DOMES AND DIAPIRS

MINERAL EXPLORATION

CENTRAL FLINDERS ZONE

ADELAIDE GEOSYNCLINE

FEBRUARY 1993

PREAMBLE

The exploration programme in the Central Flinders Zone of the Adelaide Geosyncline is based upon two concepts. The first is the close relationship between diapirs, barytes and base metal occurrences.

It is considered that base metals from lower strata have been transported upward by the diapirs aided by saline solutions.

The diapirs, in many cases, have moved into the crests of anticlines and domes and have been exposed so that any metal accumulations would have been dispersed. The possibility that the apex of diapirs or the upper limit of saline penetration in unbreached domes could contain ore bodies is considered to justify testing.

The potential for evaporite minerals should not be overlooked and the distribution of barytes with the possibility of associated strontium should be watched.

The second concept is the possibility of economic quantities of hydrocarbons, essentially methane, in the domal structures. This would depend largely on fracture permeability. The petroleum industry has developed over the last few years the drilling technique to exploit fracture permeability. The drilling of domal structures younger then those in Upper Proterozoic strata is normal practice and the exploration industry is just beginning to appreciate the possibilities of Proterozoic hydrocarbons.

Three potential structures have been identified in the Central Flinders Zone.

The Willippa Anticline has not been investigated in detail but it should be considered during progress on testing the other two structures, Bibliando and Martins Well Domes.

<u>Bibliando Dome</u> is a well defined structure which hosts a strong magnetic anomaly coincident with a gravity high and the structure of the enclosing strata.

The magnetic body which is considered to contain magnetite or basic igneous rock is approximately 1500 metres below the surface and therefore too deep for current exploitation. However, if diapiric or saline penetration has reached higher in the structure the possibility of base metal ore exists. The old Barratta Mine is located over the magnetic anomaly.

A deep test drillhole to 2000 metres or more would test the potential of this dome. Indications of natural gas could be assessed and the nature of the magnetic anomaly could be established. The stratigraphic position of the magnetic anomaly would indicate whether it is in or adjacent to Callanna Group sediments or in basement rocks and either would be significant information.

The drilling of Bibliando Dome is considered to be attractive as it would test both concepts of the exploration programme.

<u>Martins Well Dome</u> is also a well defined structure which has the potential for fracture hosted methane. The surface structure, a gravity survey and seismic sections suggest that Martins Well Dome is a "pillow" structure where a mobile material, such as salt, has been implanted in the crest of the dome.

Both the seismic and gravity data indicate that the main "pillow" structure is 3000 metres or more below the surface. It is not possible to decide whether any of the mobile material has moved as a diapir in the structure. The "pillow" structure appears to be too deep for economic development even by solution mining.

Martins Well Dome is considered to be worth testing for natural gas especially with the Natural Gas Pipeline so close.

It is not possible to decide whether the Callanna Group sediments are within reach of drilling but a test drillhole of say 2000 metres would check the possibility of diapiric intrusion higher in the structure.

The suggestion is that the Bibliando Dome should be drilled first and the future programme should await results and reassessment.

While that drilling is in progress, it would be worthwhile to map in more detail the surface outcrops at Martins Well and Willippa and to link the stratigraphy from Upalinna Dome through the Maggie Hill structure to Martins Well Dome and south to Willippa Anticline and Bibliando Dome.

At the same time a more detailed gravity survey south of Martins Well to cover the Willippa and Bibliando structures would increase the chances of solving this important area.

INTRODUCTION

The Adelaide Geosyncline is a significant geological province outcropping some 1000km in a north-south direction and some 100km wide east-west. It extends beneath adjacent younger sediments including producing and potential hydrocarbon basins. (Figure 1)

It contains approximately 12km thickness of Upper Proterozoic Pre Cambrian strata not all of which occur at any one locality. The strata which vary in age from -850 Ma to -500 Ma have been folded and faulted but are exposed in good outcrops which have been progressively mapped for the past 80 years or more commencing with the work of Douglas Mawson.

The outcropping area of the Adelaide Geosyncline is covered by an excellent set of geological maps and the surface geology, in all aspects, is well documented in reports, papers and theses. In 1987 the Geological Survey of South Australia published a comprehensive and important volume, "Bulletin 53. The Adelaide Geosyncline". Further investigations by the Survey, private companies and universities have proceeded since then.

The Adelaide Geosyncline has been recognised as a base metal province since the second half of the 19th Century when ore deposits were mined at Burra, Kapunda and Blinman, as well as many other small mines and prospects. Since then considerable funds have been spent investigating the base metal potential with only limited success in the production of zinc and barytes.

One notable aspect of the province is the absence of cross cutting igneous intrusions except for the presence of dyke swarms prior to the initiation of the Upper Protozoic sedimentation and some dolerites intruded into the early part of the sequence.

However in the mid 20th Century a series of cross cutting structures containing brecciated sedimentary rocks intruded into younger strata, were recognised. These have been classified as "diapirs" and have been mapped and discussed by many investigators and the interpretations are varied.

Geophysical surveys, principally gravimetric and aeromagnetic have been added to the large volume of geological information.

It is apparent that the accuracy of the interpretation of geological conditions, in the Adelaide Geosyncline, falls off rapidly with depth below the outcrop.

The need to enhance knowledge of the third dimension by improved geophysics and well logging with modern techniques is obvious.

The encouragement to do this arises from the possibility of economic value from such investigations. The understanding of the base metal occurrences is an incentive, but the potential for non metallic minerals and materials should not be underestimated.

In addition the possibilities of hydrocarbons, in Proterozoic strata, such as methane, is being investigated in many parts of the world, and the Upper Proterozoic sediments of the Adelaide Geosyncline are known to be capable of producing hydrocarbons.

As a starting point from which to understand the significance of the base metal occurrences it is noted that there is an intimate association of barytes with the diapirs and there is a general relationship between diapirs and the distribution of base metal occurrences. Barytes is frequently associated with base metal ore deposits in various localities and the two mineral groups have affinity.

To date the source and mechanism of emplacement of the various mineral deposits have not been explained adequately. The concept of linking them to the diapiric activity is a new approach and some of the deposits can be used as examples.

The barytes in the veins is insoluble and is unlikely to have travelled in that form. The barium content could have travelled in a saline solution and become fixed as the sulphate ($BaSO_4$) at near surface conditions. Zinc may have been transported in saline solution and later fixed as the silicate willemite (Zn_2SiO_4).

Similar conditions may explain the many Cu-Pb deposits.

Although a considerable amount of drilling has been completed within the Adelaide Geosyncline, there are no known drillholes designed to test or interpret the diapirs. The diapirs contain brecciated debris largely composed of Callanna Group sediments some of which, as at the old Blinman Mines, contain base metals.

If the mechanism by which the Callanna Group sediments are related to or responsible for the diapirs can be established, the understanding of the movement of base metals should help exploration. There is the need to achieve an understanding of the timing as well as of the mechanism of the diapirism.

EXPLORATION

To advance the knowledge of the relationship between the diapirs, the mineralisation and the associated rocks, an area in the Central Flinders Zone was selected for interpretation and testing, (Figure 2).
The reasons for selecting this area were:

1. The area has been recognised previously to contain many diapirs and numerous base metal as well as barytes occurrences (Figure 4).

2. There is a large domal structure extending from east of Wilpena Pound to north of Blinman. This structure is more open and deeply eroded compared to other structures in the Flinders Ranges (Figure 5).

3. This large structure has three domes along the axis each of which is breached by a diapir. The axes of these domes are

"en echelon" and parallel to the axis of Wilpena Pound (Figures 3 & 5).

4. The area lies north of the Nackara Arc and south of the more complex North Flinders Zone and appears to have been structurally sheltered by the Curnamona Craton (Figures 2 & 5).

5. There had been more detailed mapping and speculation about the Oraparinna and Blinman Diapirs.

6. The exposed sections adjacent to these diapirs are low in the stratigraphic section.

7. Some investigators had predicted that the brecciated material in the diapirs was derived from strata immediately below the rim rocks.

The lower section of the Adelaide Series contains three groups of sediments with which this exploration programme is concerned.

They are the Callanna Group at the base
Burra Group
Umberatana Group.

THE CALLANNA GROUP SEDIMENTS

These are clastics and carbonates deposited in evaporitic environments soon after the initial rifting of the basement rocks.

They are associated with base metals which may have been derived from the rifting or from the flanking Gawler and Curnamona Cratons which are significantly metalliferous.

The Callanna Group sediments occur in outcrop to the north and south of the Central Flinders Zone and where exposed, are brecciated and disturbed and often associated with diapirs.

They are not exposed on the flanks or in the core of the Zone except as brecciated debris in diapirs.

Signs of evaporitic conditions in the Callanna Group are well documented but no massive salts have been discovered.

This exploration programme is partly based upon the concept that significant salt formations existed in addition to the general salt content within the Callanna Group sediments, based on the following aspects:

1. The pattern of folding in the Adelaide Geosyncline is similar to fold patterns in known salt provinces (Plate 2).

2. The plucking of granitic bedrock from considerable depths and transport in diapiric debris is similar to occurrences in known salt plugs.

3. The massive size of Callanna type blocks of dolomite transported in diapirs e.g. Blinman Diapir.

If a saline environment is associated with the Callanna Group sediments, then the transportation of base metals by saline solutions may have been important. It is appreciated that no massive salt deposits are known in the area and few if any may remain after the escape of so much material by way of the exposed diapirs. The only localities in which salt or saline penetration could be preserved are possibly in unbreached domal structures.

The crestal positions of unbreached domal structures are therefore thought to be important exploration targets.

THE BURRA GROUP SEDIMENTS

These are also clastic and carbonate sediments with traces of evaporitic conditions. They are not know in the Central Flinders Zone, but outcrop immediately to the north and south. There have been no recorded fragments of typical Burra type magnesite bearing rocks in the diapirs of the region, and there is evidence that the Burra Group sediments were either eroded from or not deposited on the area being investigated.

This has the implication that there is an unconformity between the Umberatana and Callanna Group sediments and that diapirs may have been exposed in Burra time.

THE UMBERATANA GROUP SEDIMENTS

These sediments appear to have little potential for major mineral occurrences except as host rocks for minerals derived from diapirs such as barytes deposits.

The many small base metal prospects adjacent to diapirs occurring in Umberatana Group sediments, may also have been derived from saline solutions.

The exploration programme has been designed to test the conditions below the Umberatana Group or intruded into it and sites have been selected as close as possible to the base to reduce the depth of drilling.

THE POTENTIAL FOR HYDROCARBONS

Both the Callanna and Burra Group sediments have an organic content suggesting that hydrocarbons could have been generated during their formation and history.

The strata of the Adelaide Series in this region are almost unmetamorphosed but only methane would be anticipated in rocks subjected to the burial pressures and temperatures in this sequence.

Umberatana Group sediments also carry enough organic matter to have generated hydrocarbons. Cored material in this section show bitumen rims around grains (Plate 1) and fractures in these rocks instersected in Blinman No. 2 contained methane gas.

The deliverability of gas would be dependent upon the porosity and permeability of the strata. In the tight Umberatana Group sediments, this would be dependent on open and interconnected fractures, and the best localities would be where the rocks are draped over folds.

In the Callanna and Burra Groups sediments, permeability would be dependent on cavities in the dolomites.

The fact that suitable structures are close to the Adelaide Natural Gas pipeline is an incentive to test these areas.

The cosmic concept of the degassing of the planet has been borne in mind as the major domal structure, particularly if underlaid by a salt horizon, would be a favourable locality in which to predict this aspect. Direct testing would not be possible but any gas encountered should be checked for helium.

DRILLING PROGRAMME (1991-1992)

It was decided to locate the first test drilling programme near Blinman. A cored drillhole, Blinman No.1, was sited in the centre of the Blinman Diapir outcrop and drilled to a depth of 481 metres, and was still in random oriented debris when discontinued. The presence of potassium bearing salts was indicated by analytical work on the core.

The results of this drilling together with a review of the aeromagnetic data available, suggested that basement was considerably deeper than originally thought and that the structure was possibly filled with diapiric debris several kilometres thick (Figures 3 & 6).

Blinman No.2 was drilled on the eastern flank of Blinman Dome adjacent to the rim rocks of the diapir. It was discontinued at a depth of 2031 metres without reaching Callanna Group sediments or intersecting the diapir at depth (Figures 6-7).

Methane occurred in fractures but not in economic quantities. After consideration of drilling results and a reappraisal of all the data, including geological and geophysical mapping, it was apparent that the original exploration objectives could be better tested in areas where the Callanna Group sediments are considered to be shallower and on structures unbreached by diapirs.

There are a number of domal structures in the south-eastern corner of P.E.L. 41 which are unbreached (Figure 8). The stratigraphic section thins toward the eastern margin of the Adelaide Geosyncline in the Central Flinders Zone where the Adelaide Series rocks onlap the Curnamona Craton. While this may involve the "pinchout" of some horizons, there is evidence of the presence of Callanna Group sediments under the domal structures referred to.

However, it was considered sensible to seek further geophysical evidence of depths to potential targets on the two preferred structures, Martins Well and Bibliando Domes.

Additional information has now been assembled as the result of three different geophysical survey techniques.

1. A further gravimetric survey by the S.A. Geological Survey of the area over and between Martins Well Dome, Willippa Anticline and Bibliando Dome has established a pronounced gravity "low" over Martins Well Dome and a gravity "high" over Bibliando Dome (Figures 8 & 10).
   20 & 21

2. Seismic traverses have been recorded on the flanks and over the crest of Martins Well Dome (Figures 8, 10 & 19).

3. A detailed aeromagnetic survey was recorded over Bibliando Dome with further reconnaissance flights over the Bibliando, Willippa and Martins Well structures. (Figures 11 & 12)

As a result of this additional information, it is now considered that there are two important targets for testing by drilling to explore for both metallic and non-metallic minerals as well as the presence of natural gas.

FUTURE EXPLORATION

It is considered that two of the unbreached domal structures are attractive targets for test drilling.

They are the Martins Well and Bibliando Domes which have been checked by geological and geophysical surveys. (Figure 8)

These two structures are each in different structural zones although these zones may have been formed after the sediments were deposited in a similar environment. Bibliando Dome is within the Nackara Arc whereas Martins Well Dome is in the Central Flinders Zone. (Figures 2 & 5)

The dividing line between these two zones appears to pass close to Willippa Anticline, and the significance of this structural difference on the section to be explored is not known.

The regional aeromagnetic map of South Australia indicates that both domes are close to the Curnamona Craton. While the proximity to the craton suggests that the sedimentary section may be thinner under these structures, there is no direct evidence available. The closest evidence as to what may be expected in these structures is that available from the Worumba Anticline which is also in the Nackara Arc and more closely related to Bibliando Dome. (Figure 5) (Geological Survey of S.A. Bulletin 52).

The sequence of events at Worumba is interpreted as a folding episode after Callanna and Burra sedimentation with subsequent erosion of some of the Burra Group and an unconformity before the deposition of the Umberatana Group sediments. There are indications of diapiric intrusion both pre and post Umberatana time.

Martins Well Dome is more closely related to the Central Flinders Zone and may have been a southerly continuation of the major structure south of the Blinman, Oraparinna Upalinna Domes and pushed to the east during the Dalmerian Orogeny. In that case the expectancy of thinner stratigraphic section due to its present position may not be valid.

THE PROPOSED TARGETS

1. Bibliando Dome

This is a large structure in a relatively rugged topographic environment where an earlier aeromagnetic survey had indicated a strong magnetic anomaly, (Figure 9 & Figure 13).

It is located in the northern part of the Nackara Arc and is structurally linked to the area around the Worumba Anticline.

The regional gravity map of the area, (Figure 10) indicates the presence of a gravity high over the dome.

A detailed aeromagnetic Survey was completed by Aerodata in 1992 and the details are illustrated in Figures 11 and 12.

Total radiometrics measured during this survey outline the domal structure, (Figure 16).

The aeromagnetic data have been modelled and interpreted by a number of geophysicists who have contributed the following opinions:

1. The crest of the magnetic body is approximately 1500 metres below the surface.

2. The magnetic body has finite length and width, and although it conforms with the structure of the strata, it does not continued as an horizon far down the flanks and pitch of the dome.

   This is supported by the absence of a similar anomaly on the crest of the Willippa Anticline immediately to the north, (Figure 8).

3. Modelling of the anomaly indicates that the body has substantial thickness but does not extend to depth in a plug like form.

The magnetic material causing the anomaly is speculative, but it's strength suggests either magnetate or basic igneous rock. The aeromagnetic map of this part of South Australia suggests that part of Curnamona Craton or specifically the Willyama Complex, underlies this part of the Adelaide Geosyncline. The magnetite or basic igneous rock could therefore be hosted by the Adelaide Series or the Willyama basement.

It is believed that the Callanna Group sediments underlie Bibliando Dome because of a dyke like diapir cutting across the western end of the dome.

If Bibliando Dome is similar to the Worumba Anticline to the west, some of the Burra Group sediments may be present and there could be an unconformity below the outcropping

Umberatana
~~Curdamona~~ Group. Diapiric breccia could have intruded above the unconformity in the crest of the dome.

In the Worumba Anticline, there are clasts of dolerite and there are outcrops of Holowilena Ironstone, each of which have magnetic properties. Both of these rock types are known to occur in other diapirs in the region, but are not known to produce magnetic anomalies of the strength of that in Bibliando Dome.

The Bibliando Dome is in a base metal province with significant small previously worked mines at Eukaby Mines immediately south and the Baratta Mine on the crest of the dome.

It is noted that there is a close coincidence of the magnetic anomaly, the structure of the outcropping strata and the presence of a gravity high. The coincidence of magnetic and gravity highs was a factor which encouraged the exploration resulting in the discovery of the Olympic Dam Orebody. One other aspect which guided that exploration was the structural "corridor" 4A-4B as shown on Figure 17, together with other cross cutting lineaments.

ANY OTHER SIMILARITY WITH OLYMPIC DAM COULD ONLY BE CHECKED BY DRILLING.

Bibliando Dome is an attractive prospect for base metal exploration with a specific target to be tested. The drilling could also check for the possible apex of a diapir or a saline penetration. The potential for natural gas in the fractured strata over the crest of the dome would also be tested by the drill.

2. Martins Well Dome

This structure is a well exposed circular dome-like structure in relatively flat lying country and is on the eastern edge of the Adelaide Geosyncline in the Central Flinders Zone.

The occurrence of barytes in the north eastern part of the dome suggests the presence of Callanna Group sediments below. The aeromagnetic map does not provide a guide to the thickness of the stratigraphic section below the dome. The South Australian Geological Survey has produced a gravimetric map of the Parachilna 1:250,000 Sheet which includes recent work, part of which is shown on the overlay sheet, (Figures 8 & 10) and in detail on Figure 18.

It has been suggested that the Martins Well Dome is a "pillow" structure where mobile material, such as salt, has moved into the crest of the dome during it's development. The gravity map, (Figure 18) shows the pronounced gravity low which coincides with the structural dome, (Figures 8 & 10).

Two independent investigators have calculated the depth to the top of the "pillow" material which is assumed to be of lower specific gravity, as approximately 3000 metres.

In 1991 the S.A. Geological Survey ran two experimental seismic lines on the flanks of Martins Well Dome, (Figures 10 & 19). The interpretation of Line 91 AR-01 (Figure 20) was that the top of the "pillow" material was approximately 3000 metres below the surface.

In 1992 Seismograph Services Limited ran a 10km seismic line FE 92.01, east from Martins Well H.S. across the dome using modern vibrator equipment, (Figures 10 & 19).

This seismic section appears to support the presence of a "pillow" structure from approximatley 3000 metres below the surface down to approximately 4000 metres where there is a flat lying reflector which may be an unconformity. Above the "pillow" structure the strata appear to conform with the surface dips. A lower horizon with more apparent reflecting surfaces is within approximately 1800 metres of the surface. It is not possible to decide whether the material in the "pillow" has penetrated higher in the crest of the domal structure.

Deep reflectors suggest a thick stratigraphic section.

Martins Well Dome is considered to be an attractive site for a deep cored test to 2000 or more metres to test for the apex of a diapiric intrusion or the penetration of saline solutions which could be preserved and provide information on base metal and salt conditions.
It would also test the natural gas potential of the dome with the best condition for more open fractures in the strata draped over the crest.

3. **Willippa Anticline**

This is another structure which will merit further investigation if encouragement comes from results on the other two structures. The known outcrops in the crest of the anticline such as the Holowilena Ironstone suggests that the base of the Umberatana Group is shallow at this locality. The proximity to the boundary between the Nackara Arc to the south and the Central Flinders Zone to the north suggest that the structure may be more complicated than at Martins Well and Bibliando.

DOMES AND DIAPIRS

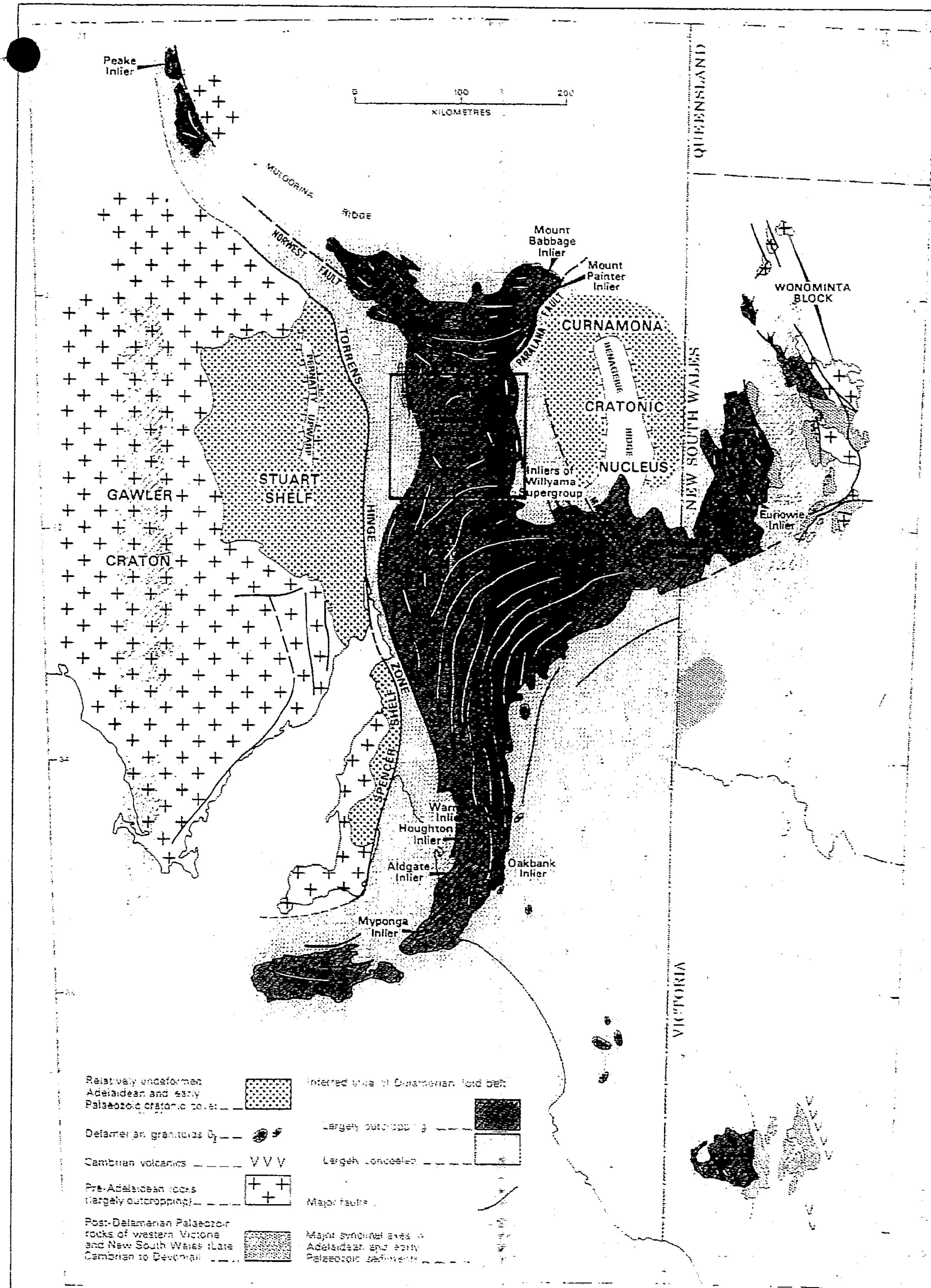
FIGURES AND PLATES

FEBRUARY 1993

LIST OF FIGURES AND PLATES

FIGURES:

PLATES:



ADELAIDE GEOSYNCLINE
SHOWING AREA OF INTEREST

FIGURE 1

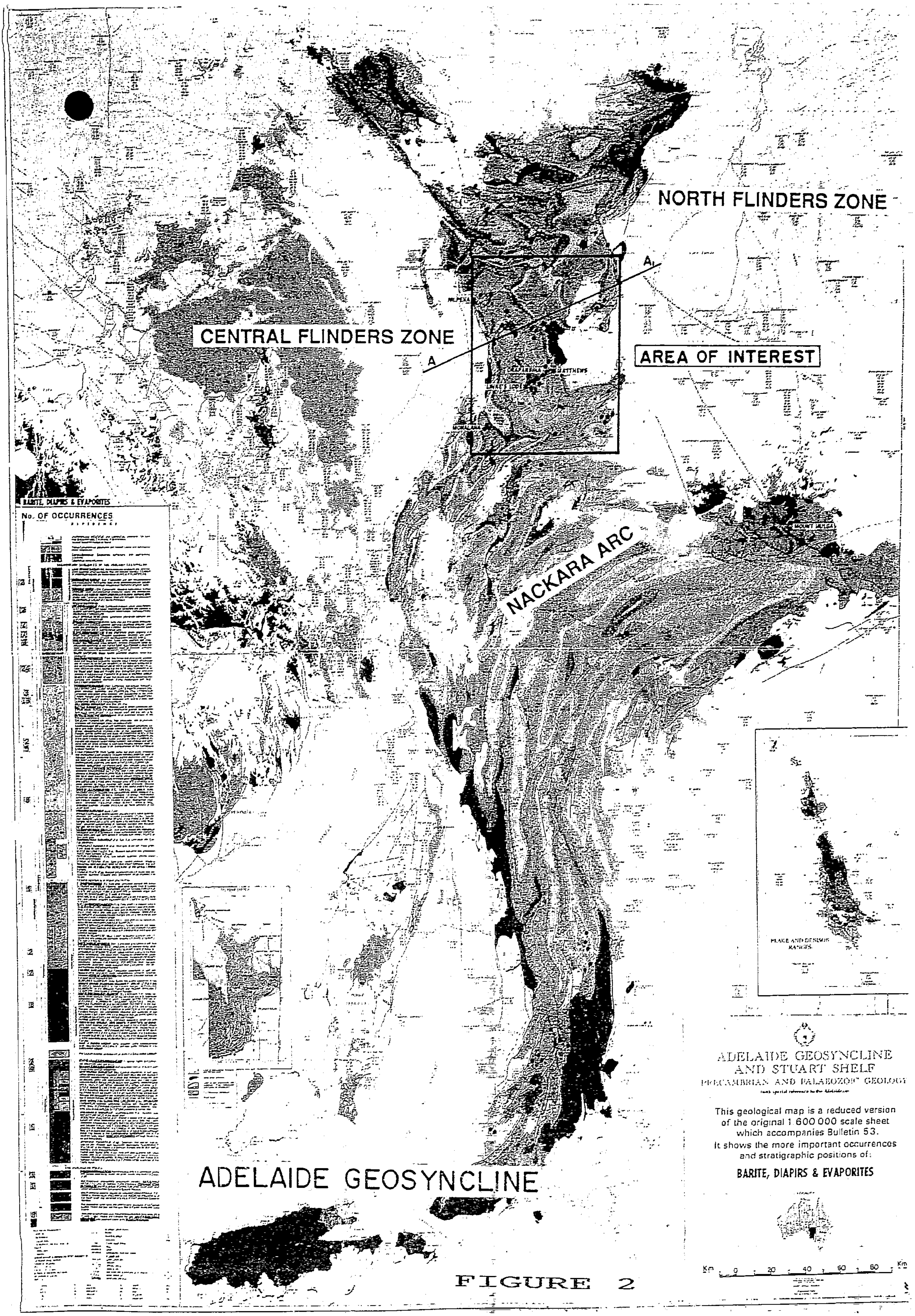

NORTH FLINDERS ZONE
CENTRAL FLINDERS ZONE
AREA OF INTEREST
A
A1
NACKARA ARC
ADELAIDE GEOSYNCLINE
BARITE, DIAPIRS & EVAPORITES
No. OF OCCURRENCES
ADELAIDE GEOSYNCLINE
AND STUART SHELF
PRECAMBRIAN AND PALAEOZOIC GEOLOGY
This geological map is a reduced version
of the original 1 600 000 scale sheet
which accompanies Bulletin 53.
It shows the more important occurrences
and stratigraphic positions of:
BARITE, DIAPIRS & EVAPORITES
Km 0 20 40 60 80 Km

FIGURE 2

CROSS SECTION FROM LAKE TORRENS TO LAKE FROME

NATURAL SCALE

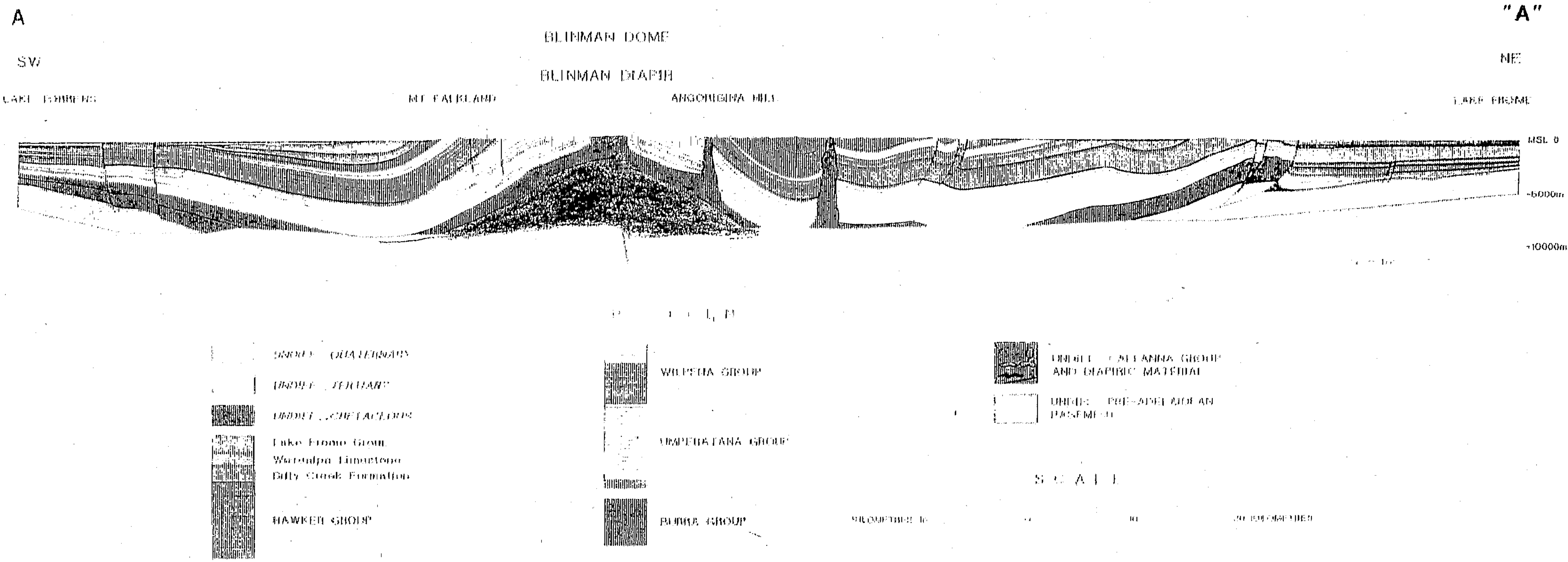
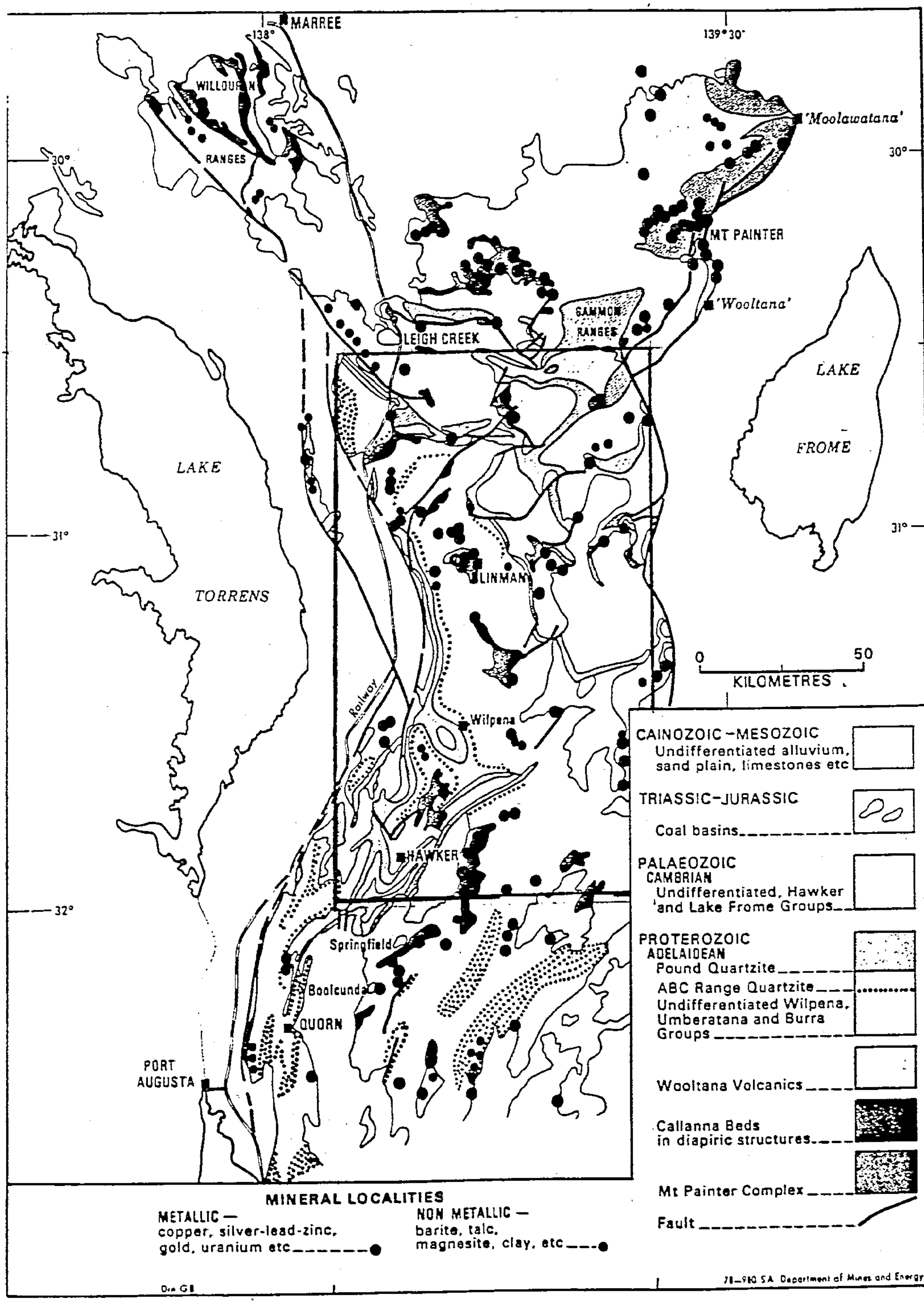


FIGURE 3



PART OF THE FLINDERS RANGES

Showing Mineral Locations and Diapirs (from A Guide to the Mineral Resources of S.A. Department of Mines and Energy of S.A. 1980)

FIGURE 4

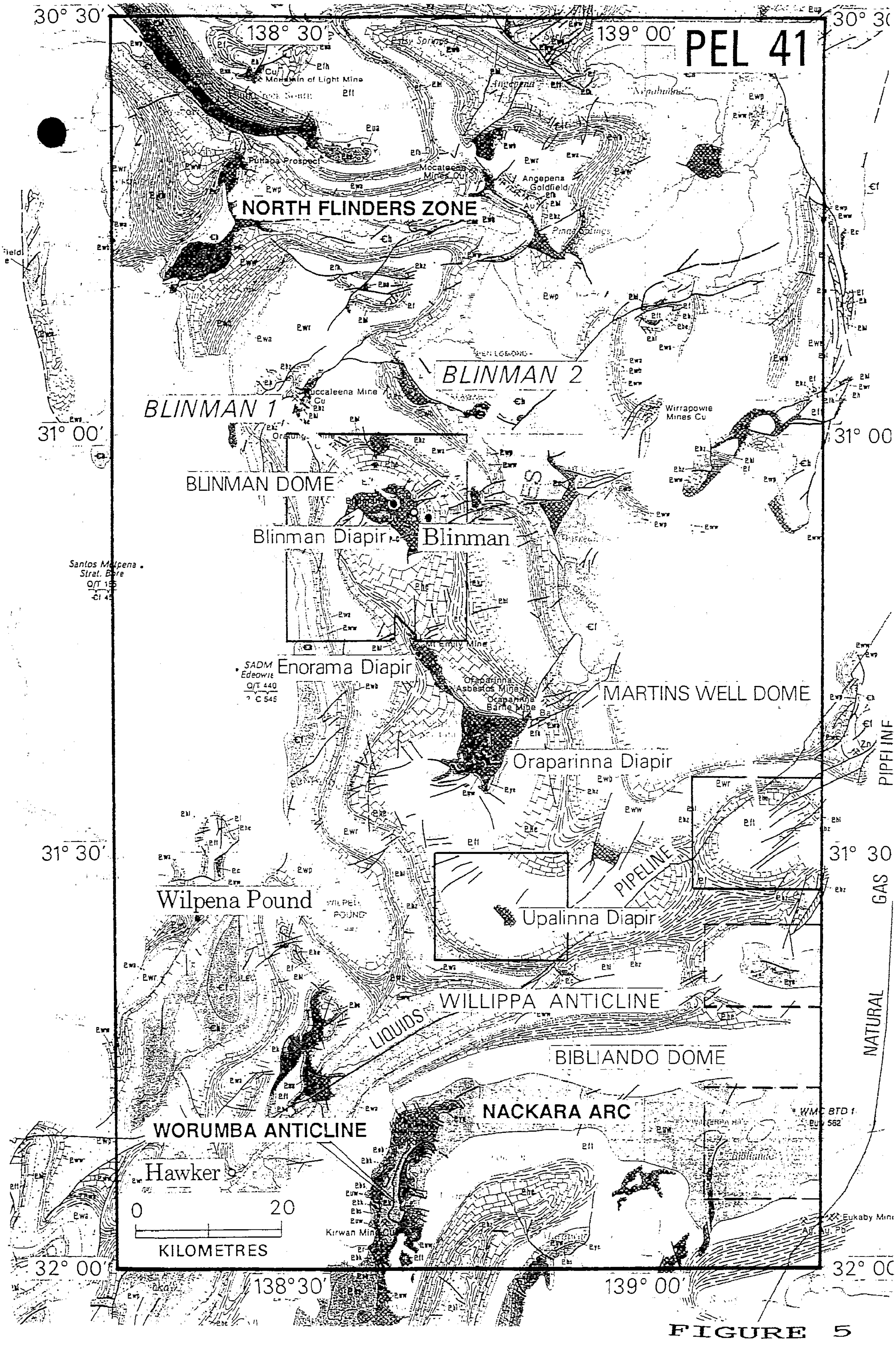
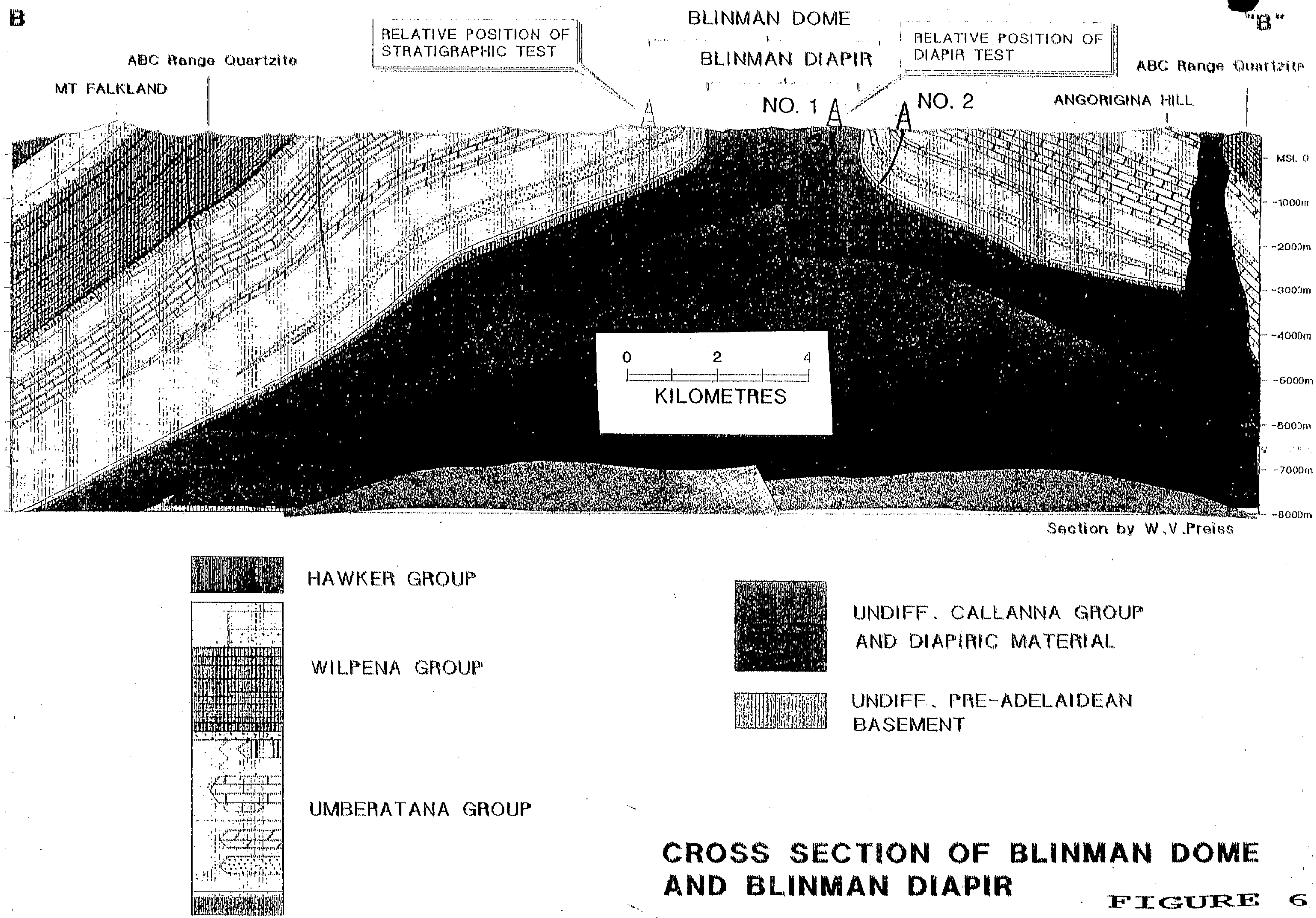

PEL 41
30° 30'
138° 30'
139° 00'
NORTH FLINDERS ZONE
BLINMAN 1
BLINMAN 2
31° 00'
BLINMAN DOME
Blinman Diapir
Blinman
Enorama Diapir
MARTINS WELL DOME
Oraparinna Diapir
31° 30'
Wilpena Pound
Upalinna Diapir
PIPELINE
WILLIPPA ANTICLINE
LIQUIDS
BIBLIANDO DOME
NATURAL GAS
NACKARA ARC
WORUMBA ANTICLINE
Hawker
0
20
KILOMETRES
32° 00'

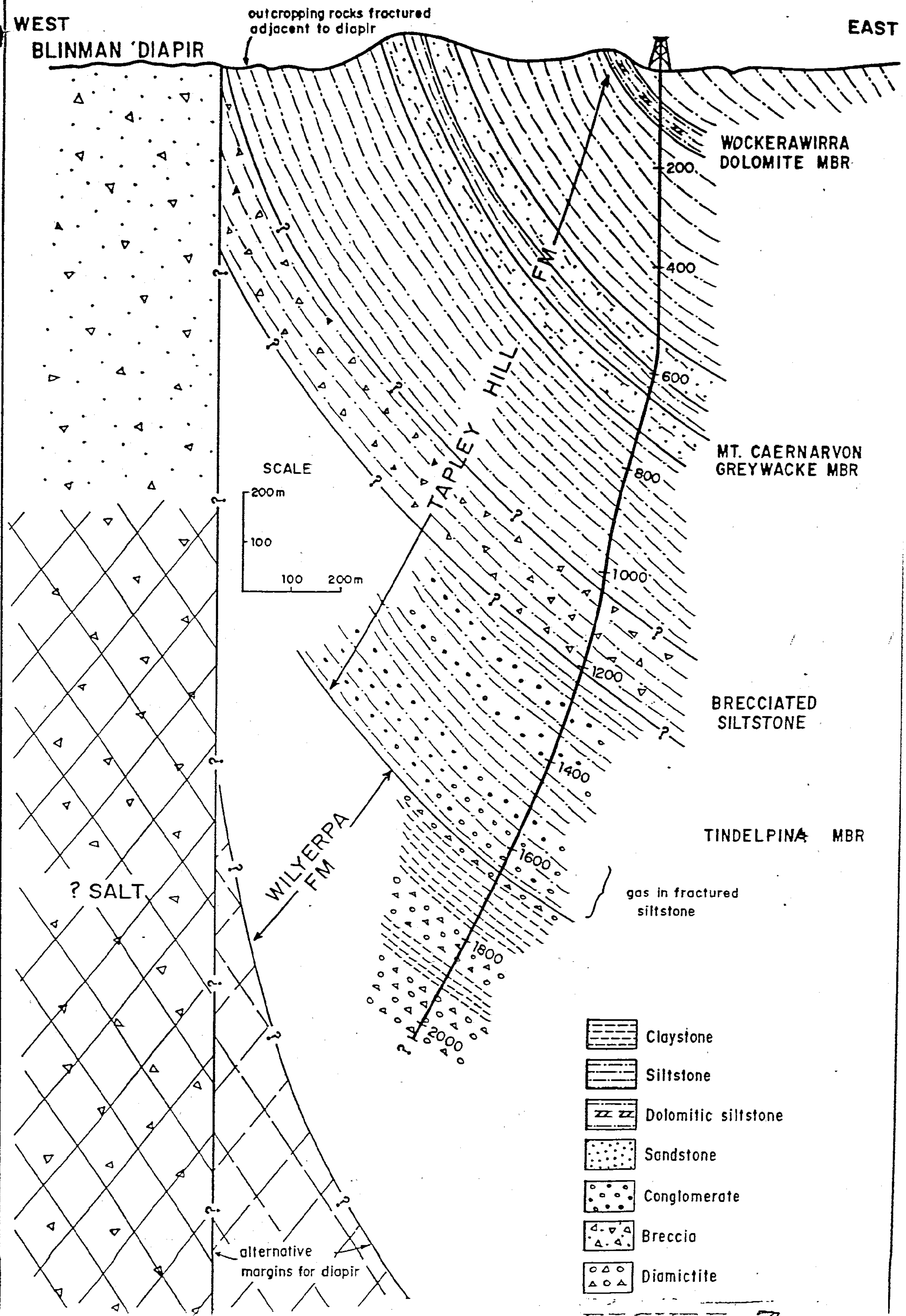
FIGURE 5



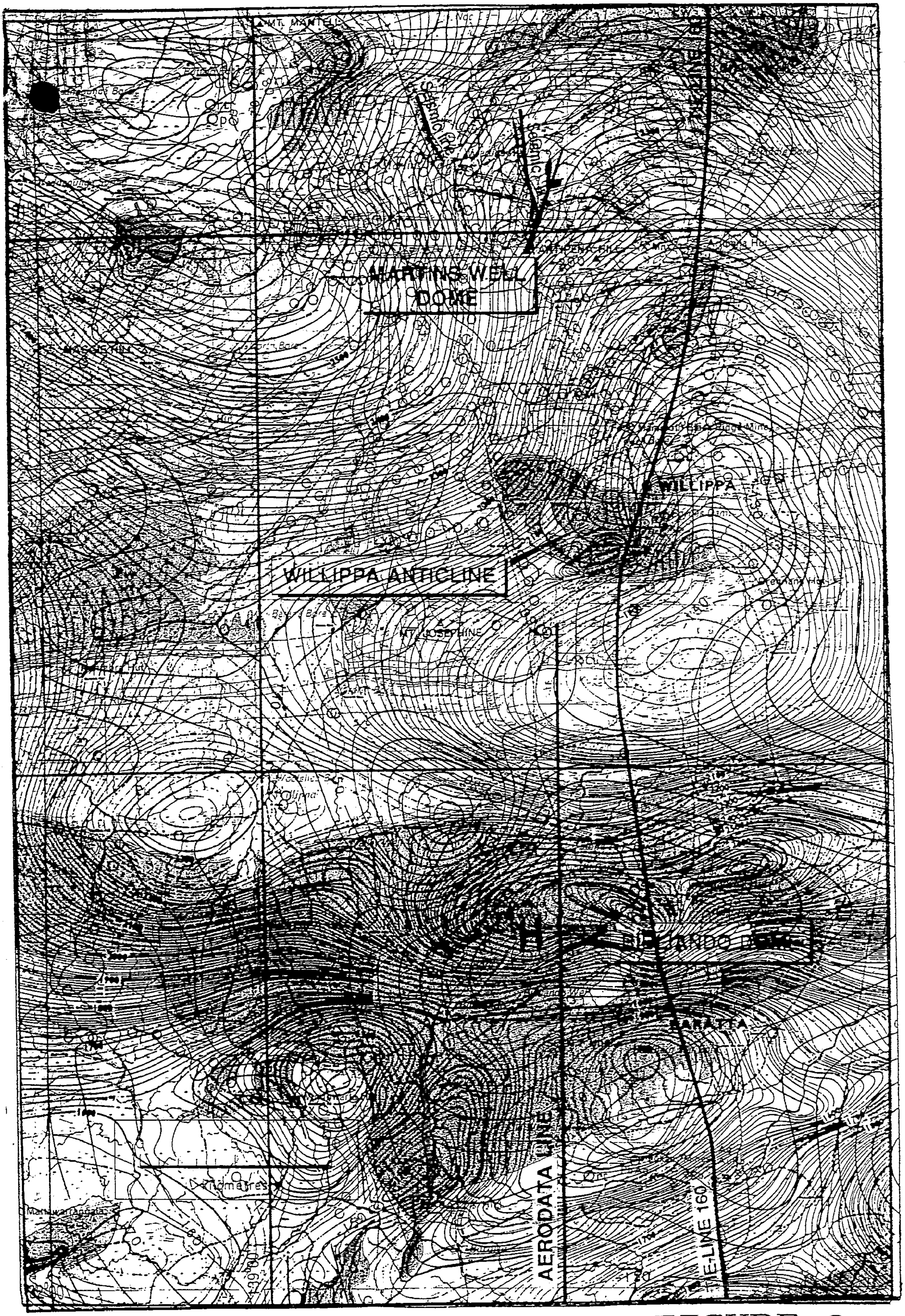
CROSS SECTION OF BLINMAN DOME AND BLINMAN DIAPIR

FIGURE 6

BLINMAN NO. 2 · ACTUAL STRATIGRAPHY



AEROMAGNETIC OVERLAY



GEOLOGICAL MAP OF SOUTH-EASTERN PART OF PEL 41

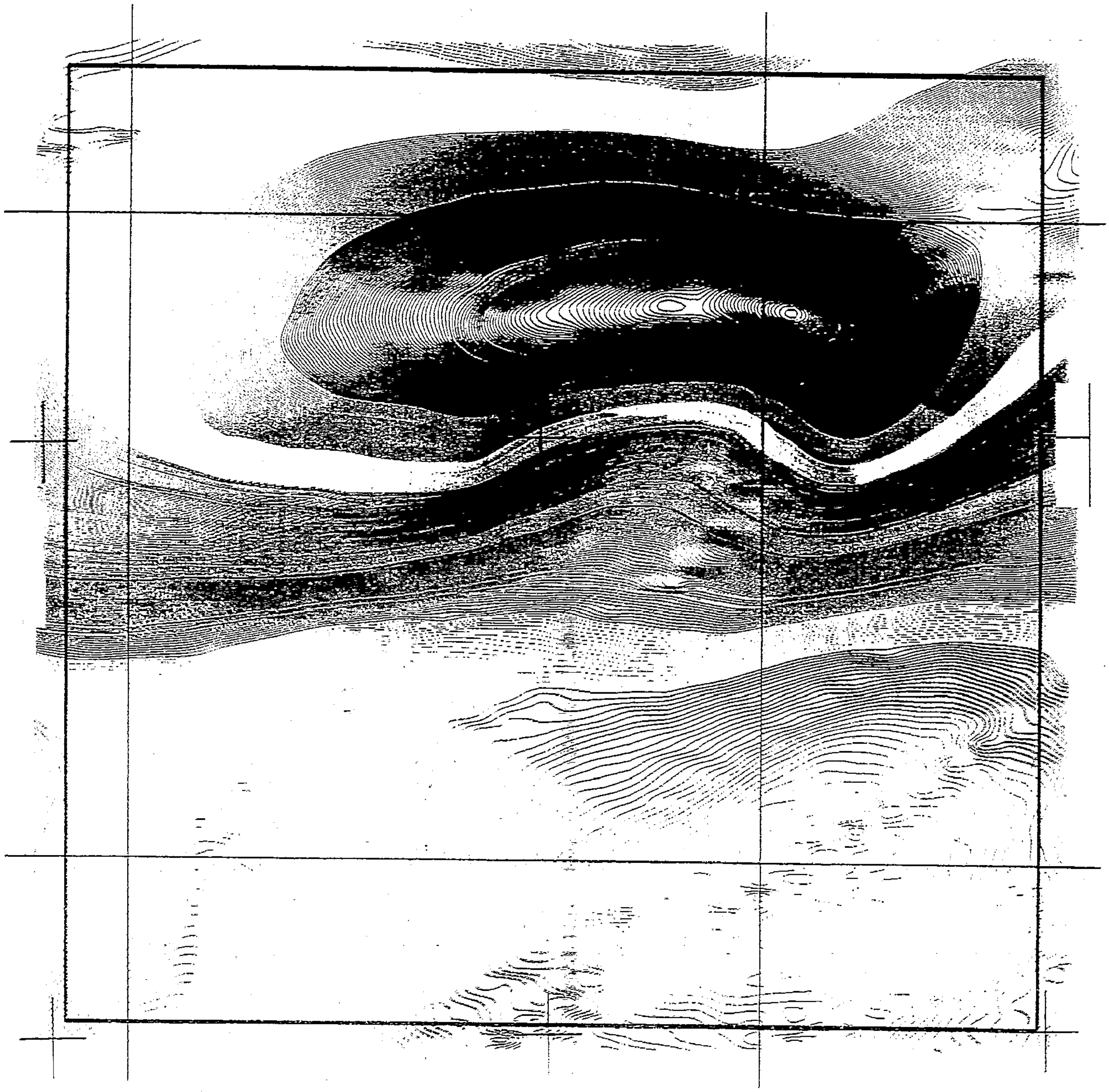
GRAVITY OVERLAY

FIGURE 9

FIGURE 10

FIGURE 8

BIBLIANDO DOME
AIRBORNE GEOPHYSICAL SURVEY



TOTAL INTENSITY MAGNETIC CONTOURS

FRONTIER EXPLORATION LIMITED

GRID NORTH

TRUE NORTH

MAGNETIC NORTH

North point relationships are shown for the centre of the map. Magnetic north is true for 1980.

GRID/MAGNETIC ANGLE 8°12'36"
GRID CONVERGENCE -0°53'0.92"
SECULAR VARIATION 0°1'38" east per year

Scale 1:100 000

0 2 4 6 8

AUSTRALIAN MAP GRID

DATA PROCESSING

REGIONAL FIELD	IGRF MODEL 1990 REMOVED
GRID CELL SIZE	150 metres
CONTOUR INTERVAL	5 nanoTeslas
PARALLAX CORRECTION	-0.6 fiducials

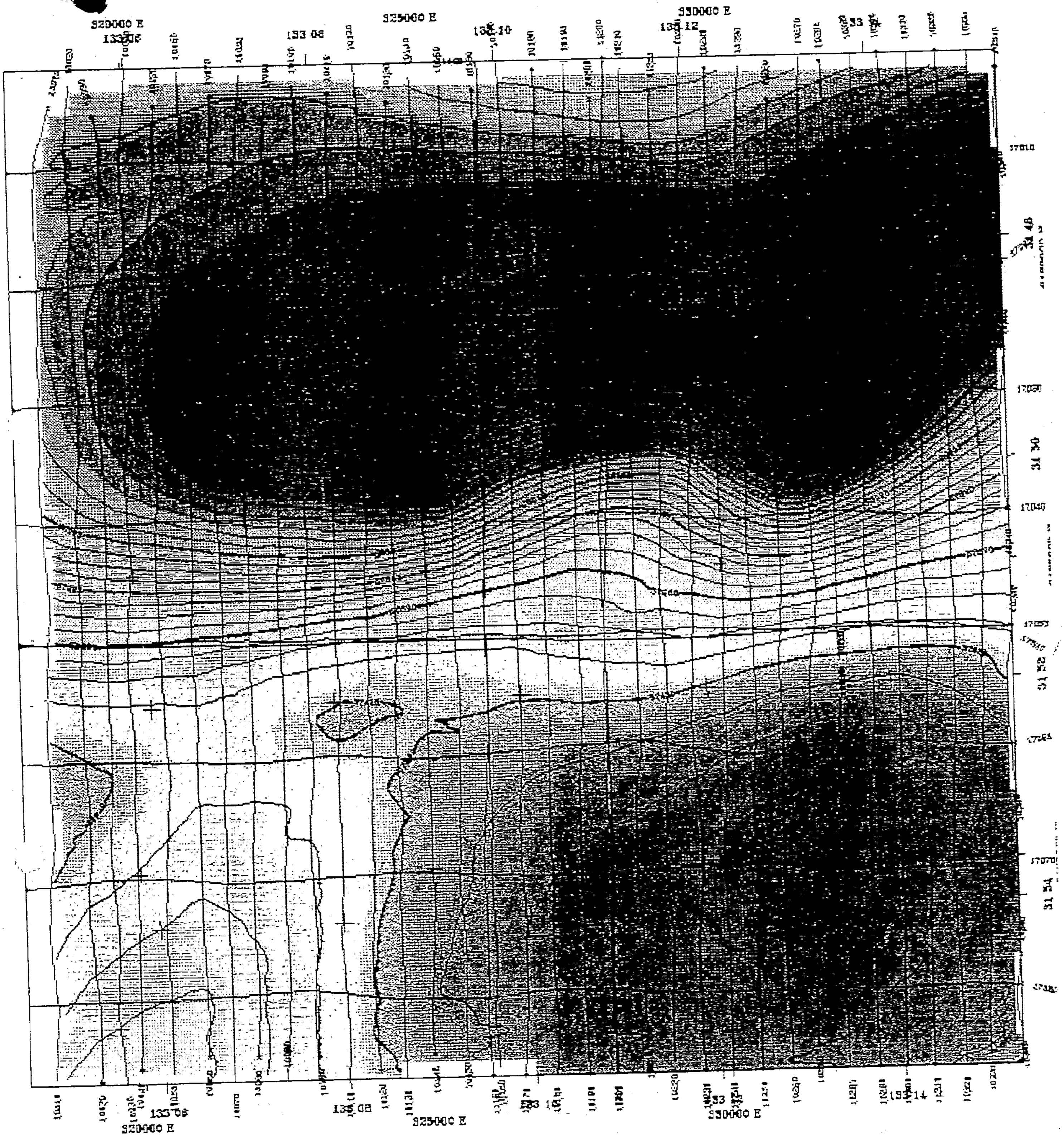
Surveyed and compiled by AERODATA HOLDINGS LIMITED
AUGUST 1992
Job No. 1307

AERODATA

COLOUR LEGEND

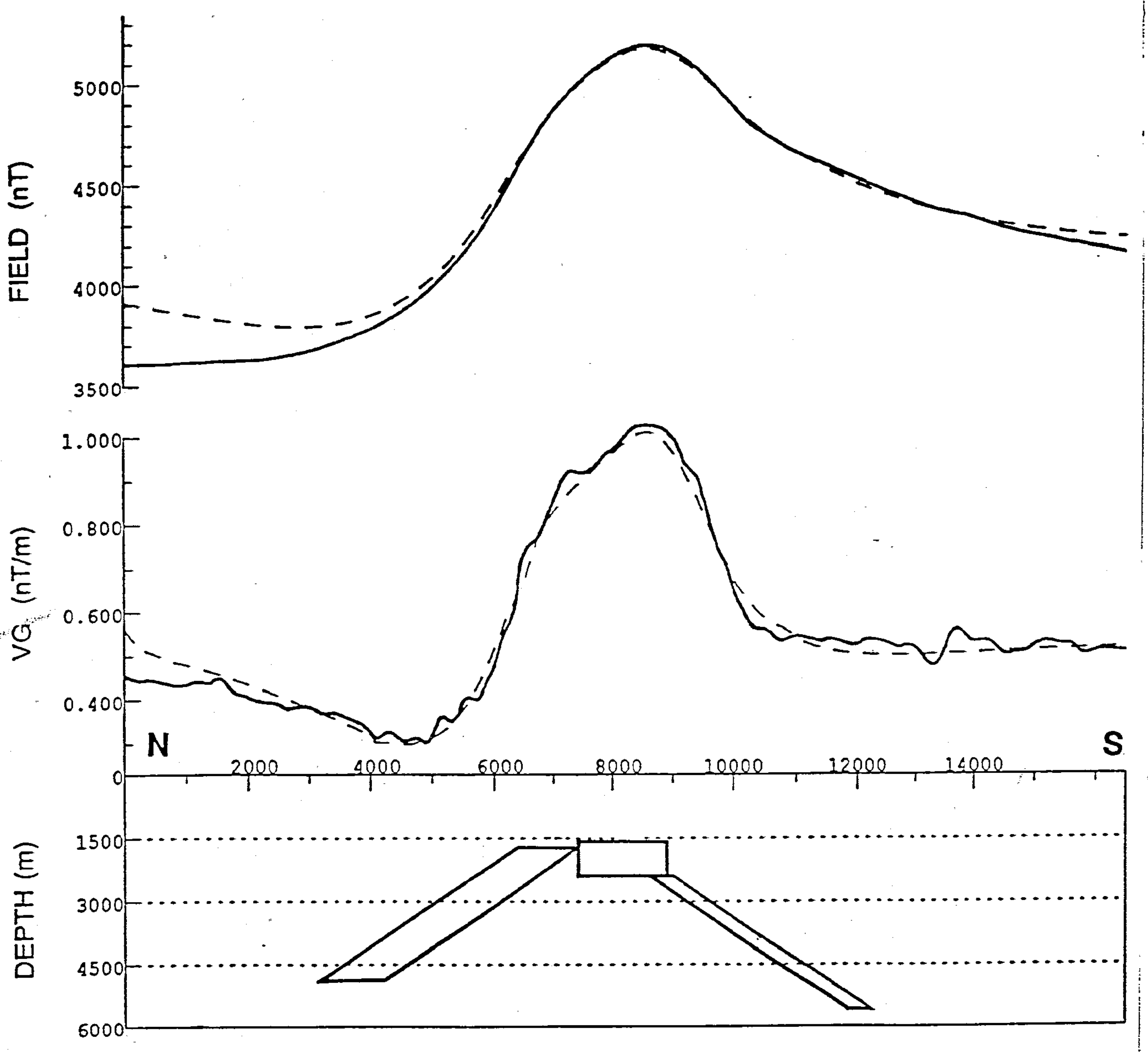
57310 >	< 58160
57400 >	< 58315
57475 >	< 58530
57700 >	>= 58530

FIGURE 11



BIBLIANDO DOME – TOTAL MAGNETIC INTENSITY

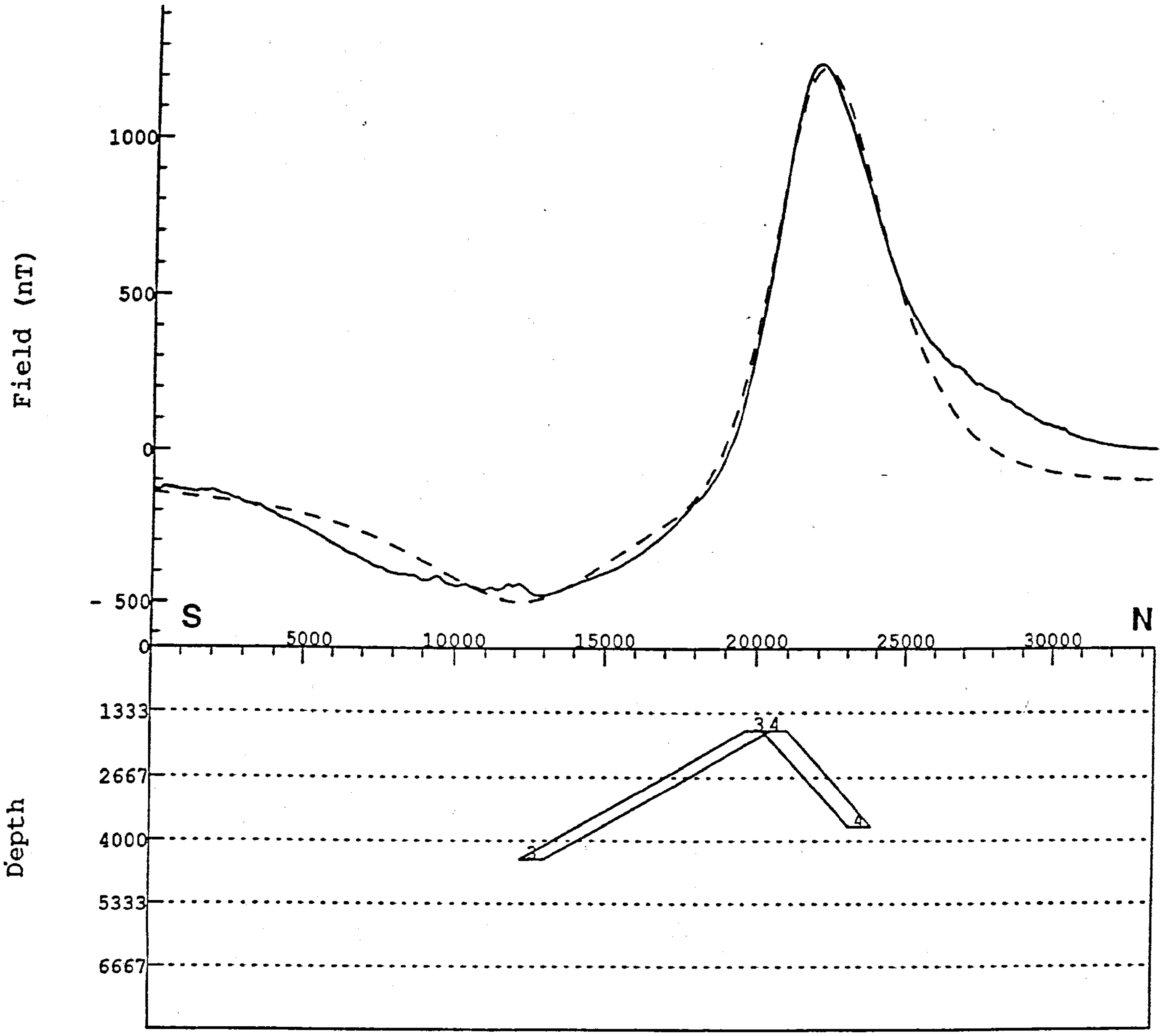
FIGURE 12



AEROMAGNETIC MODEL
TIE-LINE 160, PARACHILNA SHEET
ACROSS BIBLIANDO DOME

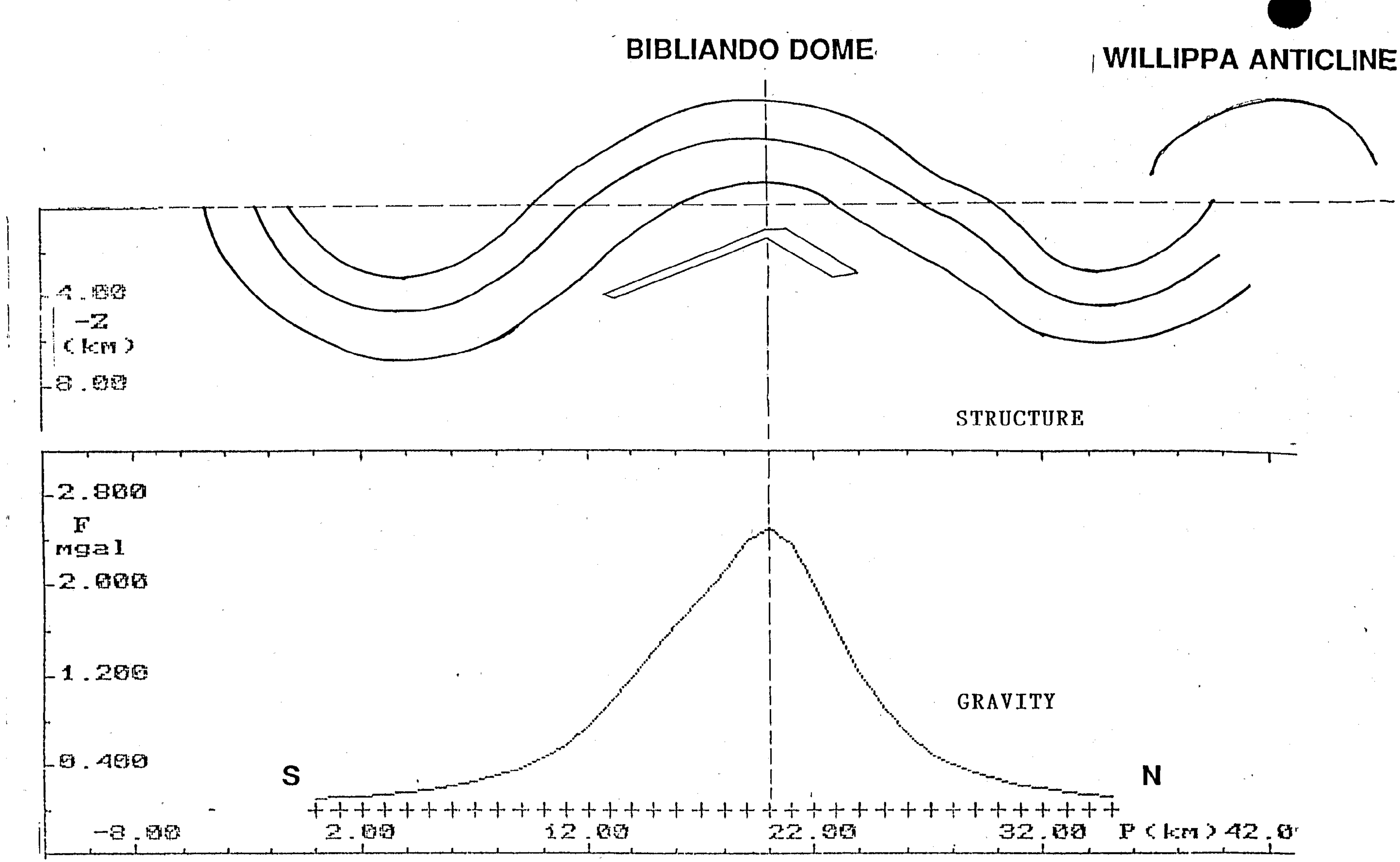
LOOKING EAST

FIGURE 13



AEROMAGNETIC MODEL
AERODATA LINE
LOOKING WEST

FIGURE 14

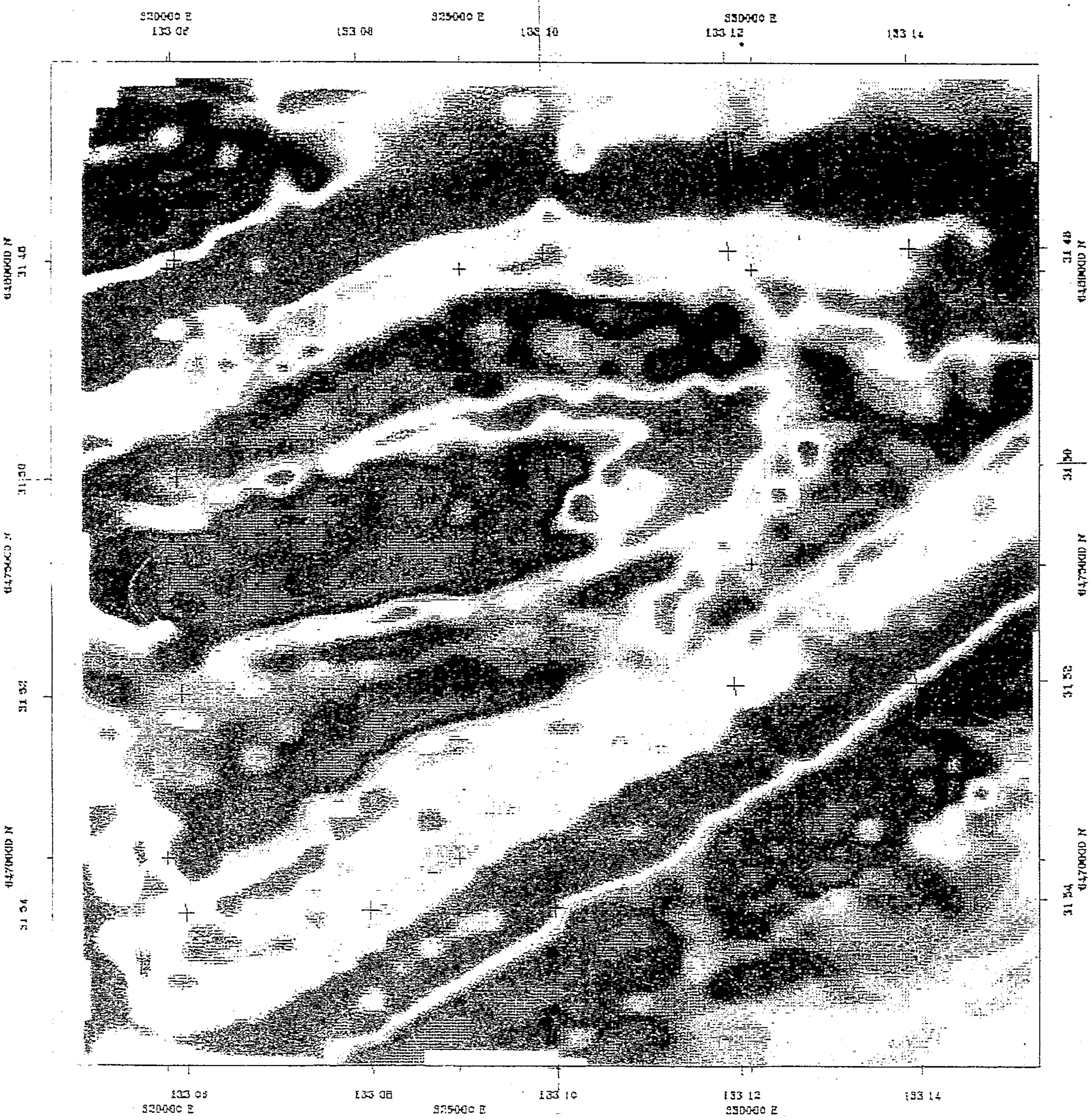


BIBLIANDO DOME

Showing Coincidence of Surface Structure

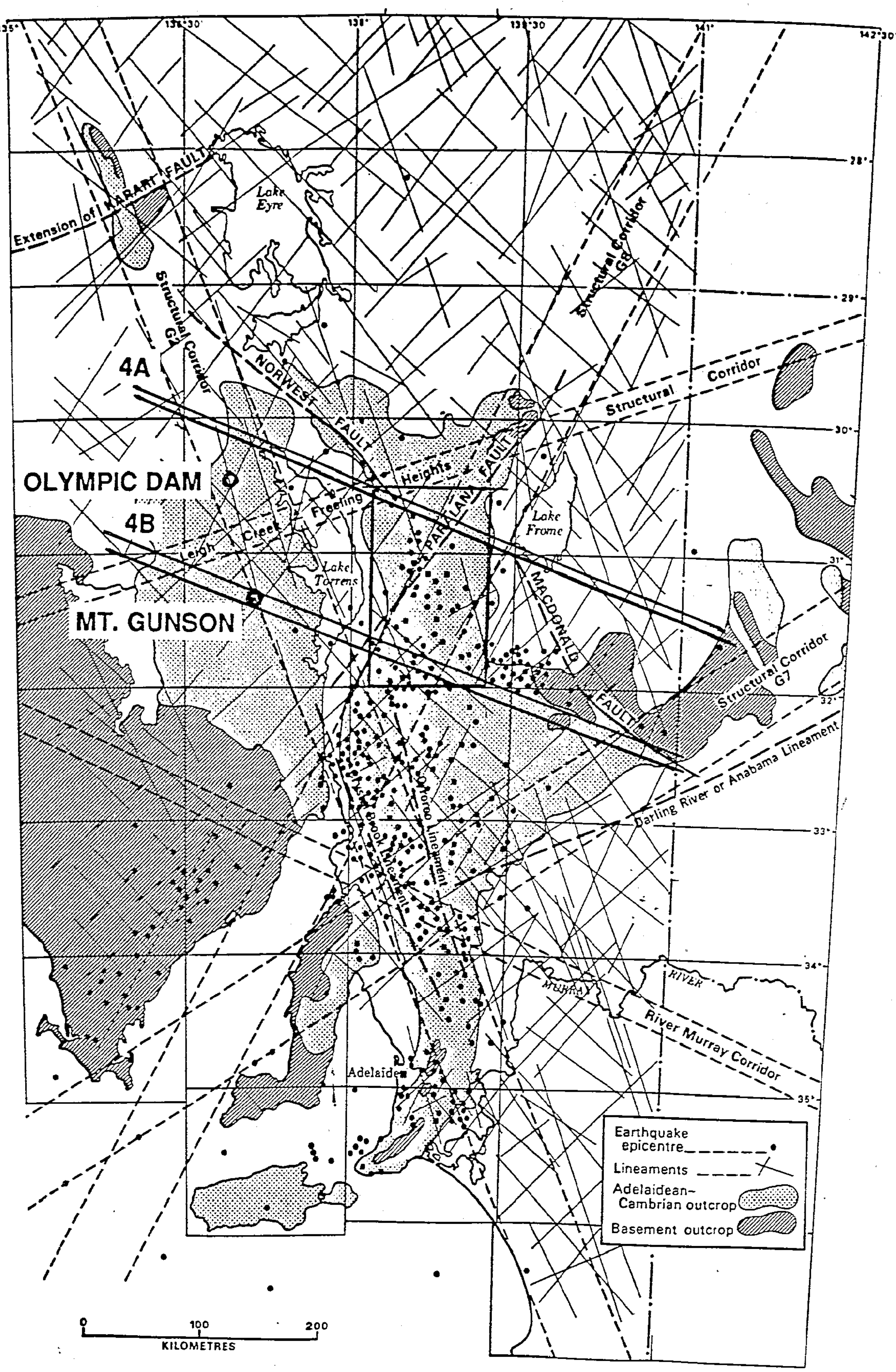
Magnetic anomaly and Gravity profile

FIGURE 15



BIBILANDO DOME - TOTAL RADIOMETRIC

FIGURE 16



Drn PAA Bull. 53

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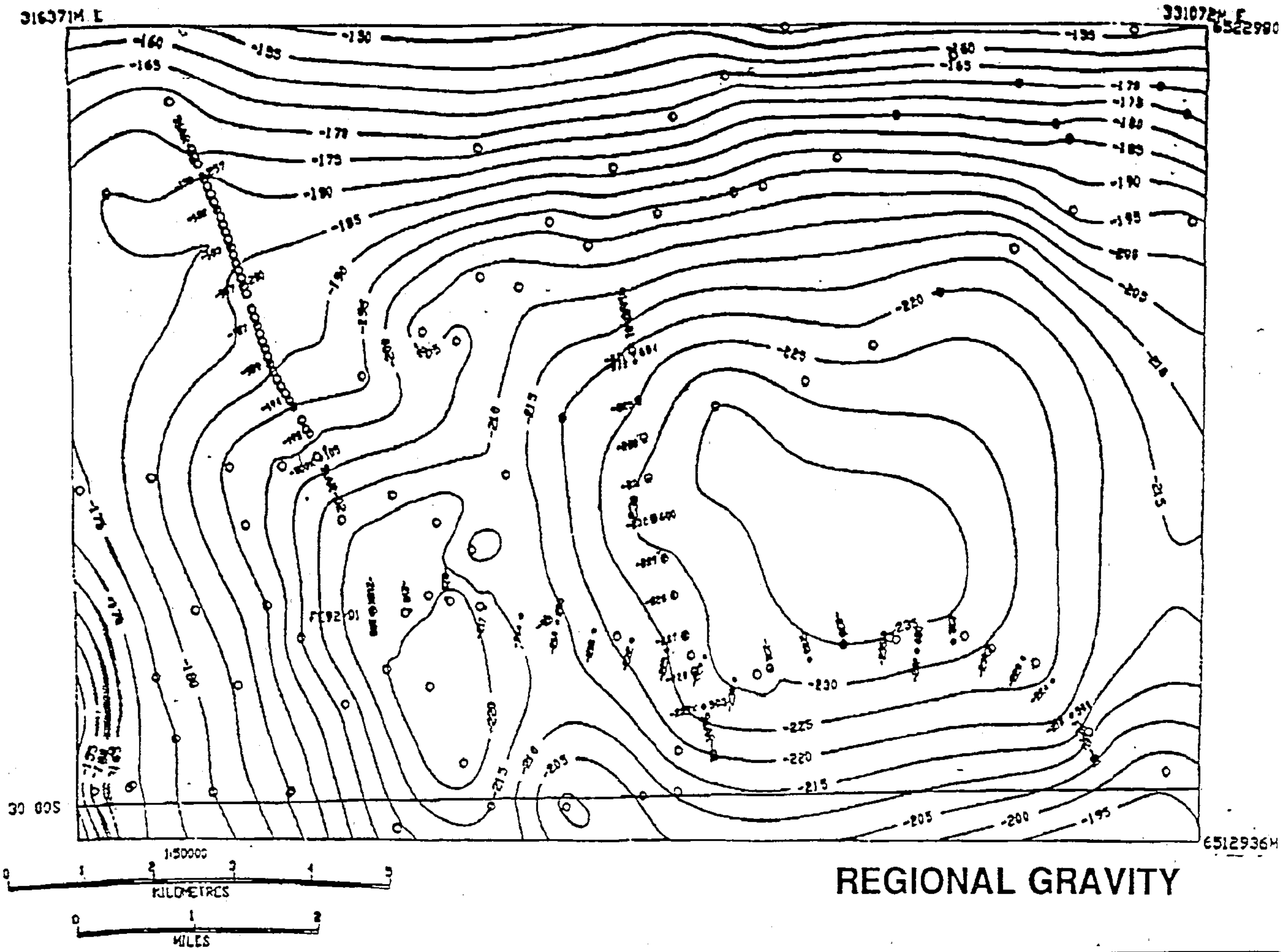
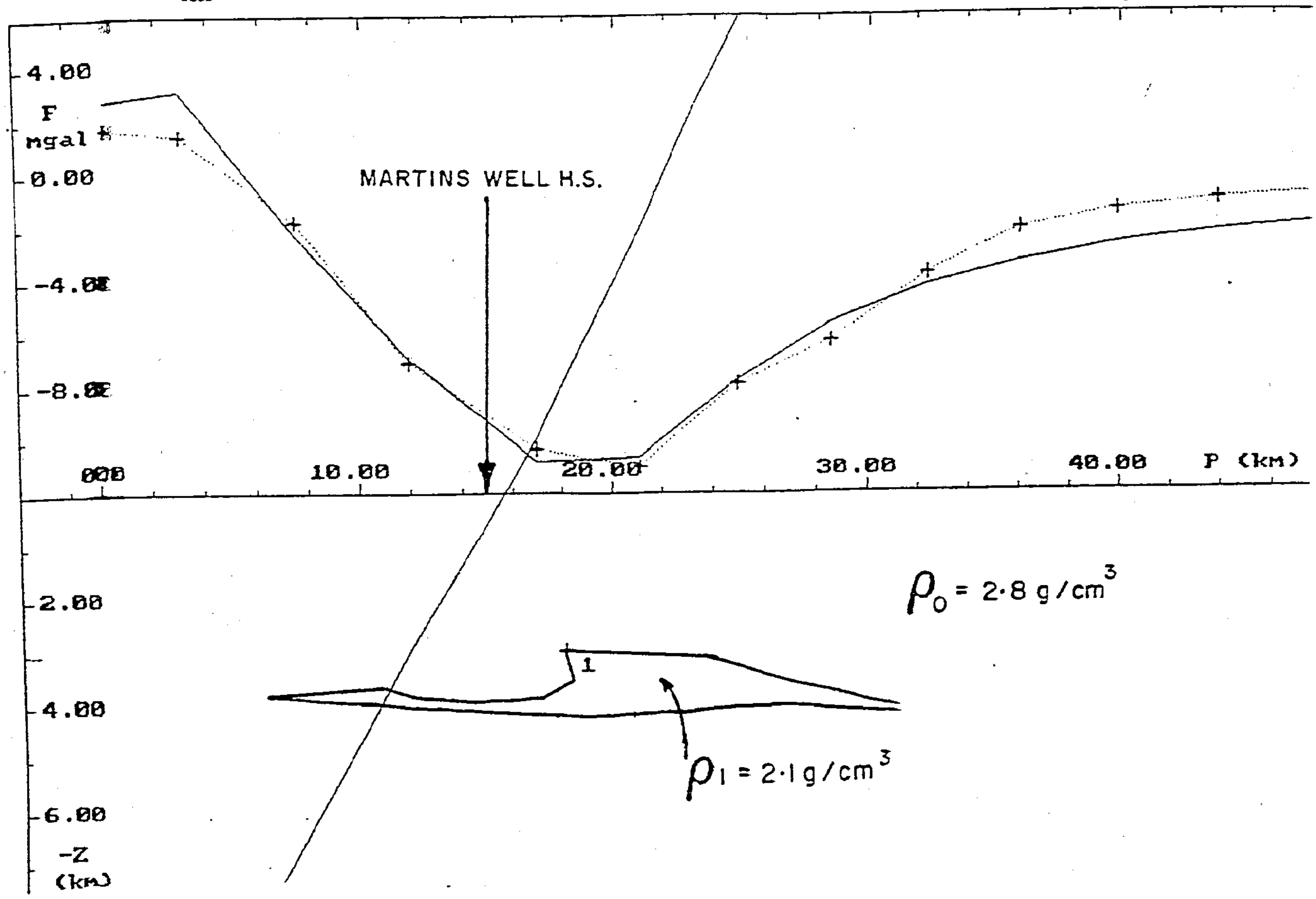
LINEAMENTS OVER THE ADELAIDE GEOSYNCLINE
(From Bulletin 53 Geological Survey of S.A.)

With 4A-4B Corridor

FIGURE 17



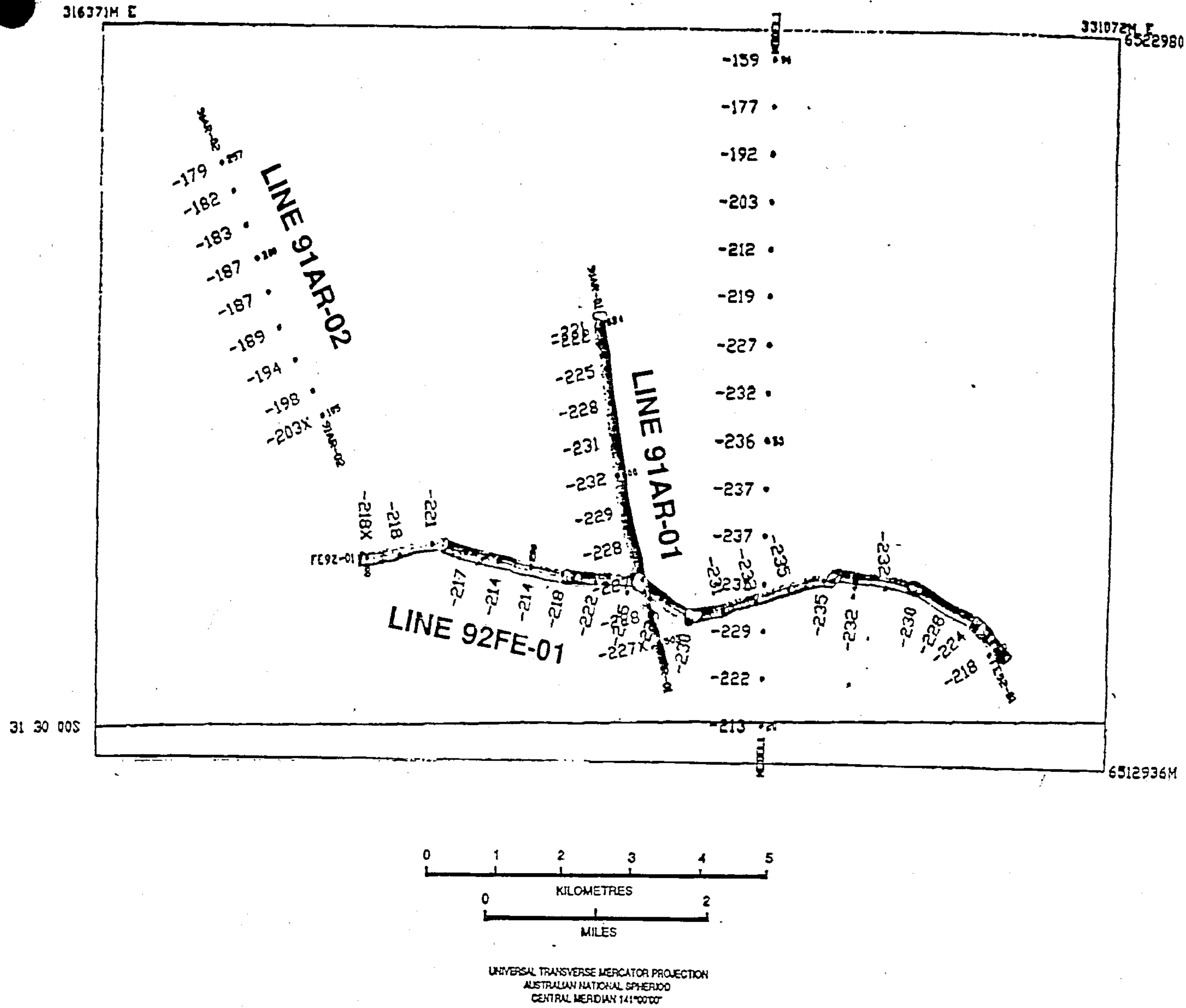
REGIONAL GRAVITY



RESIDUAL PROFILE AND MODEL
MARTINS WELL DOME

FIGURE 18

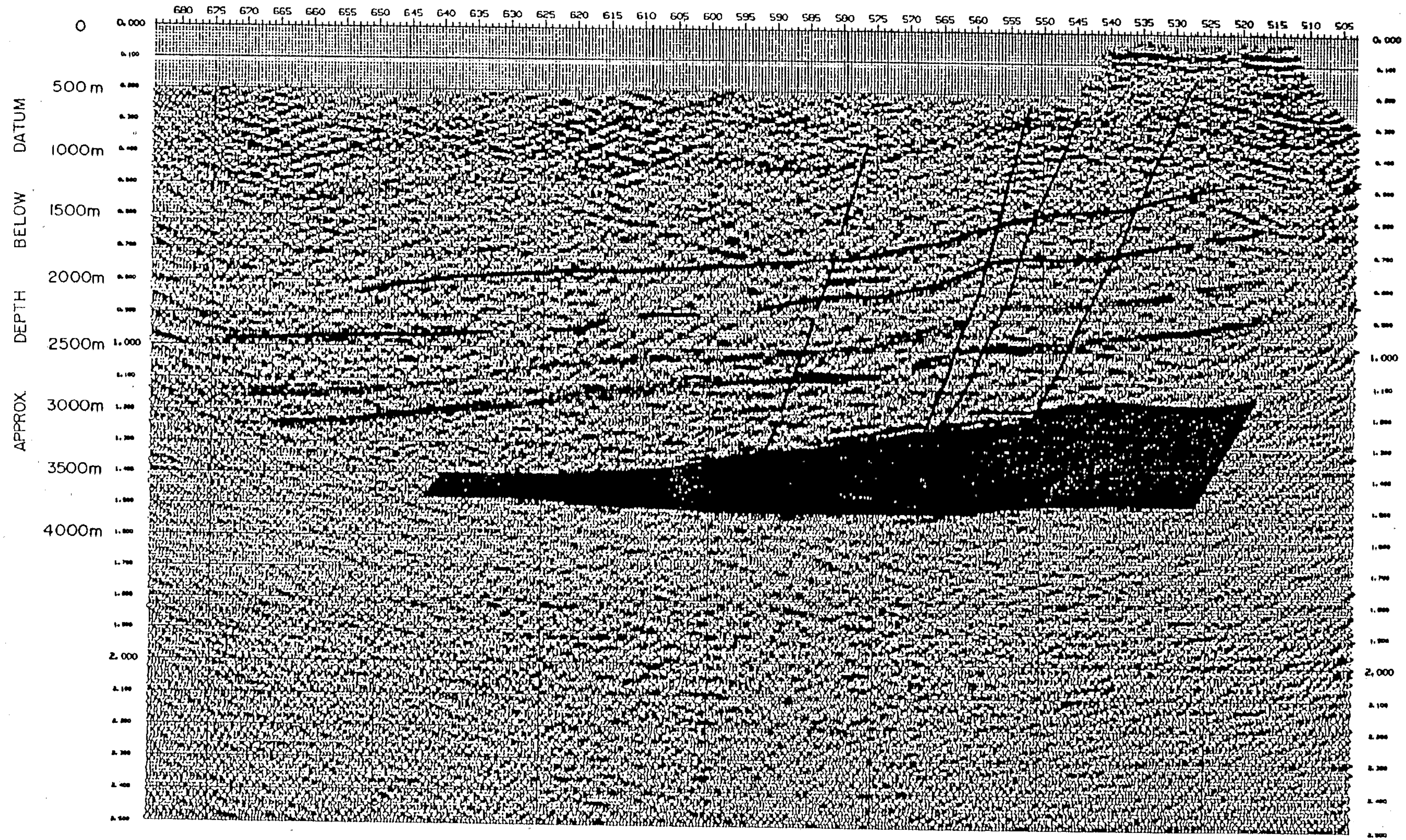
SEISMIC



MARTINS WELL DOME

Showing position of Seismic Lines

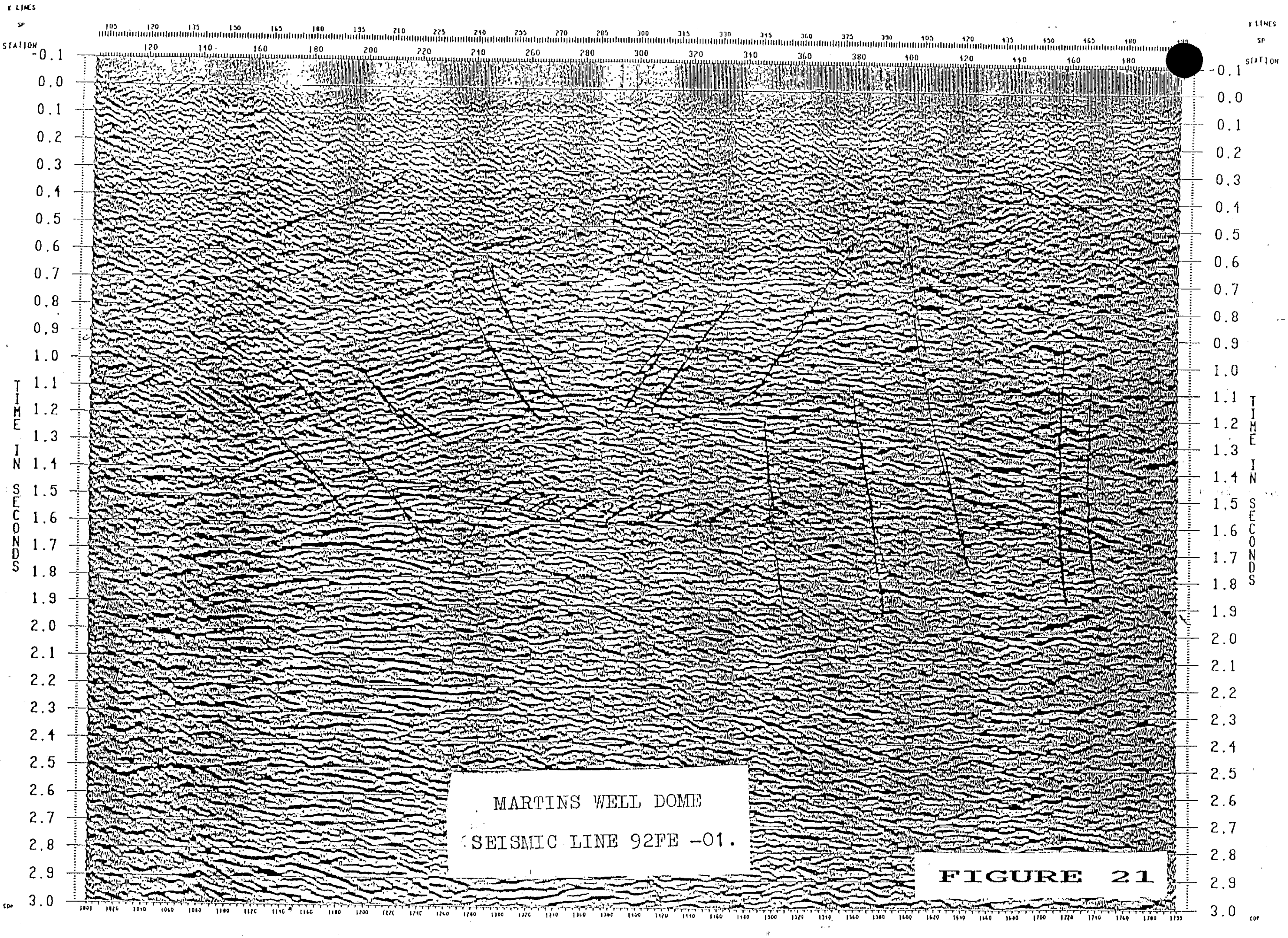
FIGURE 19



MARTINS WELL DOME

SEISMIC LINE SA 91 AR-01

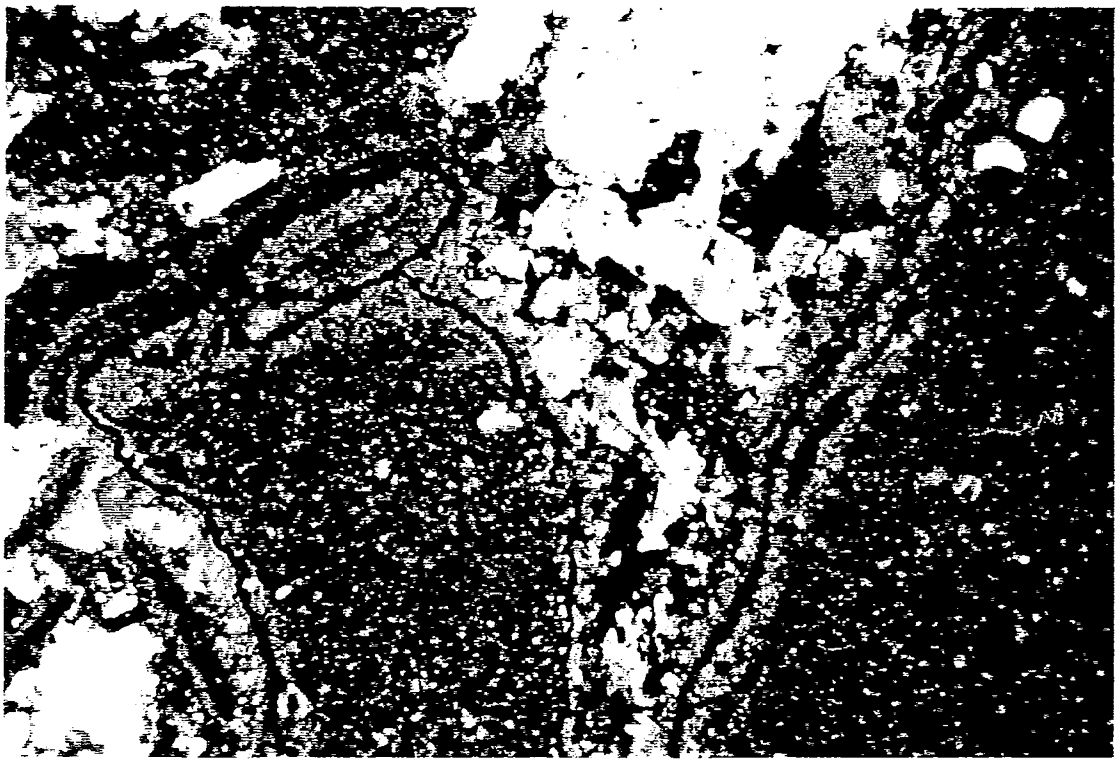
FIGURE 20



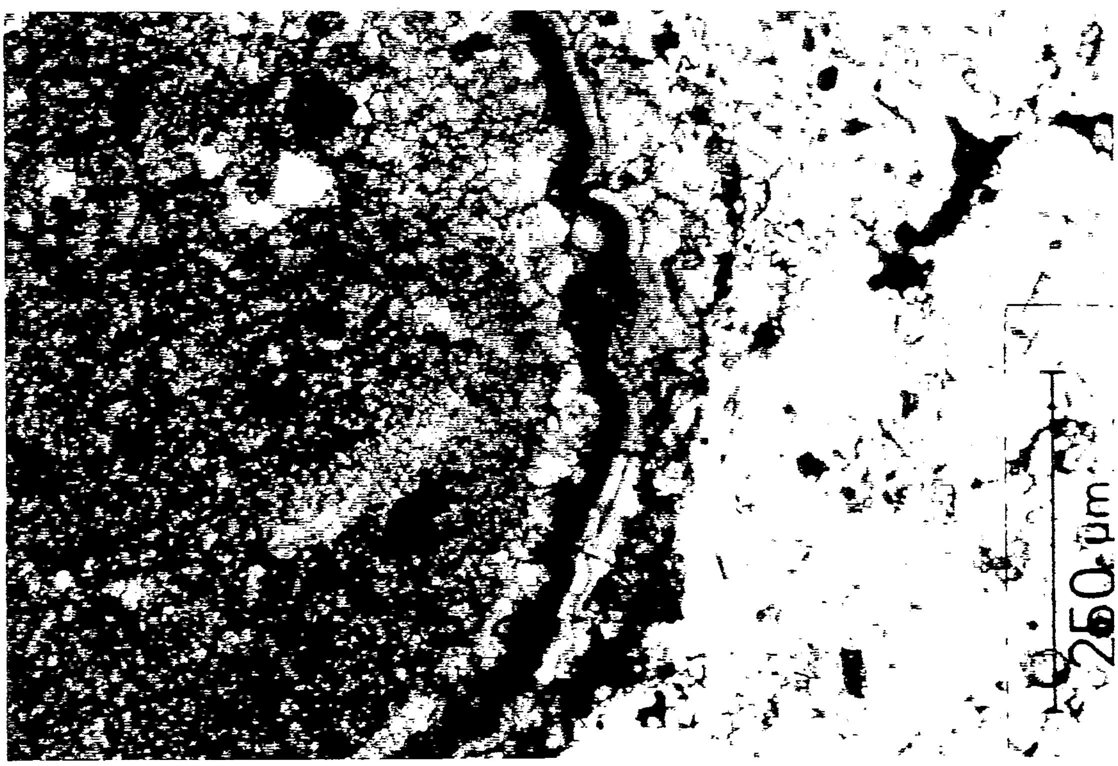
MARTINS WELL DOME

SEISMIC LINE 92FE -01.

FIGURE 21

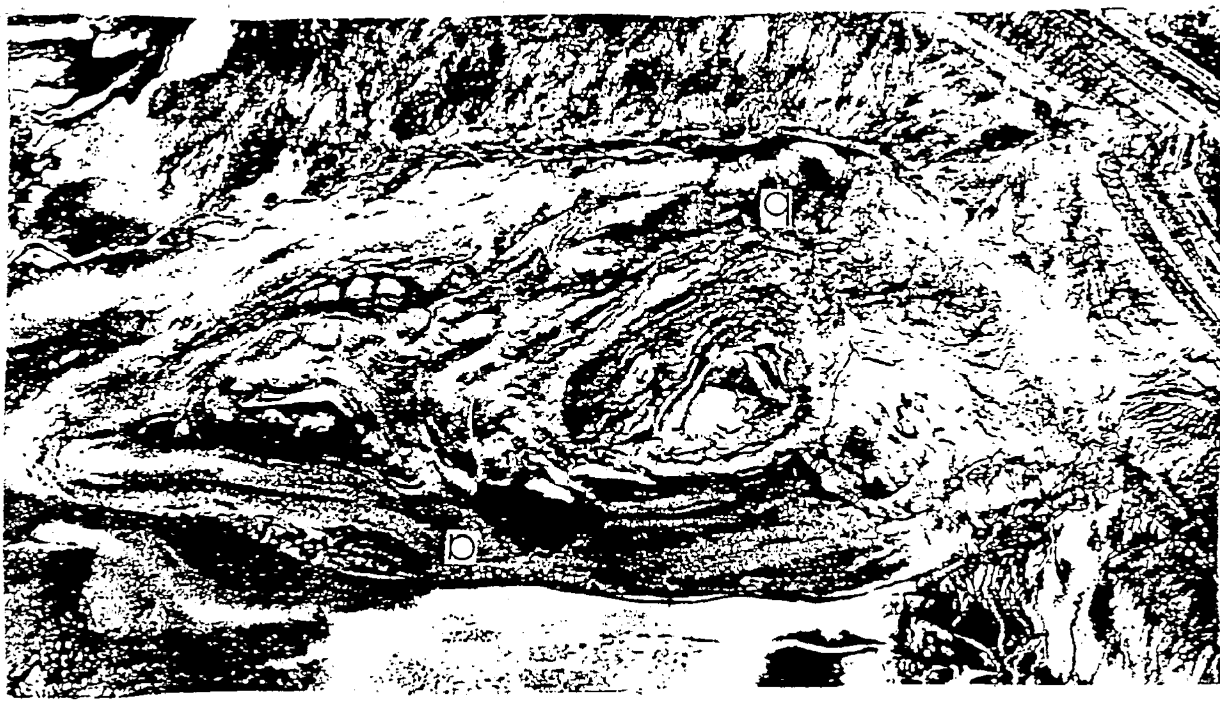


Blinman No. 2 at 1540 metres
Bitumen border on grains
Width of photograph 3.0mm



Blinman No. 2 at 1540 metres
Bitumen border on grains
Width of photograph 1.0mm

PLATE 1



AERIAL PHOTOGRAPHS

Structures in the Flinders Ranges
and a Salt Province in Iran.

PLATE 2