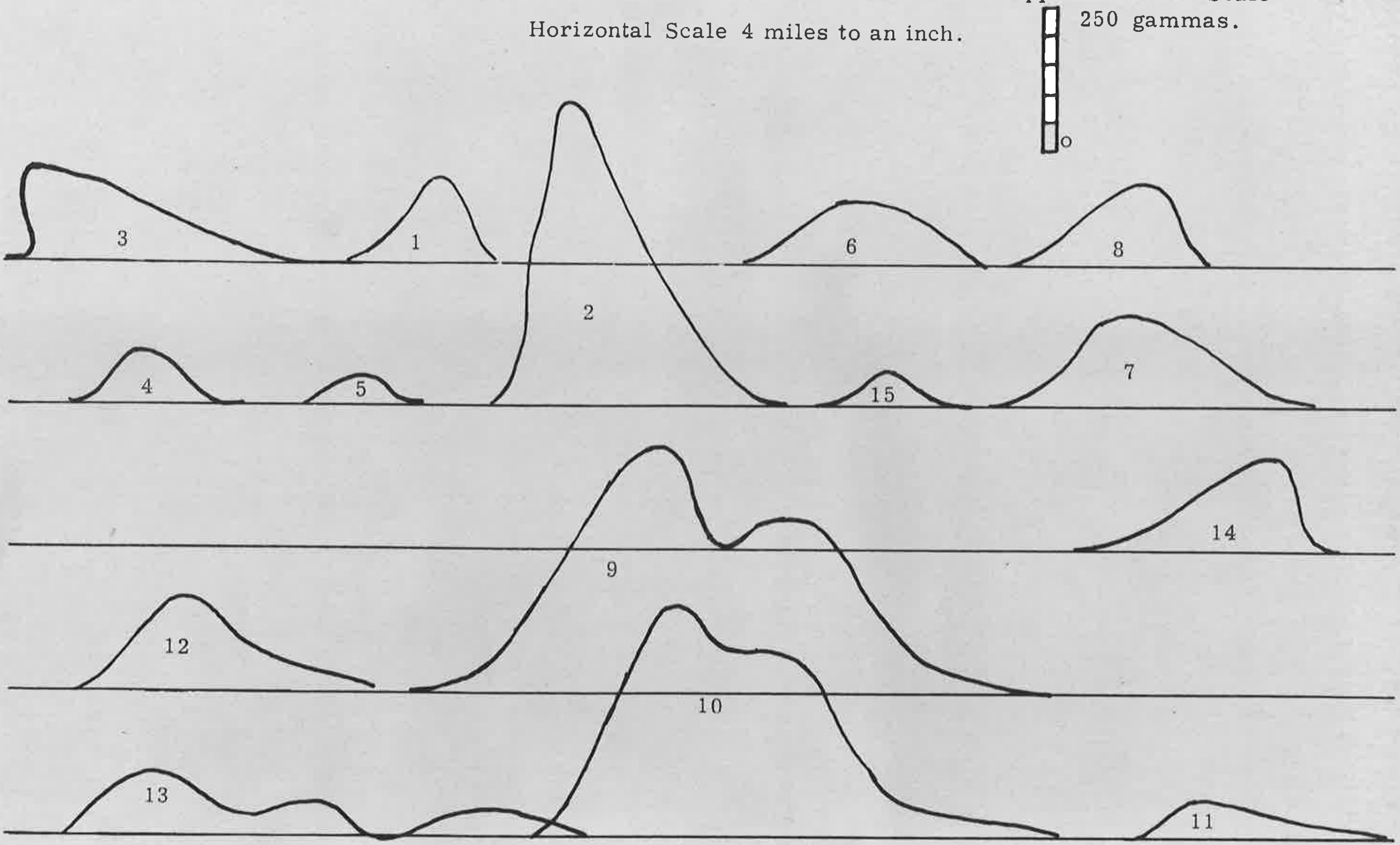
FIGURE 9
RESIDUAL MAGNETIC ANOMALIES
Horizontal Scale 4 miles to an inch.
Approx. Profile Scale
250 Gammas
0
8
7
10
1
4
6
9
3
2
5

FIGURE 10

RESIDUAL MAGNETIC ANOMALIES

Horizontal Scale 4 miles to an inch.

Approx. Profile Scale 250 gammas.



RESIDUAL MAGNETIC ANOMALIES. FIGURE 11

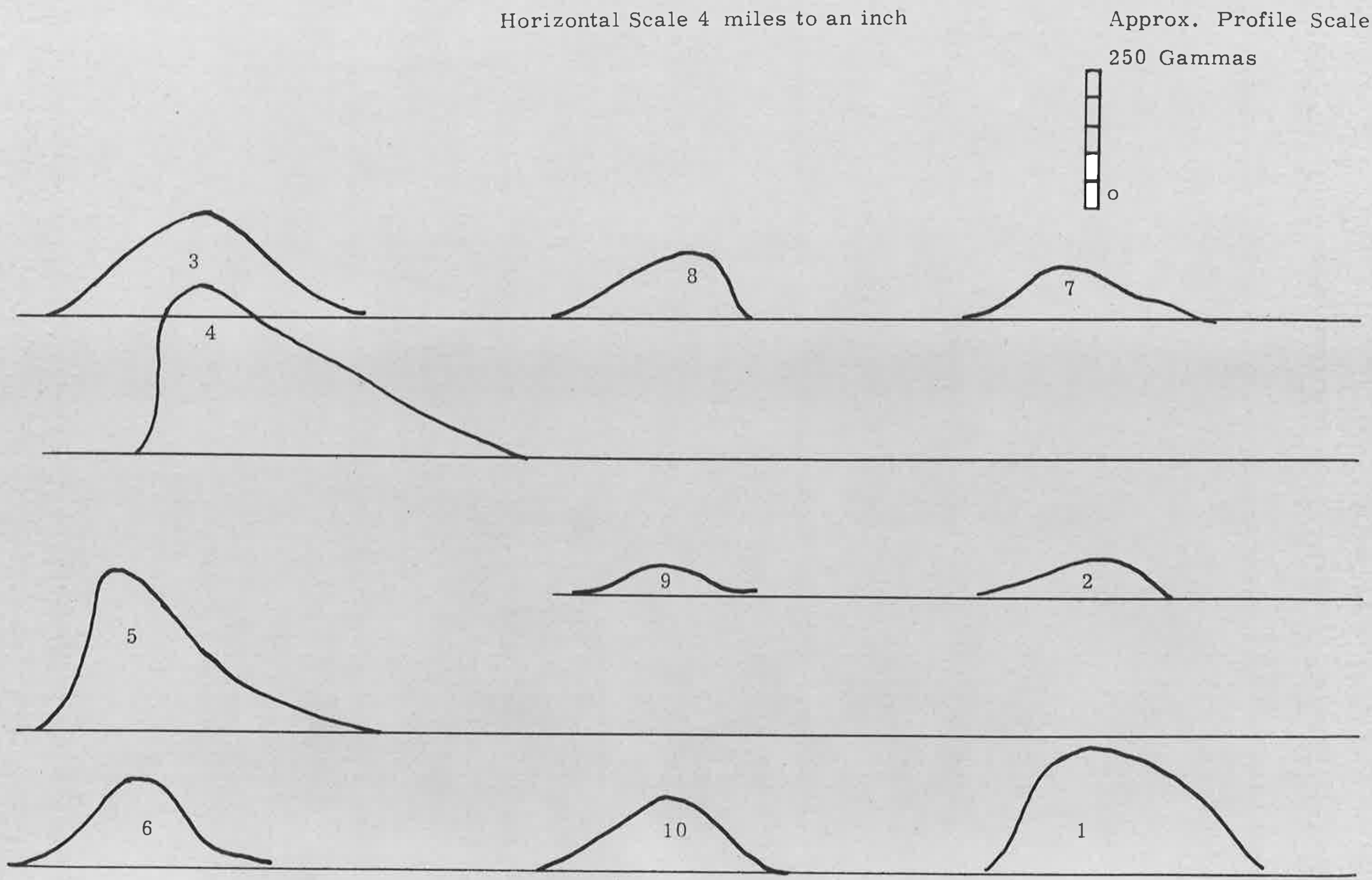


FIG. 12

RESIDUAL MAGNETIC ANOMALIES

Horizontal Scale 4 miles to an inch.

Approx. Profile Scale
250 Gammas

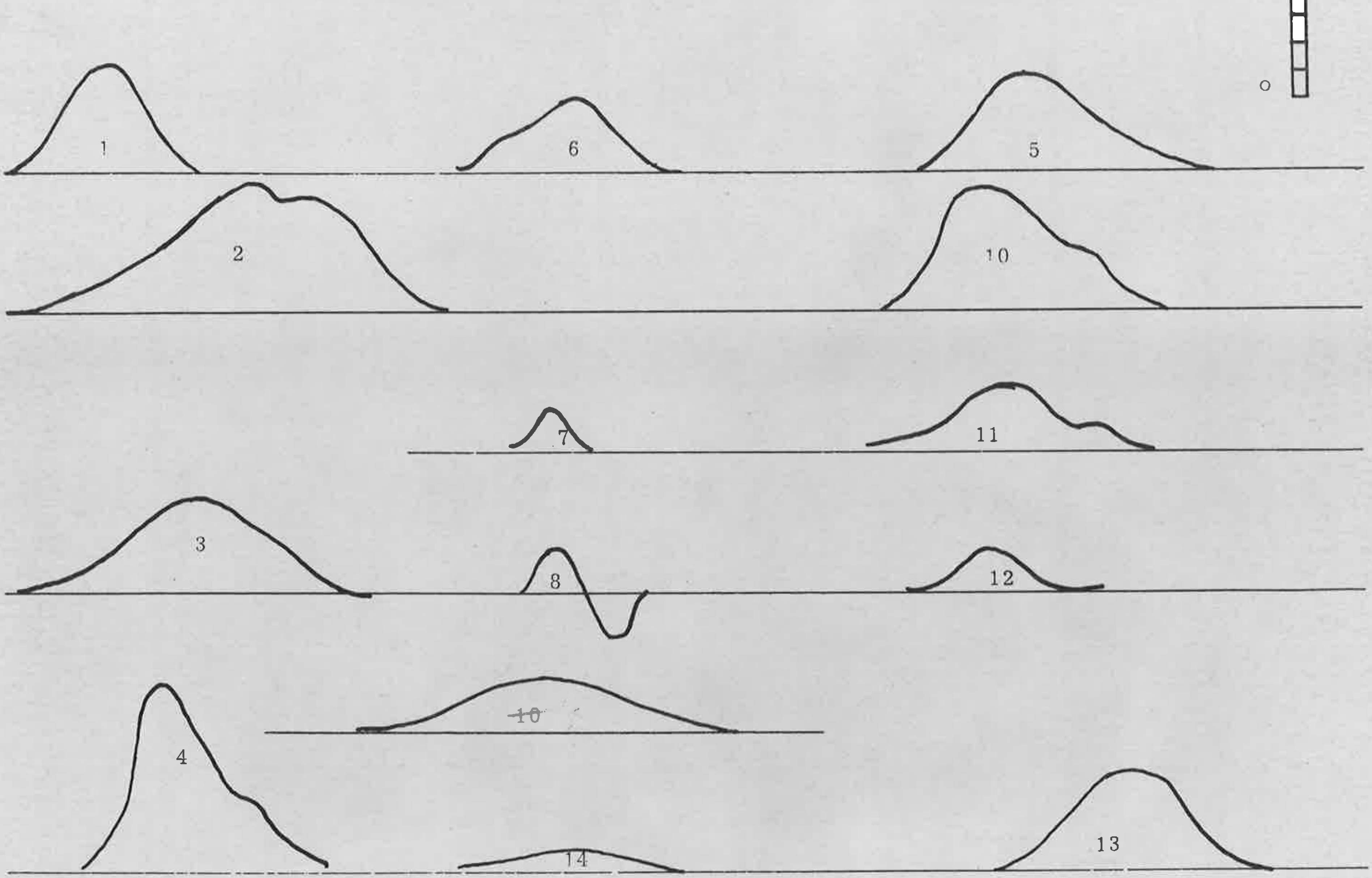


FIGURE 13

Fig 13

Approx. Profile Scale
250 Gammas

RESIDUAL MAGNETIC ANOMALIES

Horizontal Scale 4 miles to an inch.

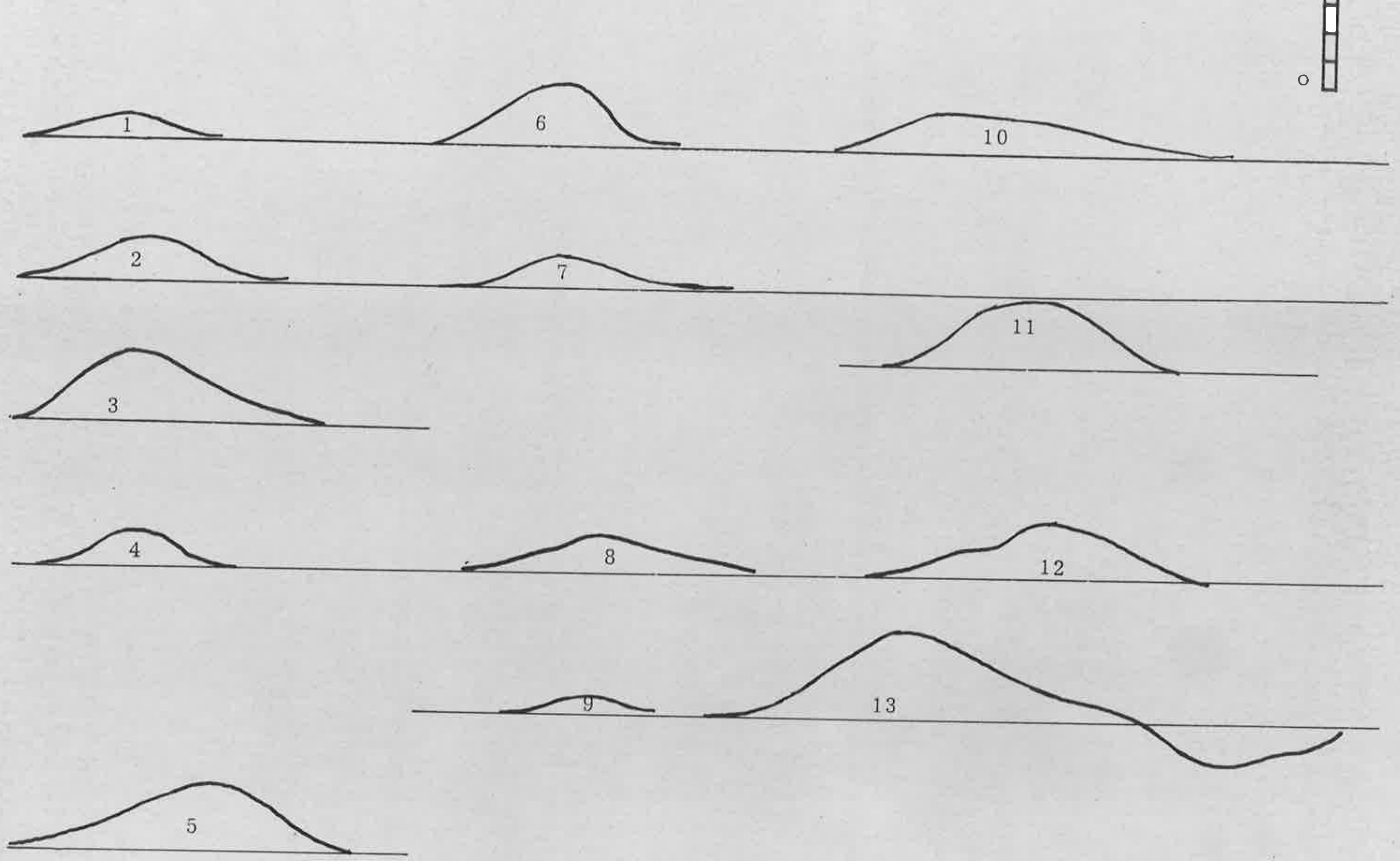


FIGURE 14

FIG 14

HISTOGRAM
RESIDUAL MAGNETIC ANOMALIES
ZONE 2

Anomalies over Post Archean
Sediments

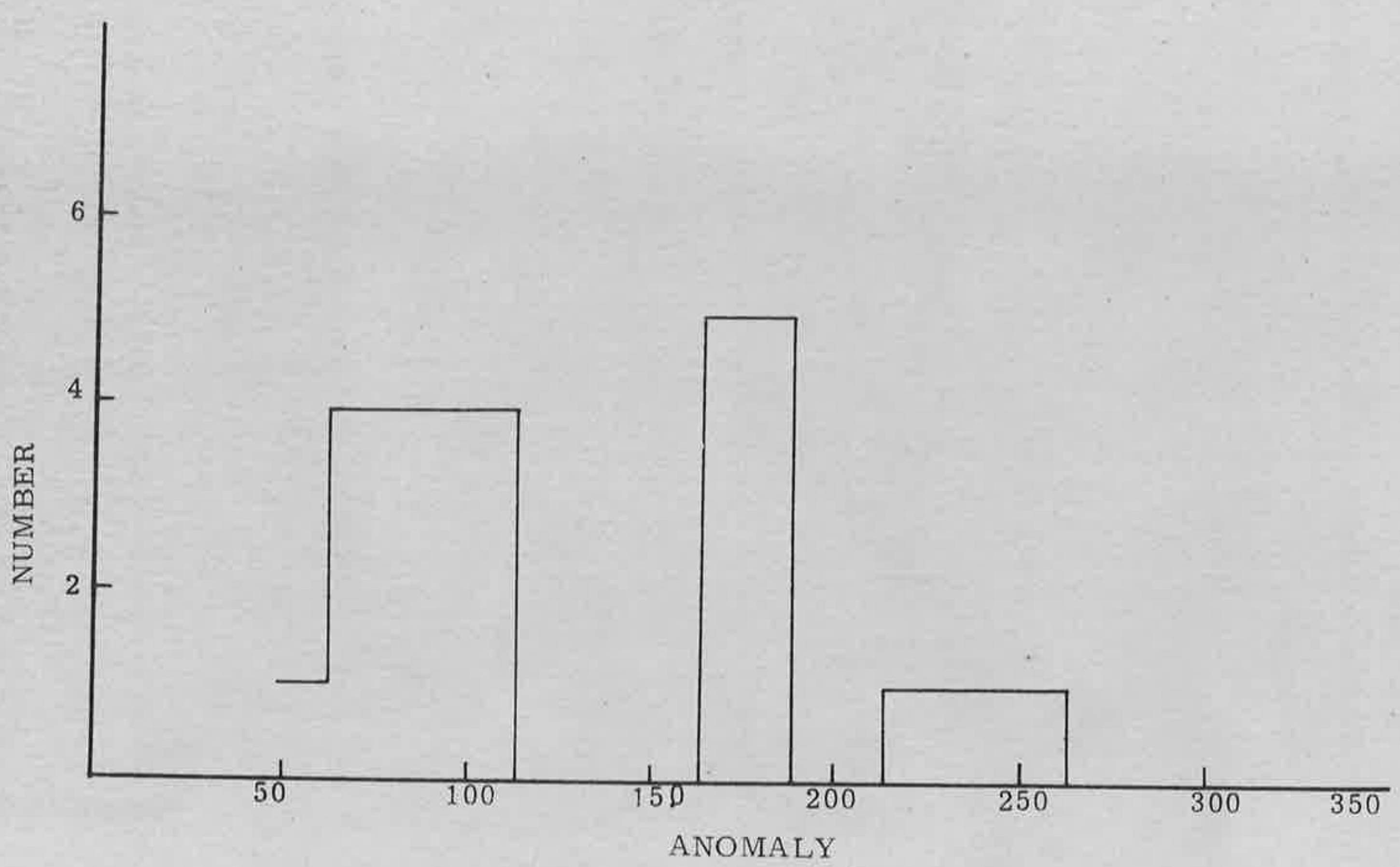
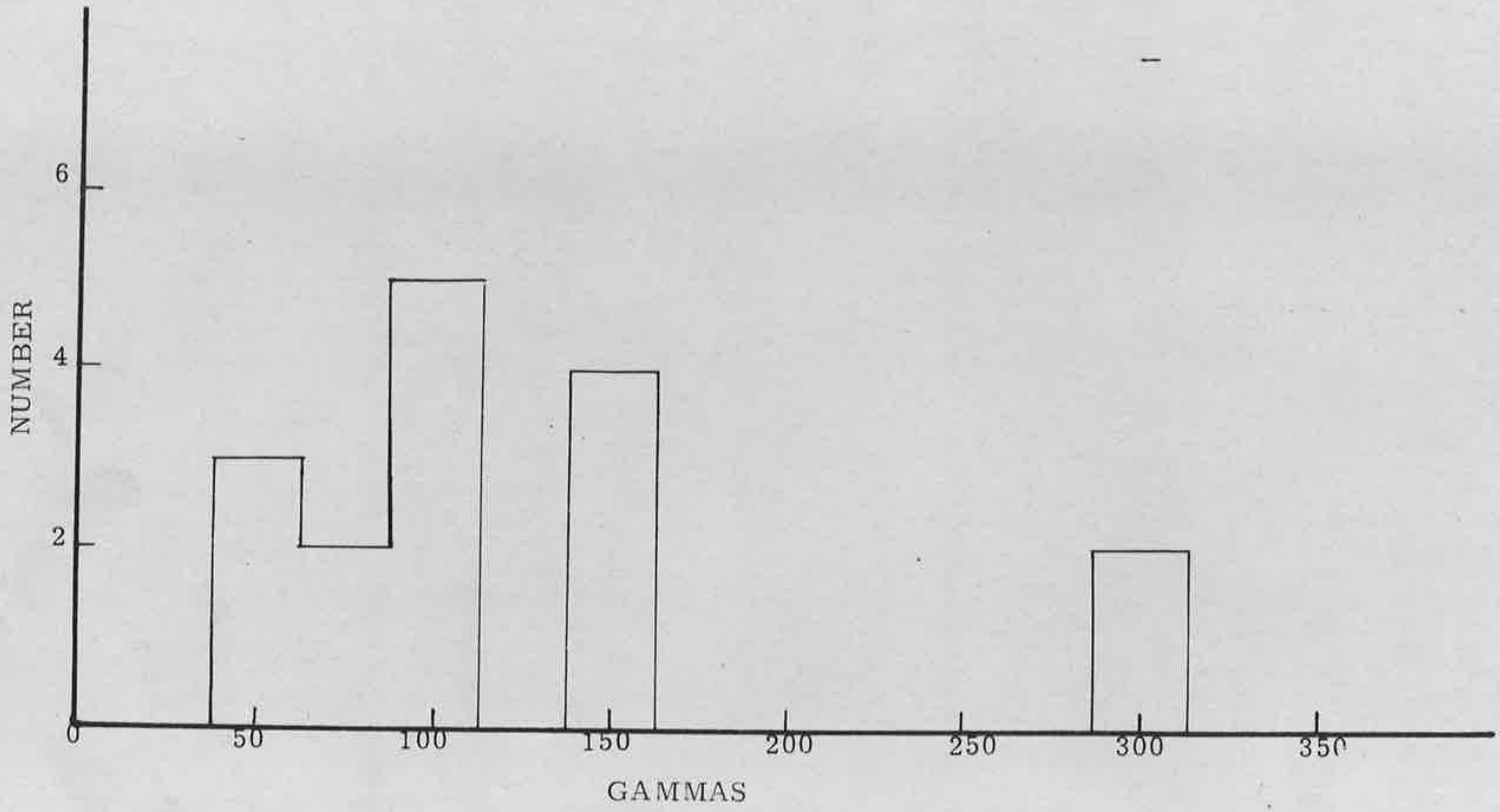
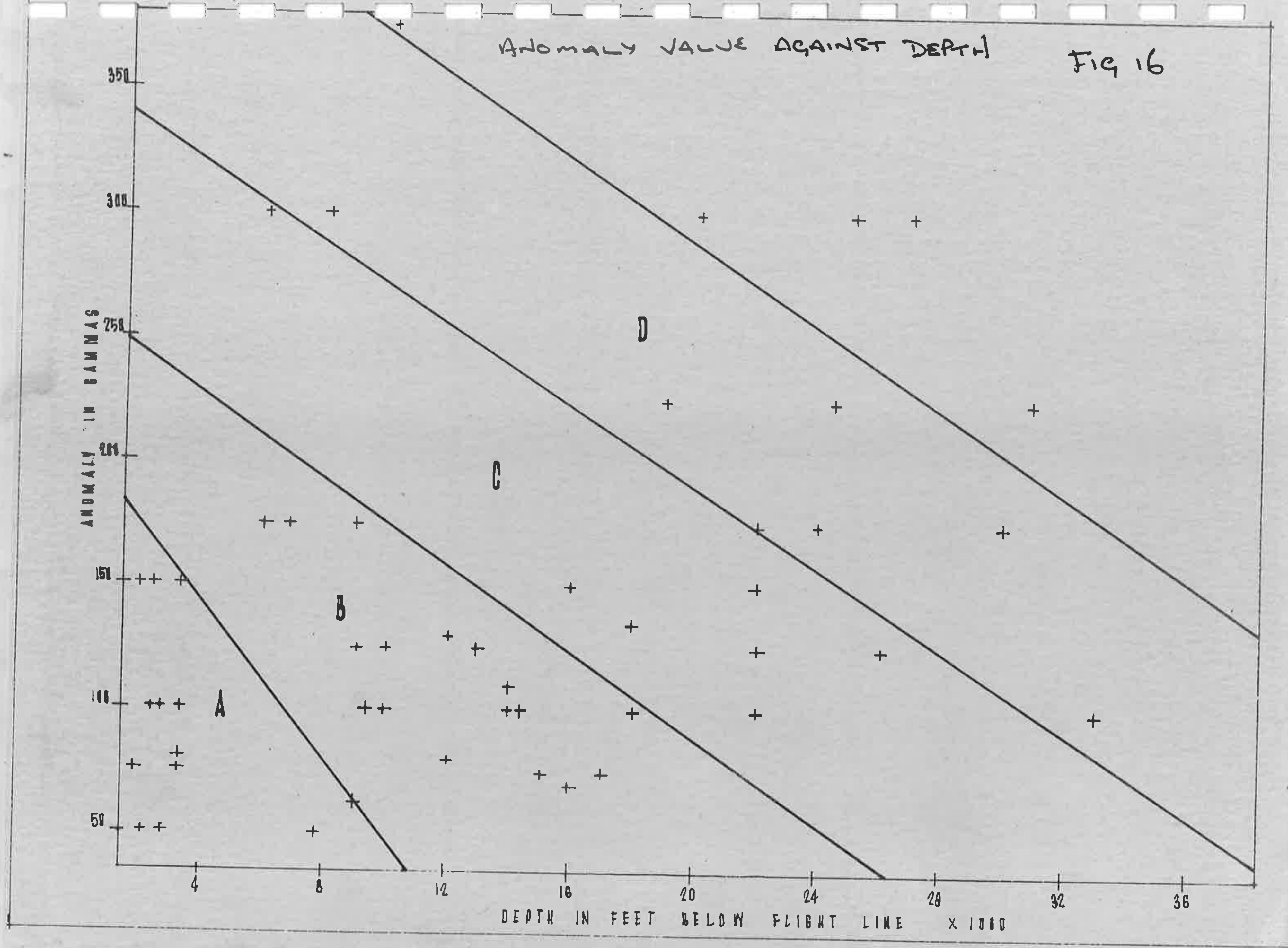


Fig 15

HISTOGRAM
MAGNETIC ANOMALIES
ZONE 1

Archean Anomalies



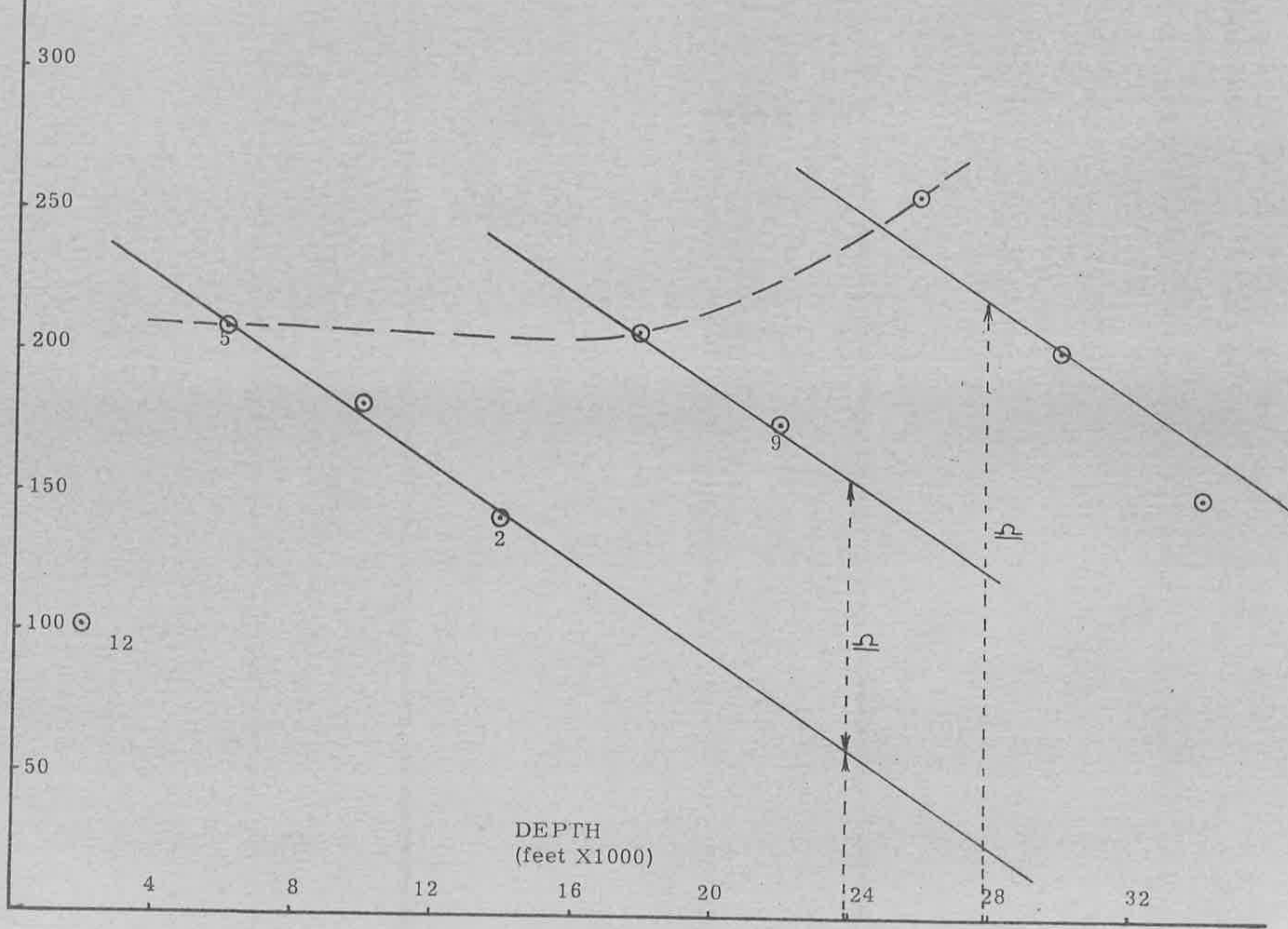


ANOMALY VALUE AGAINST DEPTH
FIG 16
ANOMALY IN GAMMAS
350
300
250
200
150
100
50
A
B
C
D
4
8
12
16
20
24
28
32
36
DEPTH IN FEET BELOW FLIGHT LINE X 1000

FIGURE 17

AVERAGE ANOMALY AGAINST DEPTH

Fig 17



GRAVITY VALUES

Station	Type	Latitude South	Elev. (feet)	Obs. Gravity 978	BOUGUER		
					D 1.9	D 2.2	D2.4
		° '					
D277	Heli	22 57.3	902	756.69	-20.3	-23.8	-26.1
D278	Heli	22 57.7	862	749.15	-23.9	-27.3	-29.4
D279	Heli	22 57.7	833	749.66	-18.3	-21.6	-23.6
D280	Heli	22 56.6	898	759.42	- 9.9	-13.4	-15.7
D281	Heli	22 57	919	759.42	- 8.6	-12.2	-14.5
D282	Heli	22 56.8	931	759.23	- 8.0	-11.6	-14.0
D283	Heli	22 56.7	813	768.79	- 6.6	- 9.8	-11.9
D284	Heli	22 56.7	822	767.19	- 7.5	-10.7	-12.8
D285	Heli	22 56.8	778	770.54	-7.4	-10.4	-12.4
D286	Heli	22 57.2	706	780.83	- 2.5	- 5.3	- 7.0
D287A	Heli	22 57.3	733	779.49	- 2.9	- 5.0	- 6.8
D288	Heli	22 50	919	762.03	+ 1.3	- 2.3	- 4.6
D289	Heli	22 50.4	730	777.08	+ 2.7	- 0.2	- 2.0
D290	Heli	22 50.6	738	773.75	- 0.3	- 3.2	- 5.0
D291	Heli	22 50.3	740	771.75	- 1.8	- 4.7	- 6.5
D292	Heli	22 50.6	830	761.06	- 6.6	- 9.8	-11.9
D2 93	Heli	22 50.7	935	750.27	-10.1	-13.8	-16.1
D294	Heli	22 50.5	902	753.80	- 8.7	-12.2	-14.5
D295	Heli	22 50.7	932	749.69	-10.9	-14.5	-16.8
D296	Heli	22 50.9	932	749.41	-11.4	-15.0	-17.3
D297	Heli	22 50.5	1014	743.52	-11.1	-15.1	-17.6
D298	Heli	22 47.1	962	748.51	-13.1	-16.8	-19.2
D299	Heli	22 47.7	905	750.52	- 8.7	-12.2	-14.5
D302	Heli	22 44.3	1184	726.30	- 9.8	-14.4	-17.5
D303	Heli	22 44.7	893	747.18	- 9.7	-13.2	-15.4
D304	Heli	22 44.3	793	754.59	- 8.9	-12.0	-15.0

GRAVITY VALUES

Station	Type	Latitude South	Elev. (feet)	Obs. Gravity 978	BOUGUER		
					D 1.9	D 2.2	D2.4
		° '					
D305	Heli	22 44.7	805	754.38	-8.7	-11.8	-13.8
D306	Heli	22 43.8	816	754.97	-6.3	-9.5	-11.5
D307	Heli	22 45.7	801	757.35	-7.0	-10.1	-12.1
D308	Heli	22 44.7	826	757.48	-4.1	-7.3	-9.4
D309	Heli	22 44.2	871	760.09	+2.2	-1.2	-3.3
D310	Heli	22 44.7	1069	746.72	+2.1	-6.4	-4.7
D311	Heli	22 44.1	784	762.46	-1.4	-4.4	-6.4
D312	Heli	22 38.6	710	760.61	-2.5	-5.3	-7.0
D313	Heli	22 38.6	770	758.59	-0.4	-3.4	-5.3
D314	Heli	22 37.9	827	751.63	-2.6	-5.8	-7.9
D315	Heli	22 38.0	826	749.72	-4.7	-7.9	-10.0
D316	Heli	22 38.6	833	747.45	-7.1	-10.3	-12.4
D317	Heli	22 38.6	849	748.03	-5.4	-8.7	-10.8
D318	Heli	22 39.6	768	753.46	-6.7	-9.7	-11.6
D319	Heli	22 40.5	814	749.81	-8.1	-11.2	-13.3
D320	Heli	22 40.3	889	743.09	-9.4	-12.8	-15.1
D321	Heli	22 40	980	735.80	-10.0	-13.8	-16.2
D322	Heli	22 37	877	732.66	-17.1	-20.5	-22.7
D323	Heli	22 39.3	950	732.75			
D324	Heli	22 31.4	986	721.30	-14.9	-18.7	-21.3
D325	Heli	22 31.4	913	725.99	-15.3	-18.8	-21.1
D326	Heli	22 32.3	893	729.60	-14.1	-17.6	-19.8
D327	Heli	22 32	882	731.86	-12.3	-15.7	-17.9
D327A	Heli	22 32.2	870	731.36	-13.8	-17.8	-19.3
D328	Heli	22 30.8	864	733.53	-10.6	-13.9	-16.1
D329	Heli	22 30.8	777	735.44	-14.7	-17.7	-19.6
D330	Heli	22 33.5	743	741.23	-14.2	-17.1	-18.9

GRAVITY VALUES

Station	Type	Latitude South		Elev. (feet)	Obs. Gravity 978	BOUGUER		
						D 1.9	D 2.2	D2.4
		o	'					
D331	Heli	22	31.6	717	743.64	-11.6	-14.4	-16.2
D332	Heli	22	33.2	728	748.89	- 7.3	-10.1	-11.9
D333	Heli	22	32.3	723	750.13	- 5.4	- 8.2	-10.0
D334	Heli	22	32.3	678	755.80	- 2.9	- 5.5	- 7.2
D335	Heli	22	31.8	633	756.66	- 4.6	- 7.0	- 8.6
D336	Heli	22	26	620	796.37	- 9.7	-12.1	-13.6
D337	Heli	22	26.4	622	751.01	- 5.3	- 7.7	- 9.3
D338	Heli	22	26.4	647	799.8	- 2.6	- 5.1	- 6.7
D339	Heli	22	26.3	654	799.68	- 5.9	- 8.4	-10.1
D340	Heli	22	28.9	683	747.09	- 7.6	-10.2	-11.9
D341	Heli	22	23	684	741.04	- 7.4	-10.0	-11.8
D342	Heli	22	25.4	706	736.25	-13.2	-15.9	-17.7
D343	Heli	22	26.6	707	731.60	-19.0	-21.7	-23.5
D344	Heli	22	26.6	787	727.11	-17.9	-20.9	-22.9
D345	Heli	22	26.6	802	726.71	-17.3	-20.4	-22.4
D346	Heli	22	25.7	942	715.07	-18.2	-21.8	-24.2
D347	Heli	22	26	993	714.40	-15.6	-19.4	-21.9
D348	Heli	22	26	1019	721.16	- 7.0	-10.9	-13.5
D349	Heli	22	18.9	940	703.60	-22.6	-26.2	-28.6
D350	Heli	22	20.2	857	708.69	-24.7	-28.0	-30.2
D351	Heli	22	19.7	913	706.23	-22.7	-26.2	-28.5
D352	Heli	22	19.5	850	717.81	-15.3	-18.6	-20.7
D353	Heli	22	20.1	802	728.07	- 9.1	-12.2	-14.2
D354	Heli	22	19.8	729	727.35	-14.6	-17.4	-19.3
D355	Heli	22	19.9	696	730.90	-13.4	-16.1	-17.8
D356	Heli	22	20.2	664		-11.1	-13.7	-15.3
D357	Heli	22	19.9	627	736.74	-12.4	-14.8	-16.4

GRAVITY VALUES

Station	Type	Latitude South		Elev. (feet)	Obs. Gravity 978	BOUGUER		
						D 1.9	D 2.2	D2.4
		o	'					
D358	Heli	22	17.8	645	790.7	-11.3	-13.8	-15.4
D359	Heli	22	22	598	795.13	-2.7	- 5.0	- 6.5
D360	Heli	22	21.7	630	736.32	- 4.5	-16.9	-18.5
D361	Heli	22	13.3	578	785.97	-18.6	-20.8	-22.3
D362	Heli	22	13.6	582	786.28	-16.7	-18.9	-20.4
D363	Heli	22	13.9	623	786.6	-10.5	-12.9	-14.5
D364	Heli	22	14.2	687	786.92	-10.2	-12.9	-14.6
D365	Heli	22	14.2	706	726.75	- 0.4	- 3.1	- 4.9
D366	Heli	22	14.1	666	724.83	-15.8	-18.4	-20.0
D367	Heli	22	13.7	681	725.20	-13.6	-16.2	-17.9
D368	Heli	22	14.6	703	733.00	- 5.3	- 8.0	- 9.8
D369	Heli	22	14.0	732	732.00	- 3.6	- 6.4	- 8.3
D370	Heli	22	13.9	760	720.52	-13.0	-15.9	-17.8
D371	Heli	22	14.5	787	708.04	-24.2	-27.2	-29.2
D372	Heli	22	14.7	817	713.48	-16.9	-20.1	-22.1
D373	Heli	22	14.8	851	721.88	- 6.2	- 9.5	-11.6
D374	Heli	22	14.8	985	708.98	- 9.8	-13.6	-16.1
D375	Heli	22	7.6	890	708.14	- 9.7	-13.1	-15.4
D376	Heli	22	8.9	857	725.26	+ 3.8	+ 0.4	- 1.6
D377	Heli	22	8.0	832	722.34	0.0	- 3.2	- 5.3
D378	Heli	22	7.7	790	709.90	-15.0	-18.1	-20.0
D379	Heli	22	7.8	761	716.43	-10.6	-13.5	-15.4
D380	Heli	22	8.5	762	719.60	- 8.8	-11.7	-13.6
D381	Heli	22	8.0	718	720.15	-10.1	-12.9	-14.7
D382	Heli	22	7.7	710	718.41	-12.1	-14.8	-16.6
D383	Heli	22	7.8	714	719.24	-11.1	-73.8	-15.6
D384	Heli	22	8.2	687	730.88	- 1.8	- 4.4	- 6.2

GRAVITY VALUES

Station	Type	Latitude South	Elev. (feet)	Obs. Gravity 978	BOUGUER		
					D 1.9	D 2.2	D2.4
		° '					
D385	Heli	22 8.2	645	736.07	- 0.5	- 2.0	- 3.6
D386	Heli	22 8.3	671	729.37	- 4.5	- 7.1	- 8.8
D387	Heli	22 8.2	620	727.14	-10.2	-12.6	-14.1
D388	Heli	22 7.3	616	721.17	-15.5	-17.9	-19.4
D389	Heli	22 2.2	673	718.71	- 8.6	-11.2	-12.9
D390	Heli	22 1.8	697	713.33	-11.9	-14.6	-16.3
D391	Heli	22 0.8	676	705.19	-20.5	-23.1	-24.8
D392	Heli	22 1.5	735	711.61	-10.7	-13.5	-15.4
D393	Heli	22 1.8	712	729.32	+ 5.1	+ 2.2	+ 0.5
D394	Heli	22 2.5	799	716.36	- 2.5	- 5.6	- 7.6
D395	Heli	22 2.2	749	714.61	- 7.4	- 2.9	-12.2
D396	Heli	22 2.5	785	795.98	- 3.9	- 6.9	- 8.9
D397	Heli	22 1.8	779	713.21	-6.3	- 9.3	-11.3
D398	Heli	22 1.8	852	705.58	- 8.9	-12.2	-14.3
D399	Heli	22 1.9	850	707.09	- 7.6	-10.9	-13.0
D400	Heli	22 1.6	872	710.76	- 2.1	- 5.5	- 7.7
D401	Heli	22 2.2	954	677.21	-30.5	-34.2	-36.6
D402	Heli	22 1.6	940	680.94	-27.1	-30.7	-33.1
61-1	Ground	22 20.5	573.0	746.78	- 6.8	- 9.0	-10.4
61-2	Ground	22 23.0	582.3	752.24	- 3.3	- 5.2	- 7.0
61-3	Ground	22 26.7	599.6	754.52	- 3.7	- 6.0	- 7.5
61-4	Ground	22 29.1	614.4	754.88	- 4.9	- 7.3	- 8.8
61-5	Ground	22 31.7	638.1	757.15	- 3.7	- 6.2	- 7.8
61-6	Ground	22 35.5	675.0	757.37	- 4.9	-7.5	- 9.2
61-7	Ground	22 39.7	773.9	758.80	- 1.1	- 4.1	- 6.0
61-8	Ground	22 44.0	803.8	765.23	+ 2.9	+ 0.2	- 2.2

GRAVITY VALUES

Station	Type	Latitude South		Elev. (feet)	Obs. Gravity 978	BOUGUER		
						D 1.9	D 2.2	D2.4
		°	'					
61-9	Ground	22	46.9	744.6	773-16	+ 3.6	- 0.7	- 1.1
61-10	Ground	22	49.8	734.0	775.85	- 2.4	- 0.4	- 2.3
61-11	Ground	22	54.0	687.6	783.99	- 2.8	+ 0.1	- 1.6
61-12	Ground	22	58	658.0	789.57	+ 1.8	- 0.7	- 2.4
43-6	Ground	22	57.4	763.6	780.68	+ 1.1	- 1.9	- 3.8
43-7	Ground	22	57.7	720.3	786.22	+ 3.3	+ 0.5	- 1.3
43-8	Ground	22	54.3	773.0	780.17	+ 4.6	- 2.9	- 0.3
43-9	Ground	22	51.0	800.3	774.47	+ 4.4	- 1.2	- 0.7
62-1	Ground	22	43.8	845.5	746.31	-13.0	-16.3	-18.4
62-2	Ground	22	48.6	848.2	751.78	-12.4	-15.7	-17.8
62-3	Ground	22	52.2	831.8	756.87	-12.4	-15.6	-17.7
62-4	Ground	22	55.0	815.8	762.60	-10.7	-13.8	-15.9
62-5	Ground	22	56.6.	819.5	766.06	- 8.7	-11.9	-13.9
62-6	Ground	22	59.3	771.9	775.25	- 5.7	- 8.7	-10.6
60-1	Ground	22	17.7	559.7	734.99	-16.5	-18.6	-21.4
60-2	Ground	22	18.6	561.2	737.80	-14.6	-16.8	-18.2
60-3	Ground	22	18.9	556.8	744.62	- 7.7	- 9.9	-11.3
60-4	Ground	22	19.0	572.0	746.99	- 5.0	- 7.2	- 8.6
60-5	Ground	22	20.2	585.5	751.03	- 1.3	- 3.6	-50.5
60-6	Ground	22	20.3	593.7	745.39	- 6.5	- 8.8	-10.3
60-7	Ground	22	20.8	603.2	745.28	- 6.5	- 8.8	-10.3
60-8	Ground	22	23.0	614.4	745.59	- 7.7	-10.10	-11.63
60-9	Ground	22	24.6	635.4	750.07	- 3.4	- 5.9	- 7.4
60-10	Ground	22	27.2	669.8	743.93	- 9.9	-12.5	-14.2
60-11	Ground	22	28.1	682.6	741.11	-12.9	-15.4	-17.1
60-12	Ground	22	28.9	690.0	739.28	-15.0	-17.7	-19.4
60-13	Ground	22	31.0	713.6	739.61	-15.2	-17.9	-19.5

GRAVITY VALUES

Station	Type	Latitude South		Elev. (feet)	Obs. Gravity 978	BOUGUER		
						D 1.9	D 2.2	D2.4
		o	'					
60-14	Ground	22	33.6	719.7	743.68	-13.5	-16.3	-18.1
60-15	Ground	22	36.1	746.9	746.39	-11.5	-14.4	-16.2
60-16	Ground	22	35.9	776.8	743.29	-12.3	-15.3	-17.2
60-17	Ground	22	35.8	831.5	738.42	-13.3	-16.5	-18.6
60-18	Ground	22	35.8	961.7	729.42	-13.2	-16.9	-19.3
60-19	Ground	22	37.8	938.2	731.13	-15.2	-18.8	-21.2
60-20	Ground	22	39.7	859.0	738.18	-15.8	-19.1	-21.3
60-21	Ground	22	42.5	870.4	741.09	-15.0	-18.4	-20.5
60-22	Ground	22	40.2	892.5	735.36	-16.8	-20.2	-22.5
60-23	Ground	22	37.4	914.5	728.22	-19.4	-22.9	-25.2
60-24	Ground	22	35.2	945.4	727.86	-15.2	-18.9	-21.2
2607	Ground	21	56.8	820	768.73	- 4.3	-7.5	- 9.5
2608	Ground	21	57.4	780	715.58	+ 0.7	-2.3	- 5.7
2609	Ground	21	58.0	732	713.33	- 5.5	-8.3	-10.2
2610	Ground	21	57.6	727	716.07	- 2.1	-4.9	- 6.7
2611	Ground	21	57.9	694	706.01	-15.4	-18.1	-20.2
2612	Ground	21	58.2	752	700.73	-16.9	- 9.7	-11.6
2613	Ground	21	57.6	727	716.07			
2755	Ground	21	59.3	963	684.45			
2756	Ground	21	54.0	1017	687.69			

GRAVITY VALUES

Station	Type	Latitude South	Elev. (feet)	Obs. Gravity 978	BOUGUER		
					D 1.9	D 2.2	D2.4
		o '					
2644	Ground	21 40.1	670	695.00	- 9.7	-12.3	-14.0
2645	Ground	21 40.1	706	682.83	-19.3	-22.0	-23.8
2646	Ground	21 39.7	882	674.36	-15.1	-18.5	-20.7
2647	Ground	21 40.2	827	676.98	-16.8	-20.0	-22.1
2648	Ground	21 39.9	806	676.35	-18.6	-21.7	-23.7
2649	Ground	21 39.7	785	674.61	-21.6	-24.6	-26.6
2650	Ground	21 40.9	870	672.49	-19.0	-22.4	-24.5
2651	Ground	21 37.9	856	675.18	-14.2	-17.5	-19.7
2652	Ground	21 39.5	881	676.86	-12.4	-15.8	-18.0
2653	Ground	21 40.4	936	674.34	-12.0	-15.6	-18.0
2654	Ground	21 38.5	892	678.30	- 9.2	-12.7	-14.9
2656	Ground	21 39.2	910	676.65	-10.9	-14.4	-16.7
2713	Ground	21 40.5	922	678.42	- 9.1	-12.7	-15.0

DEPTH DETERMINATIONS AEROMAGNETIC SURVEY

Appendix 2.(i)

ANOMALY		LOCATION	N x M	N AZIMUTH	DEPTH INDEX MAP MODEL (K = 5280 x 4)	DEPTH (feet)	PETERS (L = 5280 x 4 / 1.5)	DEPTH (feet)
Fig 7	1 (a)	line 106	2 x 4	N N-E (?)	.9 x K / .95	20000	.9 x L	12000
	(b)							
	2 (a)	line 106	2 x 4	N N-E (?)	1.5 x K / .95	33473	1.5 x L	20000
	(b)							
	3 (a)	line 106	2 x 4	N N-E (?)	.1 x K / .95	2273	.15 x L	1980
	(b)				.2 x K / .95	4446		
	4 (a)	line 104	2 x 4	Nth	.5 x K / .95	11114	.38 x L	1980
	(b)				.25 x K / .95	5557		
	5 (a)	line 103	2 x 4	N N-E	.5 x K / .95	11114	.3 x L	1050
	(b)				.1 x K / .95	2223		
	6 (a)	line 103	2 x 4	Nth	1.25 x K / .95	27786	.77 x L	4000
	(b)				.3 x K / .95	6669		
	7 (a)	line 101	2 x 4	N N-E	.15 x K / .95	3334	.12 X L	1650
	(b)				.10 x K / .95	2223		
	8 (a)	line 102	2 x 4	N	.2 x K / .95	4446	.15 x L	1980
	(b)				.1 x K / .95	2223		
	9 (a)	line 101	2 x 4	N	.1 x K / .95	2222	.15 x L	1980
	(b)				.2 x K / .95	4444		

DEPTH DETERMINATIONS AEROMAGNETIC SURVEY

ANOMALY		LOCATION	N x M	N AZIMUTH	DEPTH INDEX MAP MODEL (K = 5280 x 4)	DEPTH (feet)	PETERS (L = 5280 x 4 / 1.5)	DEPTH (feet)
Fig 7	10 (a)	line 100	2 x 4	N	.1 x K / .95	2222	.1 x L	1333
	(b)				.1 x K / .95	2222		
	11 (a)	line 99	2 x 4	N	.1 x K / .95	2222	.1 x L	1333
	(b)				.1 x K / .95	2222		
	12 (a)	line 99	8 x 4	N N-W	.1 x K / 1.3	1625	.1 x L	1470
	(b)				.1 x K / 1.3	3250		
	13 (a)		8 x 4	N N-W	.15 x K / 1.3	2438	.15 x L	1460
	(b)				.15 x K / 1.3	2438		
	14.(a)		8 x 4	N N-E	.1 x K / 1.3	1625	.15 x L	1460
	(b)				.2 x K / 1.3	3250		
	15 (a)		8 x 4	N N-E	.1 x K / 1.3	1625	.12 x L	1222
	(b)		8 x 4	N N-E	.15 x K / 1.3	2438		
	16 (a)		2 x 4	N	.1 x K / .95	2222	.12 x L	1658
	(b)				.15 x K / .95	3334		
Fig 8	1 (a)	line 106	2 x 4	N N-W	1 x K / .95	22200	.75 x L	10560
	(b)				.9 x K / .95	20000		
	2 (a)	line 103	2 x 4	N N-W	.5 x K / .95	11114	.25 x L	3520
	(b)				1.8 x K / .95	40011	1.8 x L	25344

Appendix 2. (iii)

DEPTH DETERMINATIONS AEROMAGNETIC SURVEY

ANOMALY	LOCATION	N x M	N AZIMUTH	DEPTH INDEX MAP MODEL (K = 5280 x 4)	DEPTH (feet)	PETERS (L = 5280 x 4 / 1.5)	DEPTH (feet)
Fig 8 3 (a)	line 97	2 x 4	N	1.0 x K / .95	22000	.8 x L	11264
(b)				1.0 x K / .95	22000		
4 (a)	line 97	2 x 4	N	.7 x K / .95	15560	.5 x L	7040
(b)				.7 x K / .95	15560		
5 (a)	line 100	2 x 4	N	.9 x K / .95	20000	.8 x L	11264
(b)				.5 x K / .95	11114		
6 (a)	line 100			.8 x K / .95	17780	.75 x L	10560
(b)							
7 (a)	line 92			.8 x K / .95	17780	.65 x L	9152
(b)				.7 x K / .95	15560		
8 (a)	line 93	2 x 4	N N-W	1.1 x K / .95	24451	.9 x L	12672
(b)				1.1 x K / .95	24451		
9 (a)	line 94	2 x 4	N N-W	1 x K / .95	22230	.9 x L	12672
(b)				.6 x K / .95	13340		
10 (a)	line 94	2 x 4		1 x K / .95	22230	.85 x L	11968
(b)				1.7 x K / .95	37789		
11 (a)	line 94	2 x 4	N N-W	.8 x K / .95	17783	.7 x L	9856
12 (b)				.5 x K / .95	11114	.7 x L	

DEPTH DETERMINATIONS AEROMAGNETIC SURVEY

ANOMALY		LOCATION	N x M	N AZIMUTH	DEPTH INDEX MAP MODEL (K = 5280 x 4)	DEPTH (feet)	PETERS (L = 5280 x 4 / 1.5)	DEPTH (feet)
Fig 8	13 (a)	line 94	2 x 4	N	.4 x K / .95	8892	.35 x L	4928
	(b)				.4 x K / .95	8892		
	14 (a)	line 96	2 x 4	N	1 x K / .95	2230	1.0 x L	14080
	(b)				.8 x K / .95	17783	1.0 x L	14080
	15 (a)	line 96	2 x 4	N	1.2 x K / .95	26670	1.1 x L	15488
	(b)				1.0 x K / .95	22230		
	16 (a)	line 92	2 x 4	N	1.0 x K / .95	22230	.9 x L	12672
	(b)				1.0 x K / .95	22230		
	17 (a)	line 93	2 x 4	NW	.7 x K / .95	15560	.7 x L	9856
	(b)				.8 x K / .95	17783		
	18 (a)	line 92	2 x 4	NE	1.5 x K / .95	33343	1.5 x L	21120
	(b)				1.6 x K / .95	35566		
Fig 9	1 (a)	line 85	4 x 4	N	.5 x K / 1.0	10560	.4 x L	5632
	(b)				.4 x K / 1.4	6034		
	2 (a)	line 84	4 x 4	N	.7 x K / 1.0	14784	.5 x L	7040
	(b)				.5 x K / 1.4	7543		
	3 (a)	line 86	6 x 4	N	.45 x K / 1.3	7310	.4 x L	5632
	(b)				.4 x K / 1.3	6500		

Appendix 2. (v)

DEPTH DETERMINATIONS AEROMAGNETIC SURVEY

ANOMALY		LOCATION	N x M	N AZIMUTH	DEPTH INDEX MAP MODEL (K = 5280 x 4)	DEPTH (feet)	PETERS (L = 5280 x 4 / 1.5)	DEPTH (feet)
Fig 9	4 (a)	line 86	4 x 2	N	.1 x K / 1.0	21000	.9 x L	12672
	(b)				.2 x K / 1.0	42000		
	5 (a)	line 86	2 x 4	N	.7 x K / .95	15560	.55 x L	7744
	(b)				.4 x K / .95	8891		
	6 (a)	line 87	4 x 2	N	.8 x K / 1.0	16896	.7 x L	9856
	(b)				1 x K / 1.0	21120		
	7 (a)	line 87	6 x 4	N	1 x K / 1.0	21120	1.4 x L	19712
	(b)				1.5 x K / 1.0	31680		
	8 (a)	line 88	2 x 4	N	1 x K / .95	22222	1.05 x L	14784
	(b)			N	1 x K / .95	22222		
	9 (a)	line 85	2 x 4	N	1 x K / .95	22222	.5 x L	7040
	(b)				1 x K / .95	33343		
	10 (a)	line 82	6 x 2	N	1.0 x K / 1.0	22222	.7 x L	9836
	(b)				.8 x K / 1.0	16896		
Fig 10	1 (a)	line 77	2 x 4	N	.5 x K / .95	11114	.25 x L	3520
	(b)				.45 x K / .95	10000		
	2 (a)	line 78	4 x 4	N	.4 x K / .95	6498	.4 x L	5632
	(b)				1 x K / .95	16246		

DEPTH DETERMINATIONS AEROMAGNETIC SURVEY <u>Appendix 2.</u> (vi)

ANOMALY	LOCATION	N x M	N AZIMUTH	DEPTH INDEX MAP MODEL (K = 5280 x 4)	DEPTH (feet)	PETERS (L = 5280 x 4 / 1.5)	DEPTH (feet)
Fig 10 3 (a)	line 77	2 x 4	N	.35 x K / .95	7780	1.4 x L	19712
(b)				.3 x K / .95	6669	1.4 x L	
4 (a)	line 73	2 x 4	N	.4 x K / .95	8892		
(b)				.5 x K / .95	11114	.35 x L	4928
5 (a)	line 74	2 x 4	N	.3 x K / .95	6669		
(b)				.4 x K / .95	8892	.3 x L	4224
6 (a)	line 73	2 x 4	N	.7 x K / .95	15560		
(b)				.6 x K / .95	13337	.7 x L	9856
7 (a)	line 74	2 x 4	N	.7 x K / .95	15560	.5 x L	7040
(b)				.1 x K / .95	2222	.5 x L	7040
8 (a)	line 76	2 x 4	N	.8 x K / .95	17783	.7 x L	9856
(b)				.4 x K / .95	8891		
9 (a)	line 76	4 x 2	N N-W	.8 x K / 1.0	16896	1.0 x L	14080
(b)				.8 x K / 1.0	16896	1.0	
10 (a)	line 78	4 x 2	N N-W	.75 x K / 1.0	15840	.9 x L	12672
(b)				.8 x K / 1.0	16896		
11 (a)	line 77	2 x 4	N	.45 x K / .95	10002	.8 x L	11264
(b)				1.0 x K / .95	22220		

DEPTH DETERMINATIONS AEROMAGNETIC SURVEY

ANOMALY	LOCATION	N x M	N AZIMUTH	DEPTH INDEX MAP MODEL (K = 5280 x 4)	DEPTH (feet)	PETERS (L = $\frac{5280 \times 4}{1.5}$)	DEPTH (feet)
Fig 10 12 (a)	line 78	2 x 4	N	.6 x K / .95	13373	.6 x L	8448
(b)				.6 x K / .95	13373		
13 (a)	line 79	2 x 4	N	.45 x K / .95	10003	.5 x L	7040
(b)				.4 x K / .95	8891		
14 (a)	line 81	4 x 4	N	.7 x K / 1.3	11373	1.0 x L	14080
(b)				.45 x K / 1.3	7310		
15 (a)	line 76	2 x 4	N	.4 x K / .95	8892	.4 x L	5632
(b)				.4 x K / .95	8892		
Fig 11 1 (a)	line 72	2 x 4	N	.5 x K / .95	11140	.6 x L	8448
(b)				1.2 x K / .95	26675		
2 (a)	line 72	2 x 4	N	.8 x K / .95	17783	.3 x L	4224
(b)				. x K / .95	7780		
3 (a)	line 72	2 x 4	N	.9 x K / .95	20005	.9 x L	12672
(b)				.9 x K / .95	20005		
4 (a)	line 72	4 x 4	N N-W	.65 x K / 1.3	10560	.75 x L	10560
(b)				.3 x K / 1.3	4874		
5 (a)	line 71	4 x 4	N N-W	.7 x K / .95	15560	.3 x L	4224
(b)				.4 x K / .95	8891		

DEPTH DETERMINATIONS AEROMAGNETIC SURVEY

ANOMALY	LOCATION	N x M	N AZIMUTH	DEPTH INDEX MAP MODEL (K = 5280 x 4)	DEPTH (feet)	PETERS (L = 5280 x 4 / 1.5)	DEPTH (feet)
Fig 11 6 (a)	line 71	2 x 4	N	.7 x K / .95	15560	.5 x L	7040
(b)				.7 x K / .95	15560		
7 (a)	line 71	2 x 4	N	.5 x K / .95	11140	.5 x L	7040
(b)				.8 x K / .95	17783	.5 x L	
8 (a)	line 70	2 x 4	N	.8 x K / .95	17783	.8 x L	11264
(b)				.4 x K / .95	8891	.8	
9 (a)	line 70	2 x 4	N	.5 x K / .95	11140	.4 x L	5632
(b)				.5 x K / .95	11140		
10 (a)	line 70	2 x 4	N	.7 x K / .95	15560	.7 x L	9856
(b)				.6 x K / .95	13337		
Fig 12 1 (a)	line 68	2 x 4	W	.6 x K / .95	13337	.6 x L	8448
(b)				.5 x K / .95	11140		
2 (a)	line 68	2 x 4	W	1.5 x K / .95	33384	1.2 x L	16896
(b)				.7 x K / .95	15560		
3 (a)	line 68	2 x 4	W	1.1 x K / .95	24480	.8 x L	11264
(b)				1.0 x K / .95	22228		
4 (a)	line 68	2 x 4	W	.4 x K / .95	8891	.5 x L	7040
(b)				1.0 x K / .95	22228	.5 x L	

DEPTH DETERMINATIONS AEROMAGNETIC SURVEY

Appendix 2. (ix)

ANOMALY	LOCATION	N x M	N AZIMUTH	DEPTH INDEX MAP MODEL (K = 5280 x 4)	DEPTH (feet)	PETERS (L = $\frac{5280 \times 4}{1.5}$)	DEPTH (feet)
Fig 12 5 (a)	line 67	2 x 4	W	.7 x K / .95	15560	.5 x L	7040
(b)				1.1 x K / .95	24450		
6 (a)	line 67	2 x 4	W	.7 x K / .95	15560	.8 x L	11264
(b)				.55 x K / .95	12223		
7 (a)	line 67	2 x 4	W	.15 x K / .95	3334	.18 x L	2534
(b)				.25 x K / .95	5557		
8 (a)	line 67	2 x 4	W	.15 x K / .95	3334	.13 x L	1830
(b)				.15 x K / .95	3334		
9 (a)	line 66	2 x 4	W	.5 x K / .95	11140	.4 x L	5632
(b)				1.2 x K / .95	26675		
10 (a)	line 66	2 x 4	W	.8 x K / .95	17783	.4 x L	5632
(b)				1.0 x K / .95	22228		
11 (a)	line 66	2 x 4	W	.4 x K / .95	8891	.33 x L	4646
(b)				.5 x K / .95	11140		
12 (a)	line 66	2 x 4	W	.8 x K / .95	17783	.7 x L	9856
(b)				.8 x K / .95	17783		
13 (a)	line 66	2 x 4	W	.8 x K / .95	17783	.7 x L	9856
(b)				1.0 x K / .95	22228		

DEPTH DETERMINATIONS AEROMAGNETIC SURVEY

Appendix 2. (x)

ANOMALY	LOCATION	N x M	N AZIMUTH	DEPTH INDEX MAP MODEL (K = 5280 x 4)	DEPTH (feet)	PETERS (L = 5280 x 4 / 1.5)	DEPTH (feet)
Fig 12 14 (a)	line 69	2 x 4	W	.6 x K / .95	13337	.7 x L	9856
(b)				.3 x K / .95	6669		
Fig 13 1 (a)	line 99	2 x 4	N	.7 x K / .95	15560	.5 x L	7040
(b)				.3 x K / .95	6669		
2 (a)	line 97	2 x 4	N	.8 x K / .95	17783	.5 x L	7040
(b)				.7 x K / .95	15560	.5 x L	
3 (a)	line 98	2 x 4	N	.7 x K / .95	15560	1.0 x L	14080
(b)				1 x K / .95	22228		
4 (a)	line 98	4 x 4	N	.6 x K / 1.3	9748	.35 x L	4928
(b)				.45 x K / 1.3	7311		
5 (a)	line 99	4 x 4	N	1.3 x K / 1.3	21120	1.0 x L	14080
(b)				.7 x K / 1.3	11372		
6 (a)	line 91	4 x 4	N	.8 x K / 1.3	12996	.6 x L	8448
(b)				.8 x K / 1.3	12996		
7 (a)	line 89	2 x 4	N	.7 x K / .95	15560	.6 x L	8448
(b)				.8 x K / .95	17783		
8 (a)	line 89	4 x 4	N	.8 x K / 1.3	12996	.9 x L	12672
(b)				1.0 x K / 1.3	16248		

DEPTH DETERMINATIONS AEROMAGNETIC SURVEY Appendix 2. (xi)

ANOMALY	LOCATION	N x M	N AZIMUTH	DEPTH INDEX MAP MODEL (K = 5280 x 4)	DEPTH (feet)	PETERS (L = $\frac{5280 \times 4}{1.5}$)	DEPTH (feet)
Fig 13 9 (a)	line 89	2 x 4	N	.4 x K / .95	8891	.45	6336
(b)				.4 x K / .95	8891		
10 (a)	line 83	4 x 4	N	.7 x K / 1.3	11372	.75 x L	10560
(b)				1.35 x K / 1.3	21932		
11 (a)	line 89	4 x 4	N	.7 x K / 1.3	11372	.6 x L	8448
(b)				.7 x K / 1.3	11372		
12 (a)	line 90	2 x 4	N	1 x K / .95	22222	1.1 x L	15488
(b)				.8 x K / .95	17783		
13 (a)	line 91	2 x 4	N	1.1 x K / .95	24452	1.0 x L	14080
(b)				1.4 x K / .95	31120		

FIGURE 2

FIGURE 2

BOUGUER DENSITY AGAINST HEIGHT
Scale 8 miles to an inch.