1996/55
COPY 2

AGSO

Magnetometer traverses across aeromagnetic anomalies near recent earthquake fault scarps in southwestern Australia

BMR PUBLICATIONS COMPACTUS
(LENDING SECTION)

by

I. B. Everingham and P. J. Gregson

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION LIBRARY
24 OCT 1997

AGSO Record 1996/55

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

BMR COMP
1996/55
COPY 2

Department of Primary Industries and Energy

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

"Geoscience for Australias future"

Record 1996/55

Magnetometer traverses across aeromagnetic anomalies near recent earthquake fault scarps in southwestern Australia

I.B. Everingham[1] and P.J. Gregson[1]

[1]Division of Geophysical Observatories & Mapping, AGSO

Canberra 1996

DEPARTMENT OF PRIMARY INDUSTRIES AND ENERGY

Minister for Primary Industries and Energy: Hon. J. Anderson, M.P.
Minister for Resources and Energy: Senator the Hon. W.R. Parer
Secretary: Paul Barratt

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Executive Director: Neil Williams

© Commonwealth of Australia 1997

ISSN: 1039-0073
ISBN: 0 642 27309 X

This work is copyright. Apart from any fair dealings for the purposes of study, research, criticism or review, as permitted under the *Copyright Act 1968*, no part may be reproduced by any process without written permission. Copyright is the responsibility of the Executive Director, Australian Geological Survey Organisation. Requests and inquiries concerning reproduction and rights should be directed to the **Manager, Corporate Publications, Australian Geological Survey Organisation, GPO Box 378, Canberra City, ACT, 2601**

AGSO has tried to make the information in this product as accurate as possible. However, it does not guarantee that the information is totally accurate or complete. Therefore, you should not rely solely on this information when making a commercial decision.

Contents

GEOLOGICAL SURVEY LIBRARY 24 OCT 1997

Abstract

Seven proton precession magnetometer (PPM) traverses across aeromagnetic anomaly lineaments were carried out in the areas where the lineaments cross earthquake fault scarps mapped to the south of Merredin, east of Hyden, south of Hyden and near the Lort River, southwestern Australia. Magnetic declination and inclination were also measured south of Merredin. Total magnetic field observations for about 1100 stations are listed.

Estimated depths to the top of unweathered dykes range from 25m-70m and dyke thickness is less than depth in all cases. A thickness of about 10m is probable where aeromagnetic anomalies are minimal.

The magnetic anomalies shapes associated with five dykes show that NRM polarisation is significant for four dykes and that two of these may have an emplacement age different to that of the Widgiemooltha Dyke Suite.

Introduction

A remarkable feature of the Yilgarn Craton, south Western Australia is the occurrence of aeromagnetic anomaly lineaments trending roughly east-west for hundreds of kilometres. These are attributed to relatively thin dykes which for the most part cannot be seen at the surface (Tucker and Boyd, 1987). A second remarkable feature of the craton is the phenomenon of several 30-50 km long fault scarps which have been caused by large shallow earthquakes during the last few hundred years. Such faults have been mapped by the Geological Survey of Western Australia (Chin and others, 1984; Chin, 1986 and Thom, 1972) since the Meckering earthquake of 14 October 1968 which provided a startling example of an earthquake fault scarp on a stable shield region (Everingham and others, 1969).

On the subject of 'remarkable features' we could perhaps consider it more remarkable that we find a relationship between the fault scarps and dykes, in that each of the scarps mapped on the 1:250,000 geological series (HYDEN, KELLERBERRIN and RAVENSTHORPE) is crossed by a magnetic lineament which is about normal to the fault and centrally located. A simplistic explanation of this co-incidence is that, due to the difference in elastic properties of the dyke, the dyke margin and the country rock, the modern east-west stress field (Denham and others, 1987; Denham and Windsor, 1991) at an oblique angle to the dykes' trends would cause notable stress and strain anomalies along the dyke which could trigger an earthquake.

To throw more light on the scarp relationship, more information about the dykes in the vicinity of the faults is required. The aeromagnetic data gives sufficient regional coverage but with traverses east-west, sub-parallel to the dykes and about 2.0 km line spacing. The data do not necessarily show details of a dyke's anomaly shape or continuity in the vicinity of the fault scarp. Hence short ground traverses as close as practical to fault scarps were carried out to provide more information on related dykes.

This report is designed to record the detailed data for use in subsequent researches. References relevant to this and further studies but not necessarily mentioned in this text are listed in the bibliography.

Distribution of earthquake scarps and magnetic lineaments

Figure 1 shows faults on the southern Yilgarn Craton which have been mapped to date. The Lort River Fault on the RAVENSTHORPE Sheet (Thom, 1972; Thom and others, 1977) and the Hyden Fault on the HYDEN Sheet (Chin and others, 1984) are well known (e.g. Denham, 1988; McCue, 1990), however the Merredin Fault Zone (seen on the KELLERBERRIN Sheet, Chin, 1986), the Hyden South Fault and the Mt Gibbs Fault Zone both on the HYDEN Sheet have yet to be publicised. Gordon (1994) has discussed their import on seismic risk assessment.

Also shown in Figure 1 are major dykes which have been interpreted from Bureau of Mineral Resources (BMR) maps at the scale 1:126,720, 1:250,000. These results agree in general with the 1:1,000,000 geophysical interpretation maps subsequently published by BMR and the Australian Geological Survey Organisation (AGSO) (Whitaker, 1992, 1993).

Field operations and results

Traverses measuring the total force magnetic (F) with a proton precession magnetometer (PPM) were carried out in the vicinity of the Merredin, Hyden, Hyden South and Lort River scarps.

Stations were generally read at 20 m intervals with closer station spacing in critical areas of the anomalies. It was found that paced intervals with overall start - finish check by speedometer or GPS was most efficient as speedometer control readings first used at 0.1 km intervals were found to vary more than the paced intervals. Measurements of paced intervals checked by measuring tape and, overall, by a calibrated speedometer were found to be in error by less than 5 percent on all occasions.

Diurnal and daily variation in F was negligible and corrections were only necessary when traverses were completed at a later date. Relative accuracy between start and finish of traverse is estimated to be better than 10 nT. Declination (D) and inclination (I) measurements using a D & I magnetometer (DIM) were also taken along the traverse south of Merredin and have an accuracy of 15 seconds.

Station locations given in Figures 2 to 7, are plotted on 1:250,000 geological maps and described on the headings for Tables 1-12 which list the magnetic observations. The regional field shown in the tables was calculated from the Australian Geomagnetic Regional Field (AGRF90) and the co-ordinates determined from the Global Positioning System (GPS) or from geological maps (1:250,000). Results given in the tables are plotted in Figures 8-20. Traverses were up to 25^{o} from normal to the dyke and the normality factor (NF) shown on each Figure can be used to correct the traverse distances to obtain a profile normal to the dyke. A composite diagram of all the dyke anomalies is shown in Figure 21, where each of the anomaly magnitudes is normalised to the same height on the vertical scale so that the anomaly shapes can be compared. Hyden B has been excluded as it is not certain that the anomalies represent the dyke.

Additionally observations of the effect of the vermin proof fence, and over the outcropping Binneringie Dyke near Hyden are shown in Figures 23 and 22. The latter shows the spurious effects of laterite which makes it impossible to measure the dyke anomaly with any degree of accuracy. Street (1987) had this problem with the Binneringie Dyke anomalies to the west of this area.

Interpretations

The magnetic anomaly over a dyke may be analysed to determine its location, depth to top, width and dip in ideal circumstances. However, should the depth of a dyke be greater than its width, the width cannot be determined; and, if the anomaly has components of induced and natural remanent magnetisation (NRM) the dip of the dyke cannot easily be found.

Because most of the Yilgarn Craton is covered by a relatively thick (30-60 m) regolith where weathering has demagnetised the dyke (Dentith and others, 1992), the depth determined from the magnetic anomaly is approximately the base of the regolith; hence if the thickness of a dyke is less than this, it cannot be determined from its anomaly. Accordingly we can give only maximum thicknesses in the following interpretations. Depths are determined by curve matching (Gay, 1963) in which the half-width theoretically equals depth of burial.

The magnetic anomalies over the dykes are the vector addition of two components, namely the component induced by the earth's field and the NRM. The ratio of NRM to the induced field, Q is the Koenigsberger ratio. The NRM tends to be particularly large in igneous basic rocks and could predominate. For example, McClay (1974) found a value of $Q = 20$ for feeder series gabbros of the Jimberlana Intrusion in the Norseman area and to match the different shapes of magnetic anomalies measured here a strong NRM field had to be considered in the interpretations.

The magnetic anomaly over a dyke with infinite length (along strike) and depth (down dip), can be defined by three components; one along the direction of strike, the second down dip normal to the strike and the third across the dyke normal to the strike and parallel to the surface. The strike-component can be neglected, being of importance only at the dyke extremities or dislocations. The dip-component results in a line of monopoles anomaly along the top of the dyke and the magnitude of the anomaly is simply inversely proportional to the distance from the top of the dyke. The shape of the vertical component anomaly (Z) is a symmetrical peak or trough. The transverse component is a narrow dipole which causes a lopsided (dipolar) anomaly and the combined dip and transverse fields determine the shape of an anomaly over a dyke. Hence the degree and direction of lopsidedness indicates a polarisation inclination component (Ipc) in a plane normal to the strike of the dyke. We emphasise that Ipc is normal to the strike of the dyke and should a dyke have NRM with the declination parallel to its strike, the NRM component (Irc) of Ipc will be $\pm 90^{o}$ in the plane of the dyke, regardless of the magnitude of the paleomagnetic inclination. The typical shapes of total force anomalies with appropriate anomalous polarisation vectors are shown in Figure 24.

Should either Irc or Iic (induced component) be known, the other may be determined from the vector triangle, hence a rough estimate of Iic, 1000 nT for a dyke 50m wide at a depth of 50m, is used in later discussion of possible NRM contributions to anomalies.

The Cockatoo, Emu, Binneringie and Jimberlana Dykes are included in Yilgarn Craton's 2400 Ma aged Widgiemooltha Dyke Suite (Sofoulis, 1966) for which Evans (1968) and McClay (1974) found NRM inclination (-67^{o}) and declination (242^{o}) in the Kalgoorlie-Norseman region. Evans' (1968) mean of very scattered Q values is about 4.0 and along with the above results gives some basis for guessing the Irc vector for the above dykes.

Merredin fault zone

Figures 15-17 illustrate the large remarkably symmetrical negative anomalies of 2000, 1535 and 2600 nT at three points along a 230 km stretch of the Cockatoo Dyke east of the fault scarps (Figure 1). This dyke has no known outcrop but is assumed to be a dyke because of the linearity and large amplitude of the magnetic anomaly. A similar negative anomaly lineament, the Emu Dyke, extends sub-parallel to and about 20 km south of the Cockatoo Dyke for a distance of about 350 km and the 2250 nT anomaly profile (Figure 20) south of the Merredin fault zone shows that the two dykes anomalies are similar (Figure 21).

The negative anomaly across the Merredin fault zone is indicative of a downward polarisation vector near the plane of a steeply dipping dyke with the anomaly field that of a line of monopoles extending along the strike of the dyke whereby the anomaly should be inversly proportional to the distance from the top of the dyke and have no component along the strike direction. To test the latter hypothesis a declination (D) and inclination (I), readings were taken across the dyke. The earth's present regional D is 1.0^{o}W and the dyke strike about 092^{o} for this area, hence the H-component anomaly is 3^{o} from normal to D. The resulting 28 minute change in D across the dyke and a symmetrical derived-Z anomaly (see Table 9) are consistent with a line-monopole anomaly.

South of Merredin the anomaly half-width (Figure 17) suggests a depth and maximum thickness of 50m for the dyke. Total force measurements at heights of 0.0m (55726 nT), 1.5m (55801 nT), 4.0m (55930 nT), 5.5m (55997 nT) and 150m (aeromagnetic anomaly - 700 nT) also confirmed the simple amplitude/distance relation and a 50m depth.

Maximum thickness and depth determined for the Cockatoo Dyke near Burbridge and Pidgeon Hole is 55m and 25m respectively. Aeromagnetic anomalies of 450 nT and 250 nT confirm the depth estimates and suggest that where the aeromagnetic anomalies are minimal around 100 nT, the maximum thickness of the dyke may be about 10 metres. At Norseman 75-100 nT negative anomalies are associated with a buried dyke with a thickness of 7.0m measured in an underground mine (Evans, 1968).

The Emu Dyke near Bruce Rock, with an anomaly of 2250 nT is estimated to be at a depth of 70m but a thin unweathered slither may approach the surface to a depth of about 12m, causing the sharp spike on the anomaly profile. The KELLERBERRIN geological map shows a possible outcrop of a few kilometers to the west of the traverse.

The simplest explanation for the cause of these large negative anomalies is that the steeply dipping anomalous polarisation vector (Figure 24) results mainly from Evans' (1968) NRM field during a reversal (inclination +67) with Q = 3.0. Irc is probably +80^{o} with a magnitude of 3000 nT.

Our treatment of the NRM polarisation data is superficial and Moo (1965), for example, has shown that a profile may be analysed to obtain the paleomagnetic vector. To illustrate his method he derived parameters from the Cockatoo Dyke aeromagnetic anomaly using a N-S profile at longitude 121^{o} 21'. His results are unacceptable because his profile has only three observation points about 1.5 km apart, i.e. one point on each E-W flight line, and show an incorrect shape for the anomaly.

Hyden fault

The Binneringie Dyke does not crop out in the vicinity of the earthquake scarp and the aeromagnetic maps including the pixel imagery, show a very vague indication of a dyke in the region between the north-eastern area of the HYDEN sheet and the area where the dyke crops out north of Hyden township (Whitaker, 1992). A missing flight line (1230) creates an information gap near the fault.

The traverse A to the east of the Hyden fault scarp (Figure 11) shows two relatively weak anomalies (220 nT and 410 nT) 250m apart with depth and maximum thickness of about 40m estimated. Similarly, on traverse C to the east of the scarp (Figure 13), twin anomalies of 960 nT and 300 nT, 500m apart, with maximum thickness and depth of 30 metres are recorded. On traverse D (Figure 14), between the above traverses and only 3.8 km west of the fault scarp, a single 750 nT anomaly is observed. Maximum thickness and depth indicated here is 47m. These results suggest that the dyke system is continuous across the earthquake fault scarp but that bifurcations and offsets similar to those noted along the Binneringie Dyke to the west of Hyden (Lewis 1994, Street 1987) tend to spread the overall magnetic signature thereby spoiling its definition on aeromagnetic maps.

At present the inclination of the earth's field in this area is -68^{o}, about the same as our Ipc value (Figure 24), hence most of the anomaly may be induced. A predominant NRM anomaly would rotate the polarisation vector clockwise in Figure 24 giving a nearly symmetrical positive anomaly. The anomalies in the region, typified in traverse D (Figure 14) are the only ones in this survey which may be considered to be caused mainly by induction.

In a study of the Binneringie Dyke west of 118.2^{o} E Street (1987) assumed that anomalies were induced. He observed a large range in susceptibility from much greater to markedly less than surrounding granites which therefore offered an explanation for why dyke anomalies are not apparent in certain areas. Twin and triple positive anomalies were also observed similar to those either side of the Hyden fault scarp, although anomalies measured by Street (1987) were in broader zones. However, importantly, the shape of the anomalies in the area between 117.1 and 118.2^{o} E tended to skewness with relatively negative values on the southern side of positive anomalies up to 2300 nT and is similar to the shape of the anomalies in the vicinity of the Hyden fault scarp.

Hyden South fault scarp

A pronounced aeromagnetic positive anomaly with a north-easterly strike crosses the centre of the fault. Weak anomalies seen on the pixel imagery (Whitaker, 1992) suggest a linkage to the Jimberlana Dyke. However this seems unlikely because the shape of the anomaly south of Hyden (Figures 10, 21) suggests a shallower dipping NRM field of different sign to the NRM field of the Jimberlana and Binneringie Dykes found by Evans (1968) and McClay (1974).

The 960 nT anomaly gives a depth of about 45 m for the dyke which has no mapped outcrop to confirm its existance.

Lort River anomalies

Traverse A located a -1300 nT anomaly where the aeromagnetic signature of the Wagtail Dyke crosses the centre of the Lort River fault in the vicinity of a notable sag pond fed by a minor creek west of the scarp. The ponded creek runs parallel to and immediately south of the dyke which is associated with a slight rise in elevation along Traverse A. Twenty kilometres east of the fault, on Traverse B, the anomaly is smaller but has the same lopsided shape. The depths (and maximum thicknesses) of 60m and 45m indicated at Traverse A and B are comparable to other areas. The dyke has no known surface exposure.

The magnetic anomaly shape for the Wagtail Dyke indicates (a) an NRM field with a relatively shallow north dip and Q = 3.0 compatible with shallow north-west inclinations found in paleomagnetic studies of Cambrian dykes and sills in the Albany region (Harris and Li, 1995) or (b) Evans' (1968) NRM field reversed (Irc = 75^{o}) and Q = 1.3.

Mt Gibbs fault zone

The Wedgetail Dyke negative aeromagnetic anomaly (Figure 1) crosses the area of one major and several minor recent fault scarps (Chin and others, 1984) near Mt Gibbs. However the Wedgetail Dyke may peter out here or continue to the northwest with a diminished anomaly or another east-west trending dyke may cross the area (Whitaker, 1992, 1993, 1994). Several traverses are required to determine the dyke pattern in this area.

Mt Holland fault

Gordon (1994) has listed historical fault scarps including the above. A fault is shown crossing the eastern margin of the HYDEN 1:250,000 geological map (Chin and others, 1984). However its extension is not seen on the LAKE JOHNSTONE map (Gower and Bunting, 1976) and Chin and others (1984) do not mention this fault in their text or show it in their structural map. Although a fault in this area could be associated with the extended Jimberlana Dyke we have omitted the Mt Holland fault from Figure 1 until more information is available.

Conclusions

Results are summarised in the following list.

Dyke & location	*Anomaly (nT)*	*Strike*	*Depth (m) (max. thick.)*	*Ipc*
Cockatoo				
Merredin	-2680	092	50	down/north steep
Burbridge	-1535	082	55	down/north steep
Pidgeon Hole	-2000	082	25	down/north steep
Emu				
Bruce Rock	-2250		70	down/north steep
Binneringie				
Hyden A	220	070	40	up/north steep
	410		40	
Hyden B	50?		50?	
Hyden C	960		30	
	300		30	
Hyden D	750		47	
Wickepin *	2000	070	100	up/north steep
Jimberlana?				
Hyden south	960	065	45	up/north shallow
Wagtail				
Lort River A	-1300	095	65	down/north shallow
Lort River B	-840	095	45	

* From Street, 1987.

The magnetic anomalies show that the dykes extend for hundreds of kilometers but are relatively thin, unlikely to exceed 50m in the area surveyed. Hence their elasticity contrasts with surrounding rock masses are likely to cause sharp stress irregularities which in turn could trigger seismicity, i.e. dykes may require consideration in earthquake risk assessments.

Acknowledgments

The assistance with observations as shown in the table headers of Ed Paull, (AGSO, Mundaring Observatory), Stuart Gunson (Curtin University) and Jim Courtney-Bennett is acknowledged. Discussions with Stuart Gunson regarding dyke anomalies were also very helpful.

Bibliography

Assameur, D.M., & Mareschal, J., 1995 - Stress induced by topography and crustal density heterogeneities: implication for seismicity of southeastern Canada. Tectonophysics, 241, 179-192.

Boyd, D.M., & Tucker, D.H., 1990 - Australian magnetic dykes. Parker, A.J., Rickwood, P.C., & Tucker, D.H. (editors), mafic dykes and emplacement mechanisms. Rotterdam, Balkena, 391-399.

Campbell, D.L., 1978 - Investigation of stress-concentration mechanism for intraplate earthquakes. Geophysical Research Letters, 5, 477-479.

Campbell, I.H., McCall, G.J.H., & Tyrwhitt, D.S., 1970 - The Jimberlana Norite, Western Australia - a small analogue of the Great Dyke of Rhodesia. Geological Magazine, 107, 1-11.

Chin, R.J., 1986 - Kellerberrin, Western Australia. Geological Survey of Western Australia 1:250,000 geological series - explanatory notes.

Chin, R.J., Hickman, A.H., & Thom, R., 1984 - Hyden, Western Australia. Geological Survey of Western Australia 1:250,000 geological series - explanatory notes.

Costain, J.K., Bollinger, G.A., & Speer, J.A., 1987 - Hydroseismicity: A hypothesis for the role of water in the generation of intraplate seismicity. Seismological Research Letters, 58, 3, 41-64.

Crone, A.J., Machette, M.N., & Bowman, J.R., 1992 - Geologic investigations of the 1988 Tennant Creek, Australia, earthquakes - implications for paleoseismicity in stable continental regions. United States Geological Survey, Bulletin, 2032-A.

Denham, D., 1988 - Australian seismicity - the puzzle of the not-so-stable continent. Seismological Research Letters, 59, 4, 235-240.

Denham, D., Alexander, L.G., Everingham, I.B., Gregson, P.J., McCaffrey, R., & Enever, J.R., 1987 - The 1979 Cadoux earthquake and intraplate stress in Western Australia. Australian Journal of Earth Sciences, 34, 507-521.

Denham, D., & Windsor, C.R., 1991 - The crustal stress patterns in the Australian continent. Exploration Geophysics, 22, 101-106.

Dent, V.F., 1990 - Hypocentre relocations using data from temporary seismograph stations at Burakin and Wyalkatchem, Western Australia. Bureau of Mineral Resources, Record, 1990/36.

Dent, V.F., 1991 - Hypocentre locations from a microearthquake survey, Cadoux, Western Australia, 1983. Bureau of Mineral Resources, Journal of Australian Geology and Geophysics, 12, 1-4.

Dentith, M.C., Evans, B.J., Paish, K.F., & Trench, A., 1992 - Mapping the regolith using seismic refraction and magnetic data: results from the Southern Cross greenstone belt, Western Australia. Exploration Geophysics, 23, 97-104.

Dentith, M.C., Jones, M.L., F & Trench, A., 1992 - Exploration for gold -bearing iron formation in the Burbridge area of the Southern Cross greenstone belt, Western Australia. Exploration Geophysics, 23, 111-116.

Engel, R., McFarlane, D.F., & Street, G., 1987 - The influence of dolerite dykes on saline seeps in south-western Australia. Australian Journal of Soil Research, 25, 125-136.

Evans, M.E., 1968 - Magnetisation of dikes: A study of the palaeomagnetism of the Widgiemooltha Dike Suite, Western Australia. Journal of Geophysical Research, 73, 10, 3261-3270.

Everingham, I.B., 1965 - Gravity anomalies on the Precambrian Shield of south Western Australia. University of Western Australia, MSc thesis (unpublished).

Everingham, I.B., Gregson, P.J., & Doyle, H.A., 1969 - Thrust fault scarp in the Western Australian shield. Nature, 223, 701-703.

Gay, S.P., 1963 - Standard curves for interpretation of magnetic anomalies over long tabular bodies. Geophysics, XXVIII, 2, 161-200.

Gee, R.D., 1982 - Southern Cross, Western Australia. Geological Survey of Western Australia 1:250,000 geological series - explanatory notes.

Giddings, J.W., 1976 - Precambrian palaeomagnetism in Australia: basic dykes and volcanics from the Yilgarn Block. Tectonophysics, 30, 91-108.

Glickson, A.Y., 1995 - Asteroid/comet mega-impacts may have triggered major episodes of crustal evolution. EOS, Americal Geophysical Union, Transactions, 76, 6, 49-54.

Gordon, F.R., 1994 - The geological setting of intraplate earthquakes in Western Australia. Geological Society of Australia, abstracts, 37, 137.

Gordon, F.R., & Lewis, J.D., 1980 - The Meckering and Calingiri earthquakes, October 1968 and March 1970. Geological Survey of Western Australia, Bulletin, 126.

Gower, C.F., & Bunting, J.A., 1976 - Lake Johnston, Western Australia. Geological Survey of Western Australia 1:250,000 geological series - explanatory notes.

Gregson, P.J., & Paull, E.P., 1979 - Preliminary report on the Cadoux earthquake, Western Australia, 2 June 1979. Bureau of Mineral Resources, Australia, Report, 215.

Halberg, J.A., 1987 - Post-cratonisation mafic and ultramafic dykes of the Yilgarn Block. Australian Journal of Earth Sciences, 34, 135-149.

Harris, L.B., & Li, Z.X., 1995 - Paleomagnetic dating and tectonic significance of dolerite intrusions in the Albany Mobile Belt, Western Australia. Earth and Planetory Science Letters, 131, 143-164.

Isles, D.J., & Crooke, A.C., 1990 - Spatial associations between post-cratonisation dykes and gold deposits in the Yilgarn Block, Western Australia. Parker, A.J., Rickwood, P.C. & Tucker, D.H., (editors), Mafic dykes and emplacement mechanisms. Rotterdam, Balkema, 157-162.

Jahren, C.E., 1965 - Magnetisation of Keweenawan rocks near Duluth, Minnesota. Geophysics, 5, 858-874.

Johnston, A.C., 1987 - Suppression of earthquakes by large continental ice sheets. Nature, 330, 467-469.

Lamontagne, M., & Graham, D.F., 1993 - Remote sensing looks at an intraplate earthquake surface rupture. EOS, American Geophysical Union, Transactions, 74, 32, 353-357.

Langston, C.A., 1987 - Depth of faulting during the 1968 Meckering, Australia, earthquake sequence determined from waveform analysis of local seismograms. Journal of Geophysical Research, 72, B11, 11561-11574.

Lewis, J.D., 1994 - Mafic dykes in the Williams-Wandering area, Western Australia. Geological Survey of Western Australia, annual report, 1993, 37-52.

Lewis, J.D., Daetwyler, N.A., Bunting, T.A., & Moncrieff, J.S., 1981 - The Cadoux earthquake, 2 June 1979. Geological Survey of Western Australia Report, 11.

Machette, M.N., Crone, A.J., & Bowman, J.R., 1993 - Geological investigations of the 1986 Marryat Creek, Australia earthquake - implications for paleoseismicity in stable continental regions. United States Geological Survey, Bulletin, 2032-B.

McCall, G.J.H., & Peers, R., 1971 - Geology of the Binneringie Dyke, Western Australia. Sonderdruck Geologische Rundschau, 60, 367-376.

McClay, K.R., 1974 - Single-domain magnetite in the Jimberlana Norite, Western Australia. Earth and Planetary Science Letters, 21, 367-376.

McClay, K.R., & Campbell, I.B., 1976 - The structure and shape of the Jimberlana Intrusion, Western Australia, as indicated by an investigation of the Bronzite Complex. Geological Magazine, 113(2), 129-139.

McCue, K.J., 1990 - Australia's large earthquakes and recent fault scarps. Journal of Structural Geology, 12, 761-766.

Moo, J.K.C., 1965 - Analytical aeromagnetic interpretations of the inclined prism. Geophysical Prospecting, 13, 203-224.

Myers, J.S., 1990 - Mafic dyke swarms. Geology and mineral resources of Western Australia. Geological Survey of Western memoir 3, P126.

Parker, A.F., Rickwood, P.C., Baillie, P.W., McClenaghan, M.P., Boyd, D.M., Freeman, M.J., Pietsch, B.A., Murray, C.G., & Myers, J.S., 1987 - Mafic Dyke swarms of Australia. Hallis, H.C. & Fahriz, W.F., (editors), Mafic Dyke Swarms, Geological Association of Canada, special paper, 34, 401-417.

Salama, R.B., Farrington, P., Bartle, G.A. & Watson, G.D., 1993 - The role of geological structures and relict channels in the development of dryland salinity in the wheatbelt of Western Australia. Australian Journal of Earth Sciences, 40, 45-56.

Sofoulis, J., 1963 - Boorabin, Western Australia. Geological Survey of Western Australia 1:250,000 geological series - explanatory notes.

Sofoulis, J., 1966 - Widgiemooltha, Western Australia. Geological Survey of Western Australia 1:250,000 geological series - explanatory notes.

Street, G.J., 1987 - Binneringie Dyke. Geological Survey of Western Australia, geophysical report, 4/87 (unpublished).

Talwani, P., 1988 - The intersection model for intraplate earthquakes. Seismological Research Letters, 59, 4, 305-310.

Tarlowski, C., Simonis, F., & Milligan, P., 1993 - Magnetic anomaly map of Australia, scale 1:5000 000. Australian Geological Survey Organisation, Canberra.

Thom, R., 1972 - A recent fault scarp in the Lort River area, Ravensthorpe 1:250,000 sheet: Western Australia. Geological Survey of Western Australia, annual report 1971, 58-59.

Thom, R., Lipple, S.L., & Sanders, C.C., 1977 - Ravensthorpe, Western Australia. Geological Survey of Western Australia 1:250,000 geological series - explanatory notes.

Tucker, D.H., & Boyd, D.M., 1987 - Dykes of Australia detected by airborne magnetic surveys. Halls, H.C. & Fahrig, W.F., (editors), Mafic Dyke swarms, Geological Association of Canada special paper, 34, 162-172.

Wada, Y., 1994 - On the relationship between dyke width and magma viscosity. Journal of Geophysical Research, 99, B9, 17,743-17,775.

Whitaker, A.J., 1992 - Albany magnetic and gravity interpretation (1:1000,000 scale map). Bureau of Mineral Resources, Geology and Geophysics, Canberra, Australia.

Whitaker, A.J., 1992 - Kalgoorlie magnetic and gravity interpretation (1:1000,000 scale map). Australian Geological Survey Organisation, Canberra, Australia.

Whitaker, A.J., 1993 - Esperance magnetic and gravity interpretation (1:1000,000 scale map). Australian Geological Survey Organisation, Canberra, Australia.

Whitaker, A.J., 1994 - Integrated geological and geophysical mapping of southwestern Western Australia. Australian Geological Survey Organisation, Journal of Australian Geology and Geophysics, 15(3), 313-328.

Whiting, T.H., 1986 - Aeromagnetics as an aid to geological mapping - a case history from the Arunta Inlier, Northern Territory. Australian Journal of Earth Sciences, 33, 271-286.

Williams, I.R., 1979 - Recent fault scarps in the Mount Narryer area, Byro 1:250,000 sheets. Geological Survey of Western Australia annual report, 1978, 51-55.

Table 1. Lort River - A (Road 1.0km east)

Traverse 31°-211°T through Griffiths/Fields Rd Junction Regional F = 59558 nT
GPS 33° 26.89' S 121° 15.30' E Elevation 154 m at station 0000 Coil height 1.8m
23/24 May 1995 (Observations by Everingham and Paull)

Stn (m) S	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*
000	59636	580	59807	855	58797	998	59218	1560	59522
020	636	600	826	860	753	1000	224	1580	520
040	639	620	849	865	719	1020	283	1600	519
060	641	640	869	870	676	1040	330	1620	522
080	645	660	888	875	674	1060	360	1640	513
100	650	680	902	880	668	1080	379	1660	505
120	656	700	919	885	666	1100	400	1680	506
140	660	720	934	890	679	1120	416	1700	511
160	664	740	952	895	697	1140	434	1720	515
180	667	760	961	900	720	1160	447	1740	521
200	674	765	963	905	748	1180	460	1760	503
220	677	770	959	910	778	1200	473	1780	496
240	683	775	953	915	809	1220	480	1800	488
260	687	780	945	920	836	1240	494	1820	481
280	693	785	931	925	863	1260	500	1840	477
300	690	790	913	930	888	1280	508	1860	477
320	706	795	883	935	919	1300	516	1880	474
340	711	798	848	940	948	1320	524	1900	468
360	717	800	831	945	978	1340	534	1920	464
380	719	804	752	950	59005	1360	541	1940	458
400	724	809	545	955	32	1380	547	1960	457
420	730	815	371	960	60	1400	553	1980	456
440	735	820	280	965	82	1420	560	2000	456
460	741	825	224	970	106	1440	555	2020	456
480	752	830	168	975	130	1460	535	2040	461
500	758	835	102	980	153	1480	515	2060	466
520	767	840	16	985	172	1500	506	2080	474
540	779	845	58930	990	188	1520	510	2100	482
560	793	850	860	995	203	1540	517		

Table 2. Lort River - B (Road 20.0km east)

Traverse 180°T starting 2.58km north of Griffith/Belgian Rds Junction Regional F = 59563 nT
GPS 33° 27.67' S 121° 27.32' E Elevation 270 m at station 0000 Coil height 1.8m
23/24 May 1995 (Observations by Everingham and Paull)

Stn (m) S	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*
020	59606	200	59597	320	58776	440	59245	620	59431
040	613	220	571	325	785	460	283	640	437
060	617	240	505	330	800	480	312	660	458
080	621	260	334	335	824	500	339	680	451
100	640	280	67	340	846	520	358	700	457
120	631	300	58841	360	958	540	379		
140	617	305	808	380	59049	560	389		
160	608	310	787	400	130	580	402		
180	602	315	777	420	194	600	421		

Table 3. Hyden South Fault (Road 5km east)

Traverse 168^{o}T along Allen Rocks Road (at Mauritz Road Junction) Regional F = 59163 nT
GPS 32^{o} 38.57' S 119^{o} 05.59' E Elevation 410 m at station 1100 Coil height 1.8m
22/24 May 1995 Readings reduced to 22 May datum (Observations by Everingham and Paull)

Stn (m) S	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*
000	59185	700	59320	1091	59612	1176	58922	1263	58879
025	171	725	354	1094	624	1178	881	1270	891
050	166	750	314	1097	638	1181	845	1280	902
075	174	770	285	1100	651	1184	812	1290	908
100	187	800	242	1103	660	1187	785	1300	908
125	201	825	244	1106	670	1190	764	1320	904
150	212	850	214	1109	678	1193	747	1340	897
175	218	875	246	1112	680	1196	736	1360	891
200	222	900	296	1115	679	1198	727	1380	903
225	222	925	363	1118	672	1200	724	1400	925
250	217	950	446	1120	657	1203	726	1420	940
275	273	975	519	1123	634	1206	729	1440	944
300	249	1000	539	1126	607	1209	736	1460	940
325	289	1025	490	1129	576	1212	743	1480	948
350	301	1050	492	1131	541	1215	751	1500	964
375	307	1053	484	1134	498	1218	759	1520	982
400	299	1056	485	1137	453	1221	767	1540	59006
420	335	1058	498	1139	406	1225	776	1560	29
440	364	1061	504	1143	362	1228	786	1580	45
460	315	1064	510	1146	319	1231	794	1600	54
480	292	1067	516	1150	260	1234	804	1620	64
500	247	1069	523	1153	222	1237	814	1640	65
525	203	1072	532	1155	189	1240	823	1660	63
550	201	1075	540	1158	153	1243	832	1680	59
580	244	1077	551	1161	113	1246	840	1700	69
600	272	1080	562	1164	78	1250	848		
625	264	1083	573	1167	38	1253	856		
650	321	1085	586	1170	58998	1256	865		
675	352	1088	599	1173	959	1259	872		

Table 4. Hyden - A (Near track junction, 8km east at 32°12.58', 119°21.55')

Traverse approx 180°T through bush. Regional F = 58950 nT

GPS 32° 12.43' S 119° 21.35' E Elevation 305 m at station 0500 Coil height 1.8m

GPS 32° 12.74' S 119° 21.34' E Elevation 305 m at station 1080

25 May 1995 (Observations by Everingham and Paull)

Stn (m) S	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*
000	59041	520	59018	1040	59131	1400	59308	1640	59380
020	41	540	20	1060	134	1410	276	1645	356
040	47	560	27	1080	134	1420	253	1650	317
060	51	580	29	1100	135	1430	226	1655	275
080	49	600	32	1120	143	1440	200	1660	234
100	51	620	36	1140	148	1450	172	1670	172
120	55	640	42	1160	148	1460	148	1680	105
140	63	660	46	1180	146	1470	139	1690	67
160	79	680	49	1200	138	1480	130	1700	33
180	102	700	56	1220	123	1490	131	1720	7
200	145	720	60	1240	99	1500	138	1740	5
220	119	740	65	1250	93	1510	145	1760	6
240	67	760	73	1260	98	1520	157	1780	9
260	61	780	79	1270	108	1530	169	1800	13
280	59	800	86	1280	129	1540	183	1820	16
300	46	820	94	1290	148	1550	202	1840	17
320	22	840	99	1300	171	1560	226	1860	20
340	58981	860	106	1310	190	1570	252	1880	21
360	970	880	110	1320	209	1580	279	1900	22
380	974	900	112	1330	231	1590	305	1920	20
400	983	920	116	1340	257	1600	340	1940	30
420	988	940	120	1350	285	1605	362	1960	34
440	995	960	121	1360	308	1610	381	1980	43
460	59002	980	124	1370	328	1615	399	2000	48
480	6	1000	126	1380	333	1620	409		
500	10	1020	129	1390	324	1630	414		

Table 5. Hyden - B (Road 20km west)

Traverse 180^{o}T from 2.0km north of road dogleg — Regional F = 58982 nT
GPS 32^{o} 16.62' S 119^{o} 09.79' E Elevation 362 m at station 1960 — Coil height 1.8m
GPS 32^{o} 16.11' S 119^{o} 09.70' E Elevation 412 m at station 1000 (Green's gate)
25/26 May 1995 (Observations by Everingham and Paull)

Stn (m) S	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*
0	59161	460	59193	860	59292	1310	59290	1620	59150
20	169	480	194	880	270	1320	255	1640	165
40	178	500	194	900	295	1330	356	1660	186
60	184	520	197	920	285	1335	283	1680	197
80	194	540	199	940	310	1340	500	1700	207
100	201	560	202	960	323	1345	435	1720	226
120	204	580	207	980	287	1350	315	1740	235
140	206	600	213	1000	236	1355	179	1760	250
160	207	620	224	1020	220	1360	291	1780	228
180	205	640	241	1040	225	1370	397	1800	200
200	204	660	249	1060	226	1380	6	1820	191
220	209	680	269	1080	224	1390	58991	1840	181
240	212	700	287	1100	218	1400	59037	1860	171
260	213	720	306	1120	223	1420	76	1880	155
280	216	740	332	1140	277	1440	114	1900	161
300	218	760	372	1160	335	1460	110	1920	156
320	216	780	396	1180	257	1480	51	1940	161
340	211	790	407	1200	266	1500	88	1960	157
360	205	795	408	1220	326	1520	76	1980	148
380	203	800	403	1240	264	1540	99	2000	148
400	197	810	397	1260	305	1560	135		
420	193	820	376	1280	340	1580	133		
440	192	840	327	1300	333	1600	146		

Table 6. Hyden - C (20km west)

Traverse 180^{o}T from road dogleg — Regional F = 58982 nT
GPS 32^{o} 16.64' S 119^{o} 09.85' E 40m north of station 1960
Coil height 1.8m
26 May 1995 (Observations by Everingham and Paull)

Stn (m) S	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*
0	59187	330	59410	500	59273	840	59083	1015	59309
20	199	340	424	520	248	860	94	1020	276
40	207	350	438	540	251	880	107	1025	233
60	215	360	440	560	251	900	122	1030	183
80	226	370	465	580	241	910	134	1040	100
100	235	380	553	600	189	920	147	1060	47
120	249	390	510	620	145	930	159	1080	38
140	260	400	552	640	104	940	174	1100	41
160	266	410	613	660	76	950	190	1120	35
180	273	420	614	680	57	960	210	1140	43
200	289	430	698	700	50	970	234	1160	51
220	300	440	809	720	47	980	260	118	52
240	313	450	948	740	51	990	290	1200	54
260	332	460	60022	760	54	995	301		
280	353	470	56	780	60	1000	312		
300	379	480	59773	800	68	1005	326		
320	403	490	445	820	74	1010	326		

Table 7. Hyden - D (Vermin fence 4 km west)

Traverse 142° from H.T. line/fence intersection Regional F = 58966 nT
32° 14.74' S 119° 12.89' E at station 0000 (1:250,000 geological map) Coil height 1.8m
30 June 1995 (Observations by Everingham and Courtney-Bennett))

Stn (m) S	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*
020	59116	860	59235	1700	59161	2540	59267	2980	59008
040	68	880	242	1720	99	2560	294	3000	9
060	77	900	223	1740	119	2580	365	3020	2
080	94	920	178	1760	113	2600	415	3040	12
100	88	940	137	1780	101	2610	446	3060	21
120	84	960	106	1800	100	2620	462	3080	38
140	80	980	91	1820	97	2630	490	3100	53
160	100	1000	90	1840	100	2640	519	3120	51
180	123	1020	101	1860	102	2650	549	3140	73
200	97	1040	104	1880	95	2660	586	3160	77
220	92	1060	118	1900	90	2670	623	3180	80
240	91	1080	134	1920	88	2675	625	3200	87
260	94	1100	144	1940	96	2680	624	3220	88
280	92	1120	154	1960	101	2681	622	3240	86
300	91	1140	155	1980	105	2682	635	3260	86
320	95	1160	152	2000	105	2683	645	3280	73
340	40	1180	152	2020	105	2684	643	3300	66
360	104	1200	171	2040	107	2685	630	3320	53
380	98	1220	172	2060	107	2690	543	3340	44
400	97	1240	179	2080	117	2695	510	3360	48
420	84	1260	178	2100	115	2700	530	3380	41
440	90	1280	164	2120	114	2705	430	3400	41
460	96	1300	151	2140	98	2710	337	3420	43
480	94	1320	163	2160	43	2715	308	3440	58
500	100	1340	161	2180	119	2720	263	3460	64
520	118	1360	160	2200	144	2725	211	3480	62
540	129	1380	155	2220	124	2730	145	3500	70
560	144	1400	159	2240	145	2735	85	3520	64
580	142	1420	159	2260	147	2740	58	3540	56
600	146	1440	152	2280	174	2745	40	3560	53
620	161	1460	164	2300	172	2750	18	3580	56
640	170	1480	165	2320	169	2760	58992	3600	77
660	173	1500	170	2340	169	2780	969	3620	80
680	160	1520	179	2360	179	2800	953	3640	83
700	121	1540	171	2380	190	2820	965	3660	108
720	180	1560	172	2400	208	2840	968	3680	128
740	191	1580	181	2420	219	2860	971	3700	140
760	167	1600	154	2440	222	2880	988	3720	152
780	66	1620	145	2460	223	2900	993	3740	158
800	176	1640	115	2480	183	2920	59001	3760	151
820	190	1660	154	2500	193	2940	6	3780	162
840	220	1680	153	2520	247	2960	4	3800	160

Table 8. Merredin Fault Zone - Total Force (Road within zone)

Traverse 180°T from Depot Dam/Perons Rd Junction — Regional F = 58692 nT

31° 41.49' S 118° 20.32' E at station 1630 (1:250,000 Geological map) — Coil height 1.8m

4 October 1993 (Observations by Gregson and Everingham)

Stn (m) S	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*
1000	58313	1473	58114	1691	57557	1967	58472	2314	58535
1050	378	1489	69	1700	788	1983	470	2328	532
1100	436	1500	2	1710	921	2000	496	2343	550
1150	447	1513	57914	1720	999	2016	514	2357	570
1200	436	1522	835	1730	58103	2033	526	2371	573
1222	436	1531	734	1740	184	2050	510	2386	575
1238	425	1540	626	1750	233	2067	520	2400	578
1254	423	1550	483	1760	273	2083	516	2420	593
1269	427	1560	304	1770	306	2100	518	2440	636
1285	414	1570	102	1780	320	2114	525	2460	630
1300	411	1580	56872	1790	332	2128	515	2480	655
1308	403	1590	598	1800	356	2143	530	2500	653
1323	388	1600	327	1812	368	2157	537	2550	640
1338	371	1613	55978	1825	382	2171	545	2600	642
1354	351	1622	829	1838	396	2186	554	2650	664
1370	334	1629	801	1850	410	2200	525	2700	695
1385	316	1631	805	1862	417	2214	535	2750	733
1400	289	1640	939	1875	422	2228	532	2800	730
1405	264	1648	56170	1890	433	2243	541	2850	750
1418	243	1657	423	1900	434	2257	532	2900	710
1432	220	1665	834	1916	446	2271	522	3000	685
1446	196	1674	57140	1933	442	2286	530		
1459	150	1683	310	1950	447	2300	531		

Table 9. Merredin Fault Zone - Declination and Inclination (Road within zone)

Traverse 180°T from Depot Dam/Perons Rd Junction

31° 41.49' S 118° 20.32' E at station 1630 (1:250,000 Geological map)

14 October 1993 (Observations by Gregson and Everingham)

Regional D = 1° 05' West — Regional I = -66° 34' — Regional Z

Stn (m) S	*Declination minutes (West)*	*Inclination degrees*	*minutes*	*Vertical force derived (nT)*
0120	65.85	-66	38.05	53680
1220	71.95	-66	43.00	53644
1580	77.65	-67	32.15	52556
1610	69.60	-66	55.45	51611
1620	62.60	-66	33.45	51249
1625	62.05	-66	21.15	51133
1630	59.75	-66	6.50	51023
1635	57.20	-65	49.15	51001
1650	52.45	-65	16.65	51067
1680	53.60	-64	51.85	51838
2000	49.55	-66	1.10	53444
2100	54.50	-66	5.95	53500
2300	62.80	-66	8.90	53523

Table 10. Dyke Traverse near Burbridge (South of Southern Cross)

Traverse 157.5°T 5.5km north of Cockatoo Tank Junction — Regional F = 58616 nT
31° 32.86' S 119° 28.29' E at station 0415 (1:250,000 Geological map) — Coil height 1.8m
1985 (Observations by Everingham and Gunson)

Stn (m) S	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*
000	58468	279	58305	379	57464	486	57832	586	58392
100	457	290	274	390	260	496	956	600	58410
200	423	300	241	400	75	500	58010	700	480
207	416	307	206	411	56961	511	101	800	497
217	408	317	152	421	951	521	170	900	499
228	396	326	90	432	57033	532	229	1000	509
238	385	336	9	443	167	543	270	1100	498
248	370	348	57909	454	339	554	311	1200	498
259	352	359	785	464	517	564	344	1300	506
269	330	369	641	475	682	575	369		

Table 11. Dyke Traverse near Pidgeon Hole (south of Bullabulling)

Traverse 210°T along the road from Victoria Rock — Regional F = 56750 nT
31°25.0' S 120° 52.6' E at station 0000 (1:250,000 Topographic map)
1981 (Observations by Gunson and WAIT students)

Stn (m) S	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*
000	58661	1020	58548	1140	57149	1260	58709	2100	58755
100	668	1030	531	1150	56904	1270	738	2200	758
200	703	1040	481	1160	723	1280	760	2300	756
300	720	1050	415	1170	57127	1290	776	2400	736
400	785	1060	365	1180	544	1300	788	2500	751
500	773	1070	291	1190	900	1400	847	2600	752
600	670	1080	198	1200	58159	1500	827	2700	748
700	672	1090	114	1210	358	1600	863	2800	778
800	644	1100	57972	1220	475	1700	798	2900	780
900	636	1110	776	1230	567	1800	771	3000	751
1000	558	1120	445	1240	631	1900	796		
1010	576	1130	387	1250	677	2000	762		

Table 12. Dyke Traverse near Bruce Rock

Traverse 180°T from point 1.50 km south of road T. Junction Regional F = 58600 nT
31°53.34' S 118° 14.92' E at station 0000 (1:250,000 Geological map) Coil height 1.8m
31 June 1995 (Observations by Everingham and Courtney-Bennett)

Stn (m) S	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*	*Stn (m) S*	*Field nT*
020	58469	360	58507	700	58124	870	56964	1160	58541
040	492	380	477	720	23	880	57120	1180	575
060	495	400	462	740	57896	890	281	1200	603
080	513	420	463	760	731	900	435	1220	624
100	548	440	464	780	510	910	570	1240	650
120	565	460	451	790	360	920	688	1260	671
140	589	480	430	800	194	940	876	1280	702
160	582	500	403	810	20	960	58055	1300	716
180	558	520	387	820	56859	980	119	1320	679
200	563	540	368	830	615	1000	206	1340	668
220	547	560	350	838	412	1020	223	1360	680
240	555	580	333	839	392	1040	169	1380	672
260	549	600	317	840	410	1060	240	1400	674
280	536	620	297	841	454	1080	337	1420	686
300	526	640	273	842	505	1100	418	1440	682
320	521	660	238	850	685	1120	457	1460	683
340	518	680	193	860	807	1140	502	1480	675

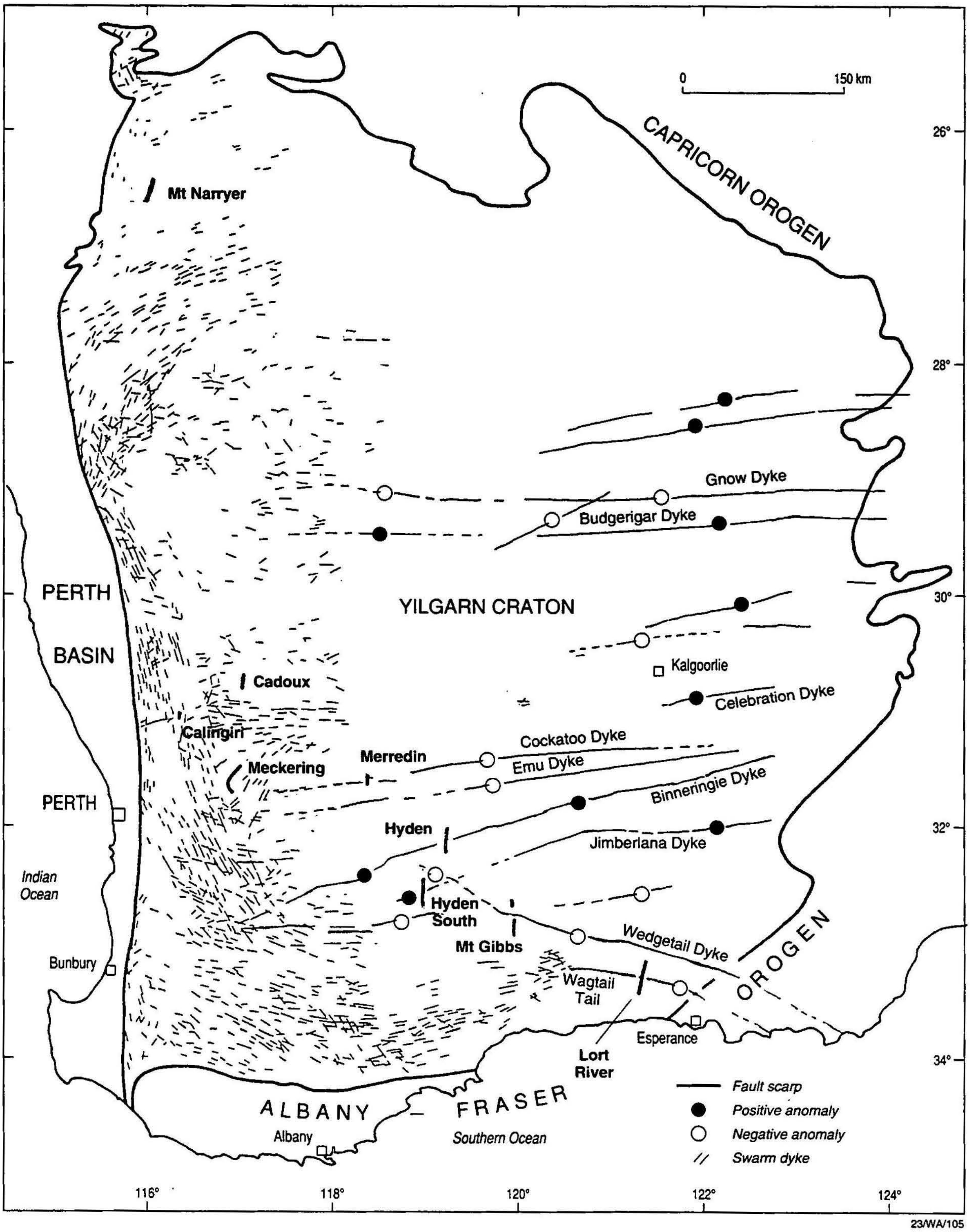

Fig. 1. Earthquake fault scarps and mafic dykes.

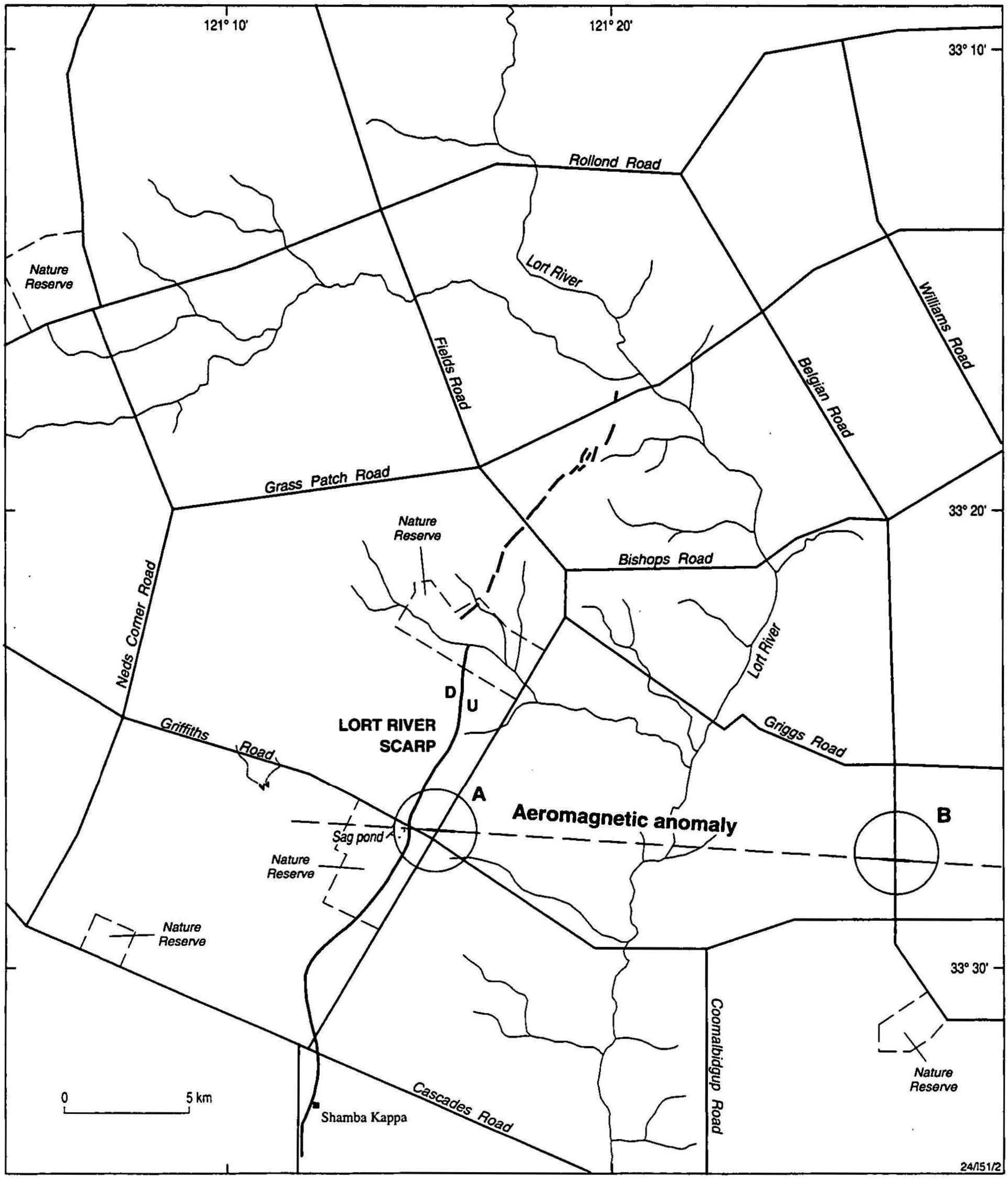

Fig. 2. Locality map - Lort River A and B traverses.
Peak anomaly shown as heavy line within circle.

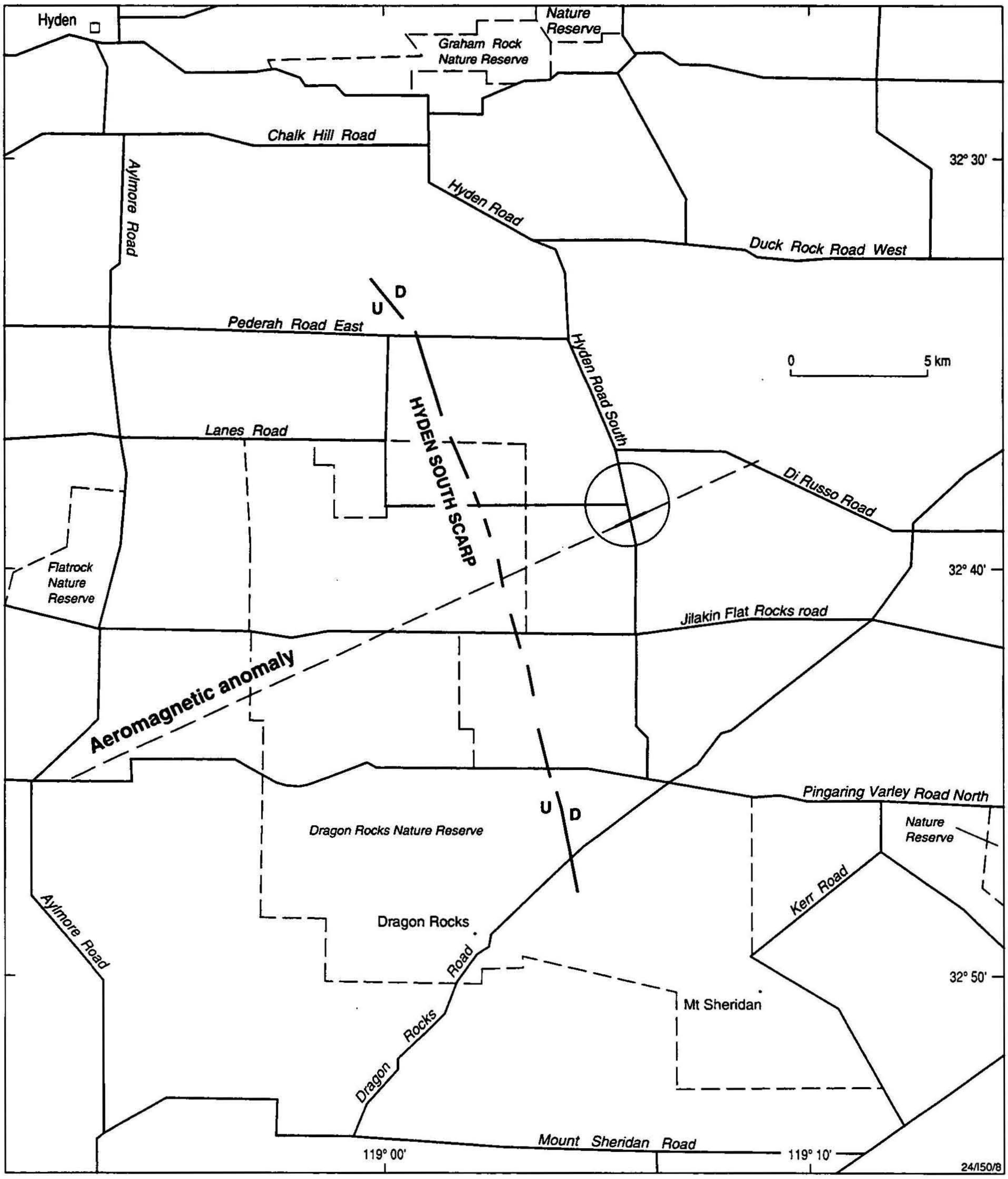

Fig. 3. Locality map - Hyden south traverse
Peak anomaly shown as heavy line within circle.

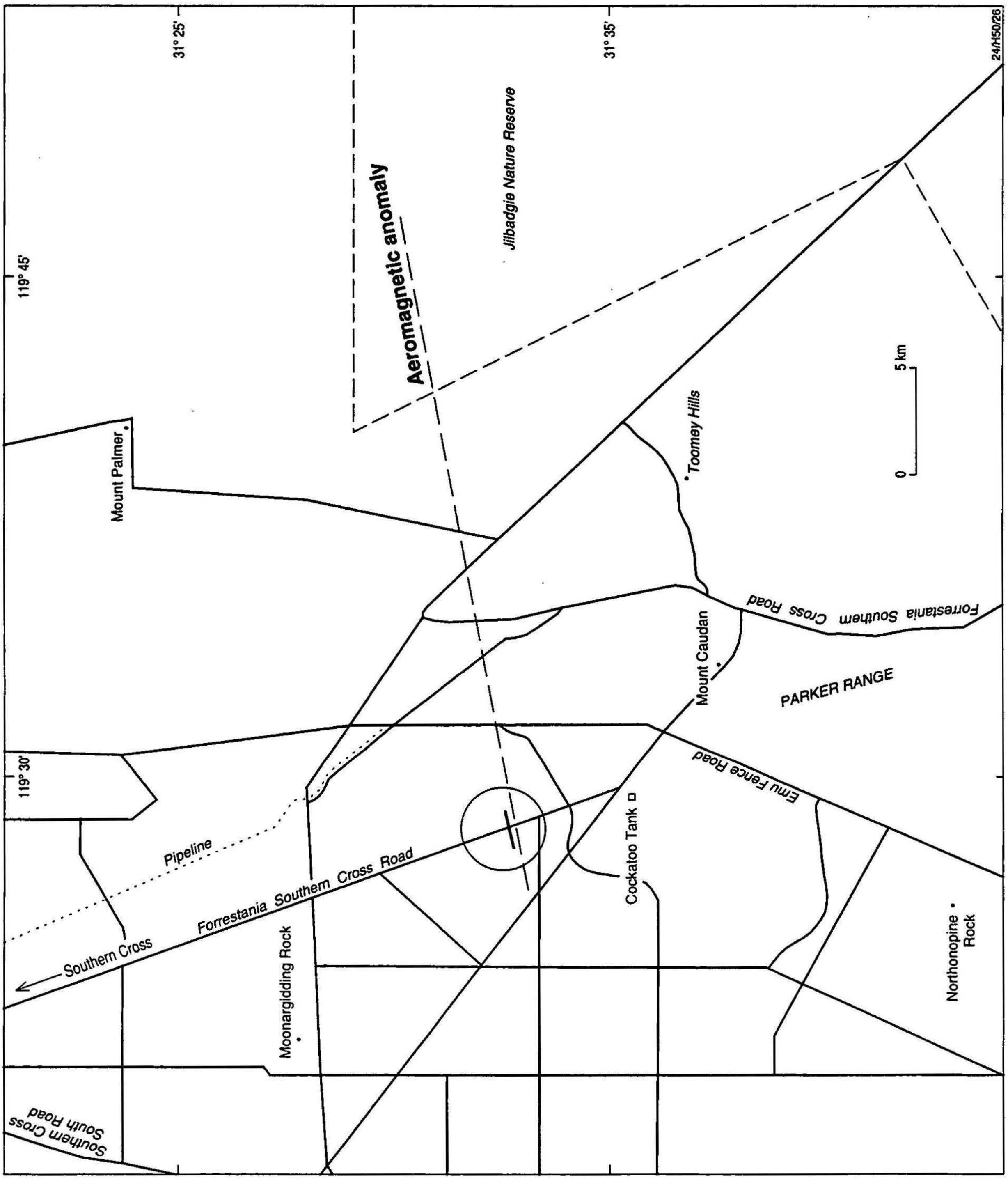

Fig. 4. Locality map - Hyden A, B, C and D traverses.
Peak anomaly shown as heavy line within circle.

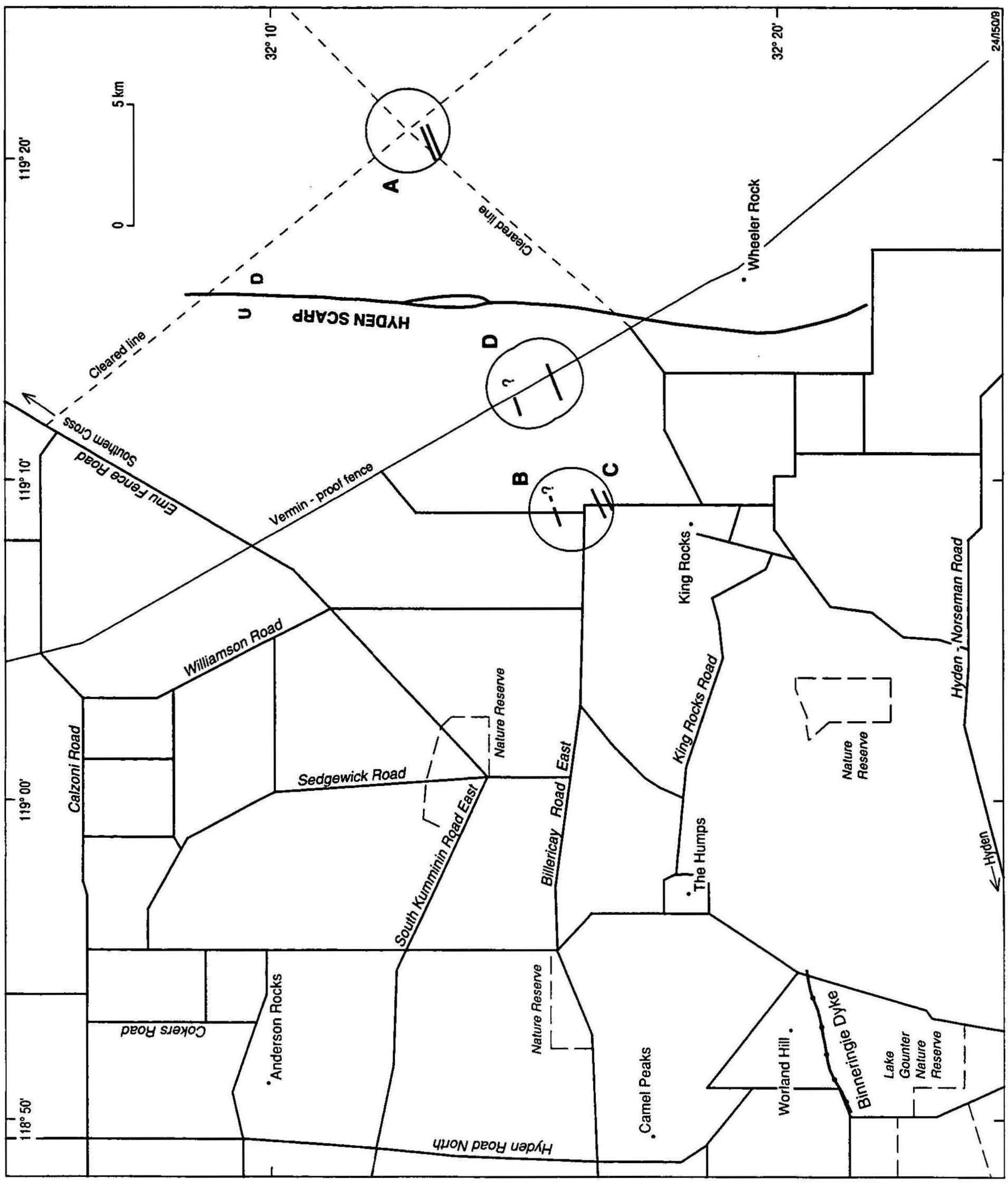

Fig. 5. Locality map - Merredin and Bruce Rock traverses.
Peak anomaly shown as heavy line within circle.

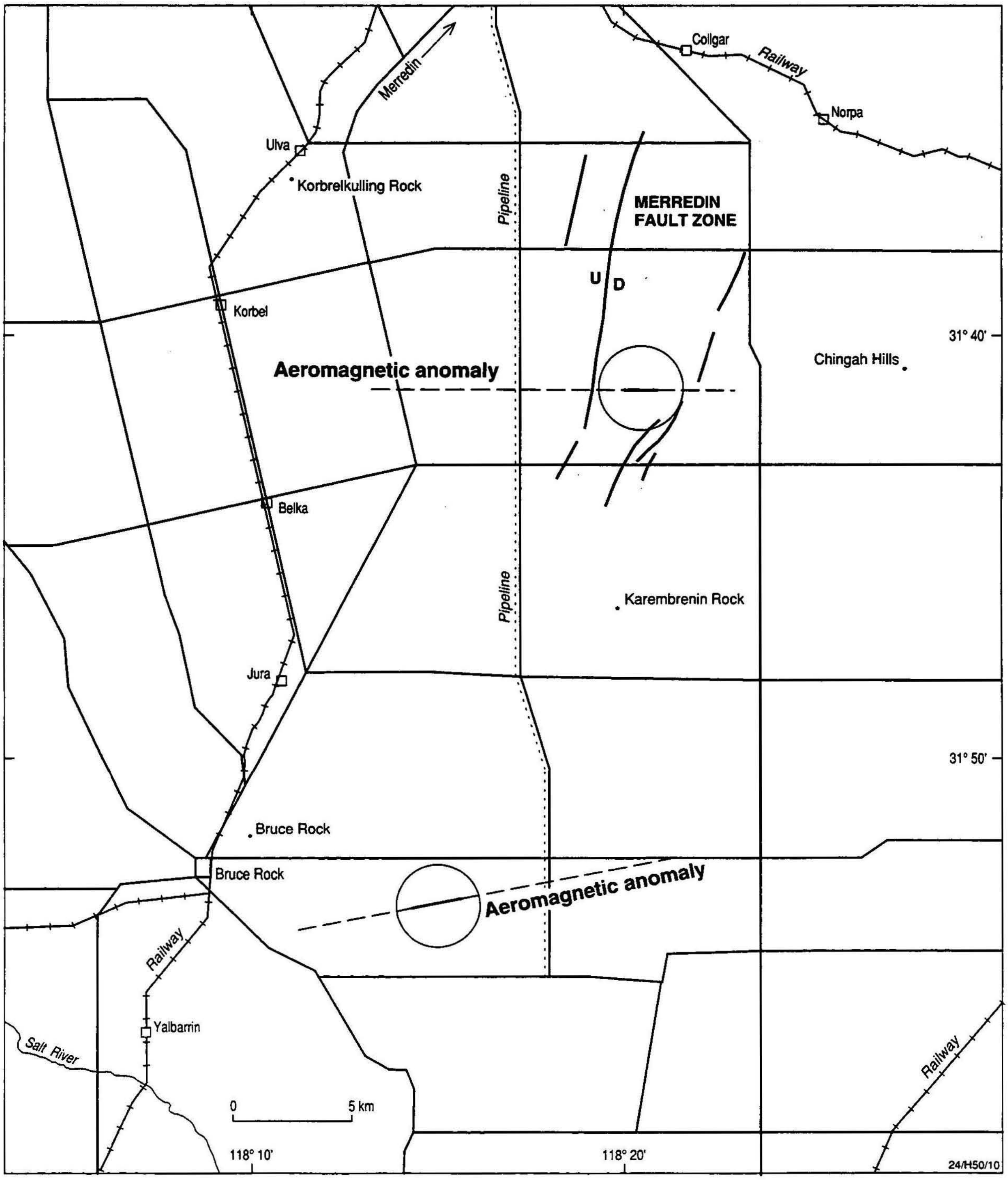

Fig. 6. Locality map - Dyke traverse near Burbridge.
Peak anomaly shown as heavy line within circle.

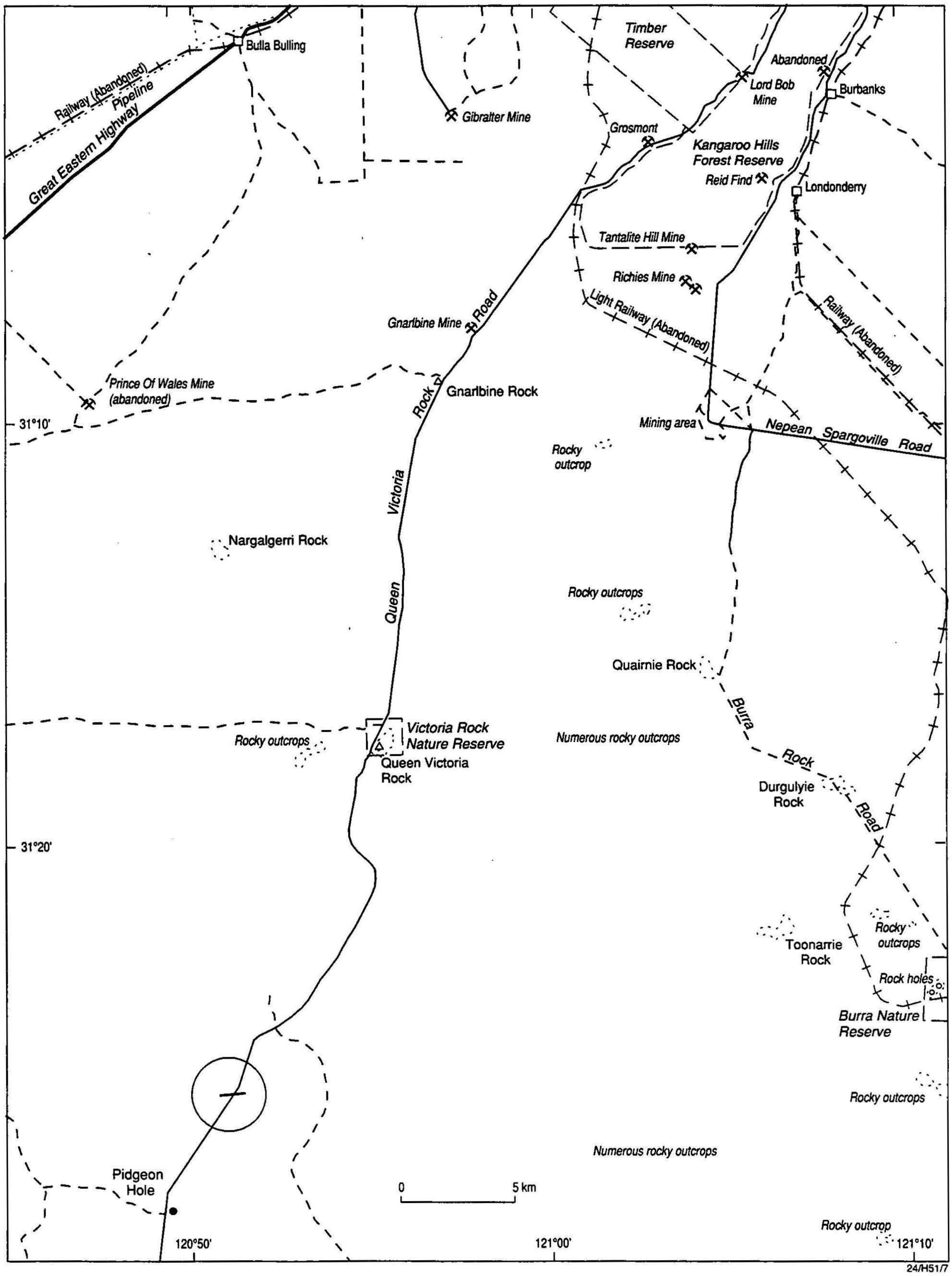

Fig. 7. Locality map - Dyke traverse near Pidgeon Hole
Peak anomaly shown as heavy line within circle.

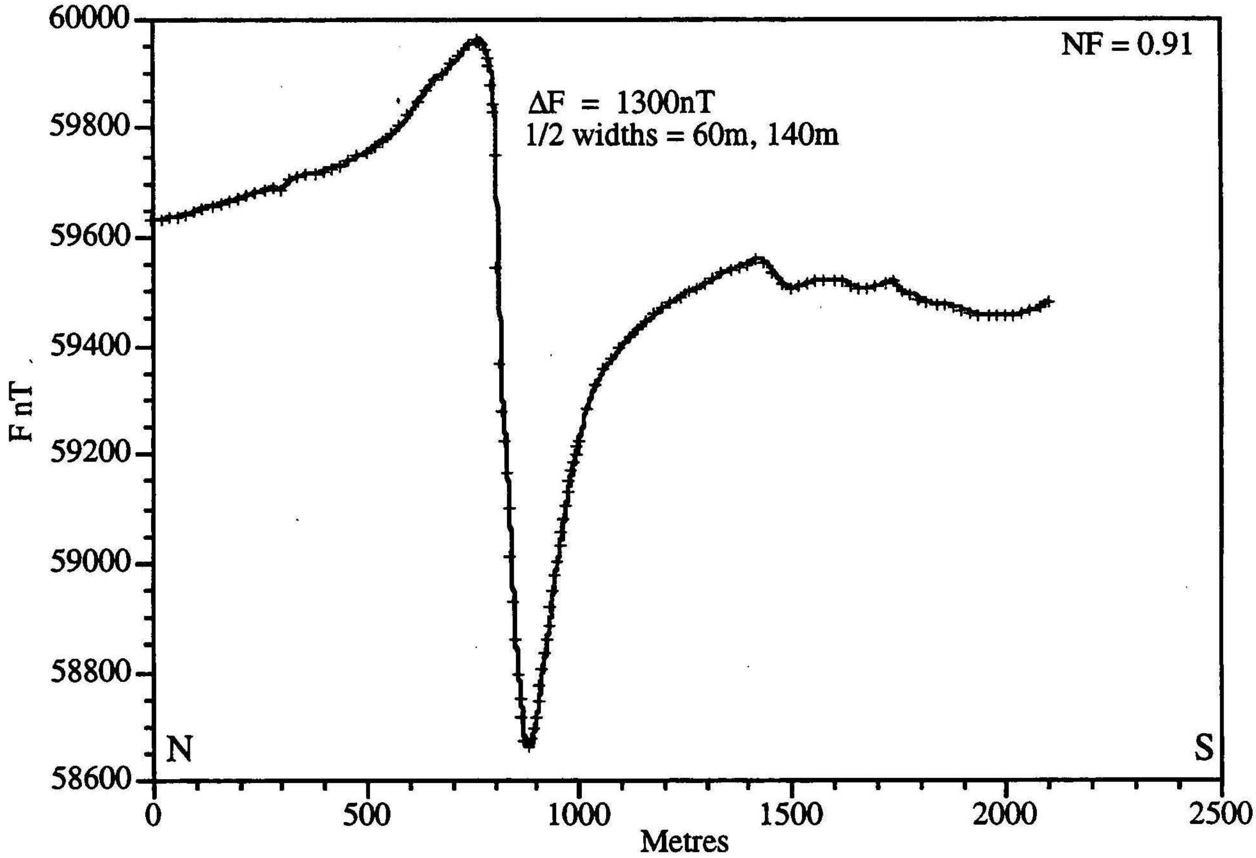

Fig. 8 Lort River A - magnetic anomaly. NF is normality factor. Multiply distance scale by NF to obtain profile normal to dyke anomaly.

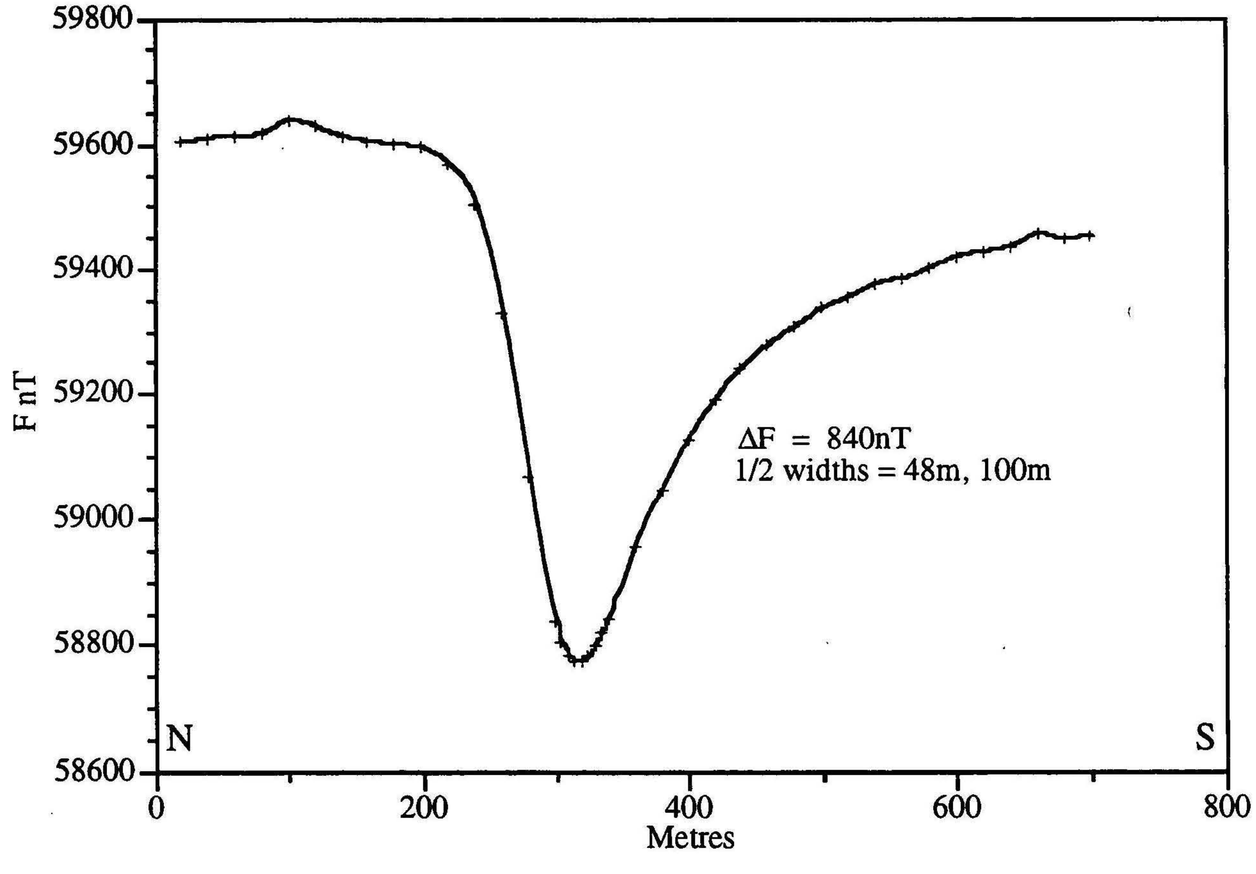

Fig. 9 Lort River B - magnetic anomaly.

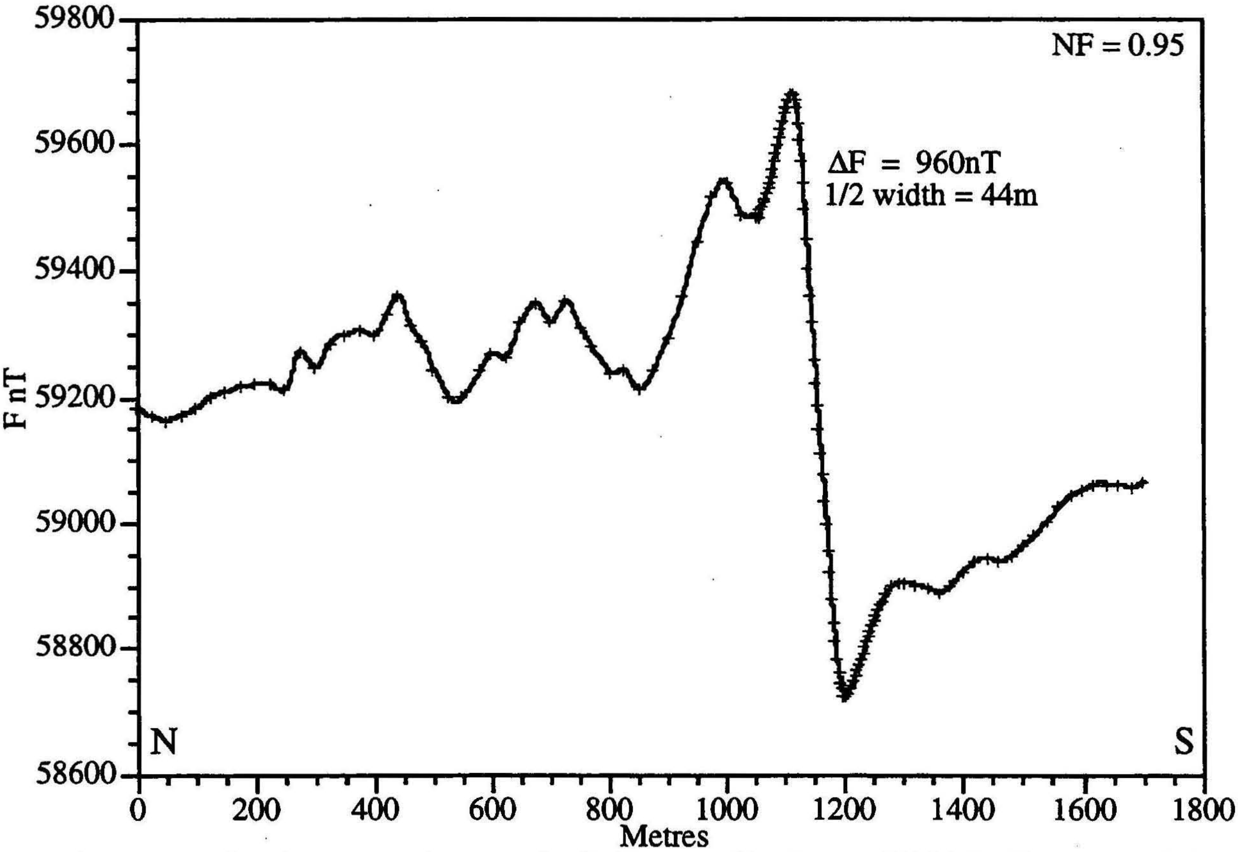

Fig. 10. Hyden South - magnetic anomaly. NF is normality factor. Multiply distance scale by NF to obtain profile normal to dyke anomaly.

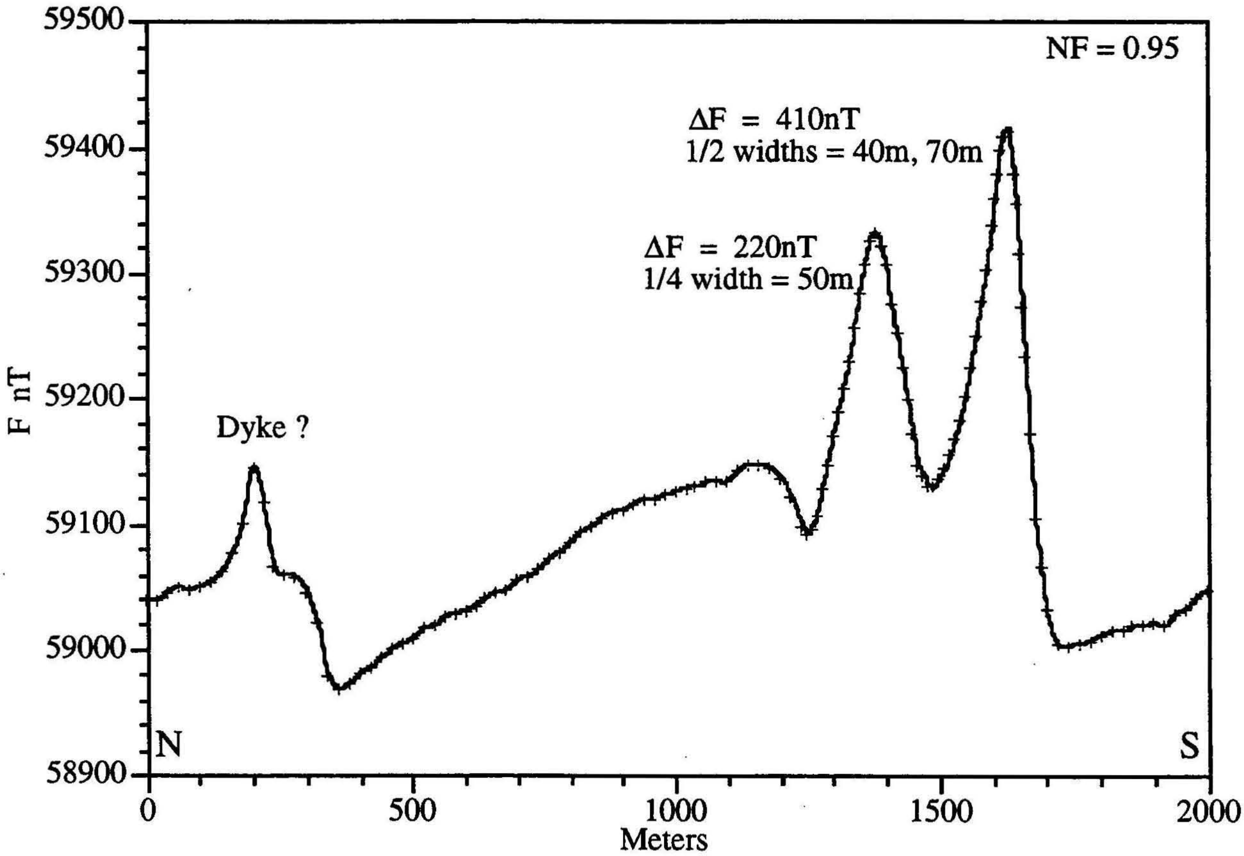

Fig. 11 Hyden A - magnetic anomaly. NF is normality factor. Multiply distance scale by NF to obtain profile normal to dyke anomaly.

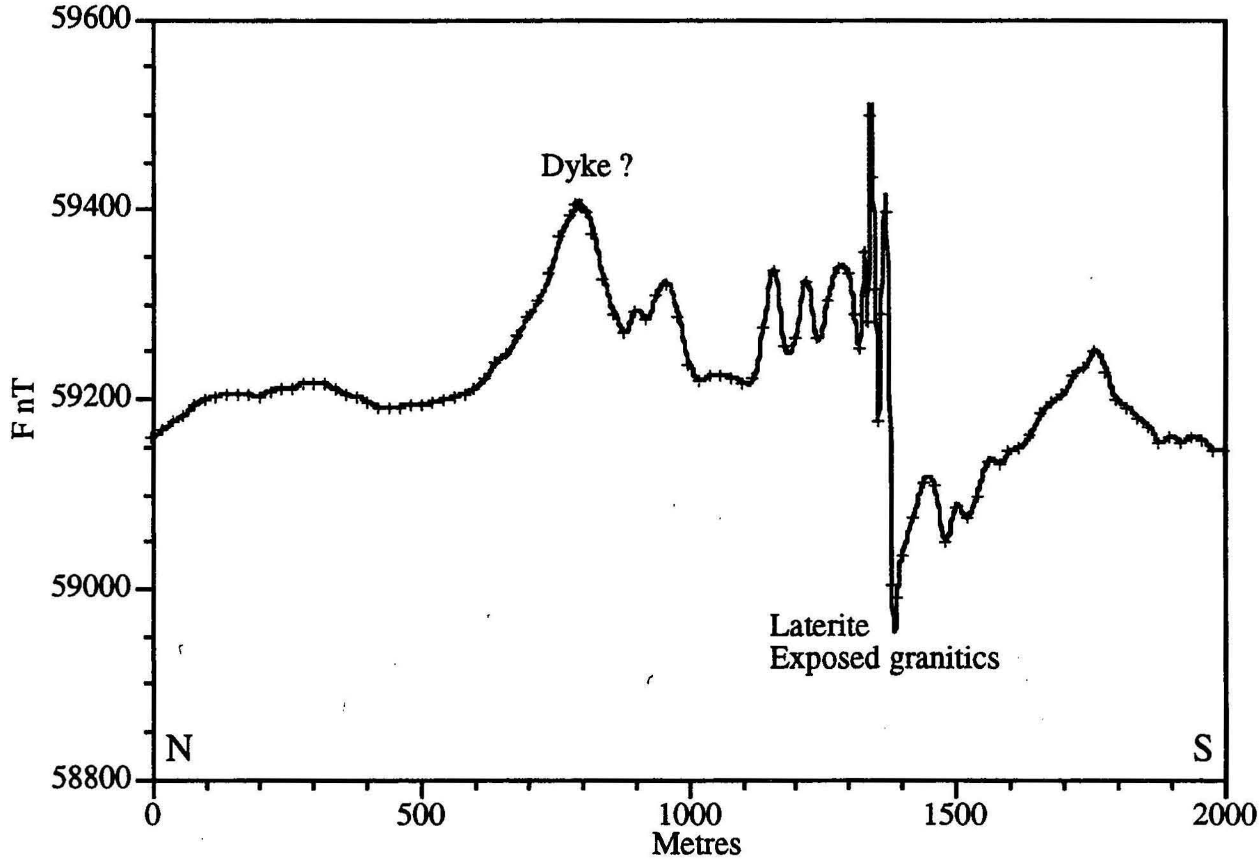

Fig. 12. Hyden B - magnetic anomaly

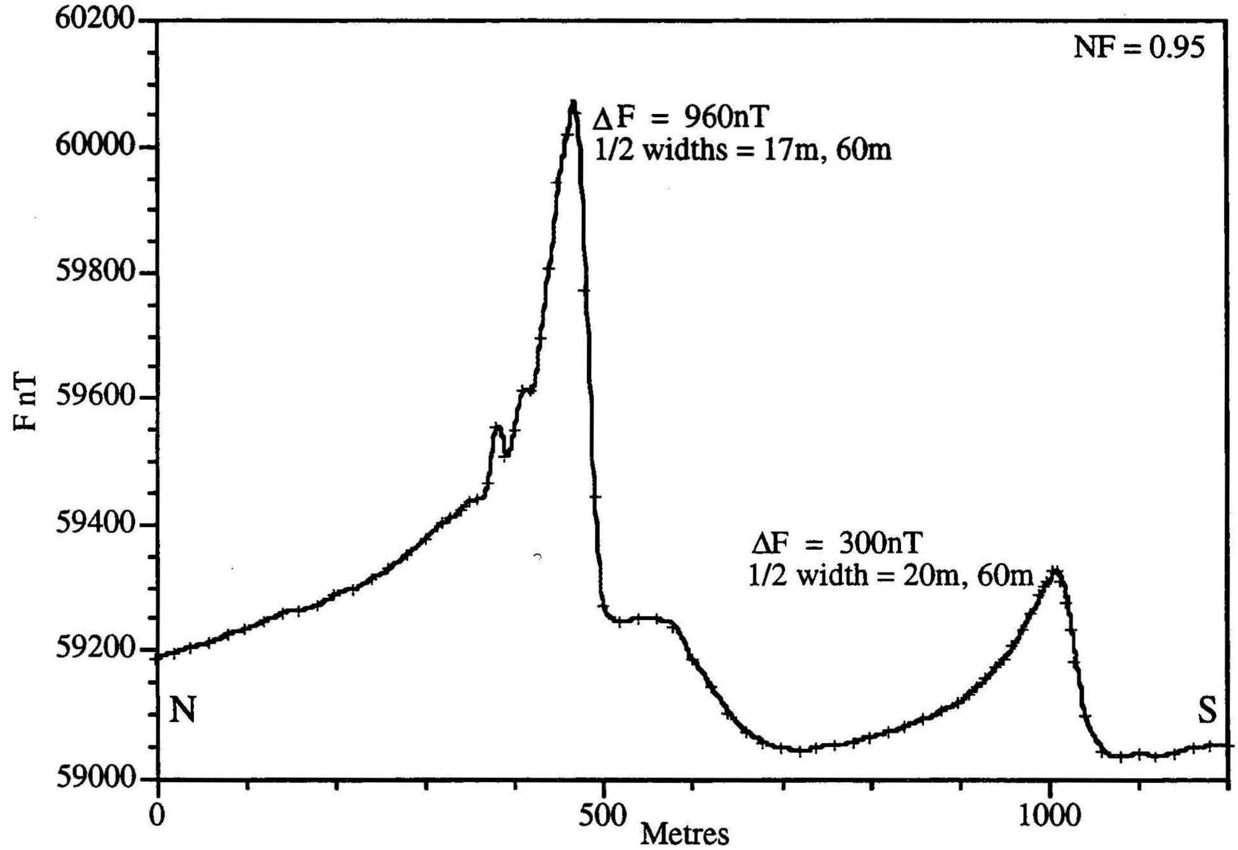

Fig. 13. Hyden C - magnetic anomaly.NF is normality factor. Multiply distance scale by NF to obtain profile normal to dyke anomaly.

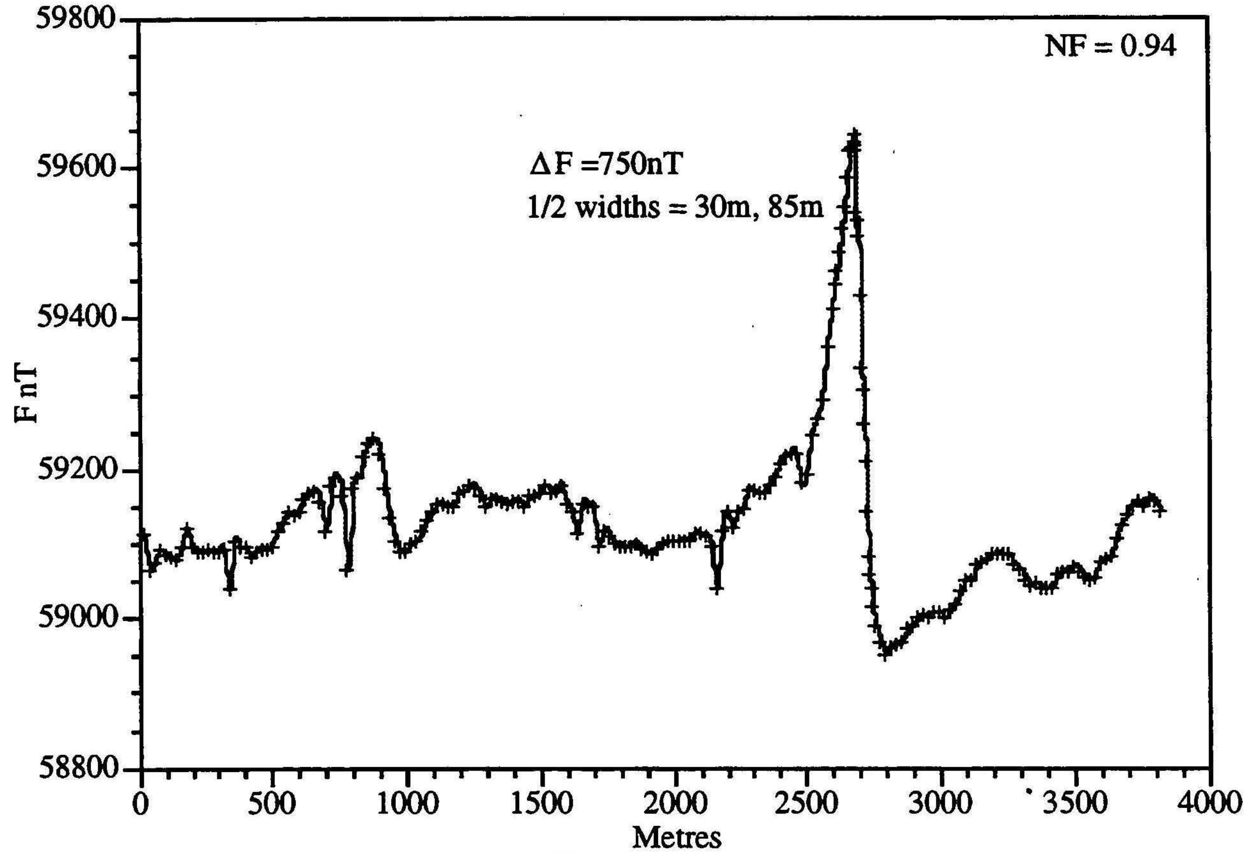

Fig. 14. Hyden D - magnetic anomaly.NF is normality factor. Multiply distance scale by NF to obtain profile normal to dyke anomaly.

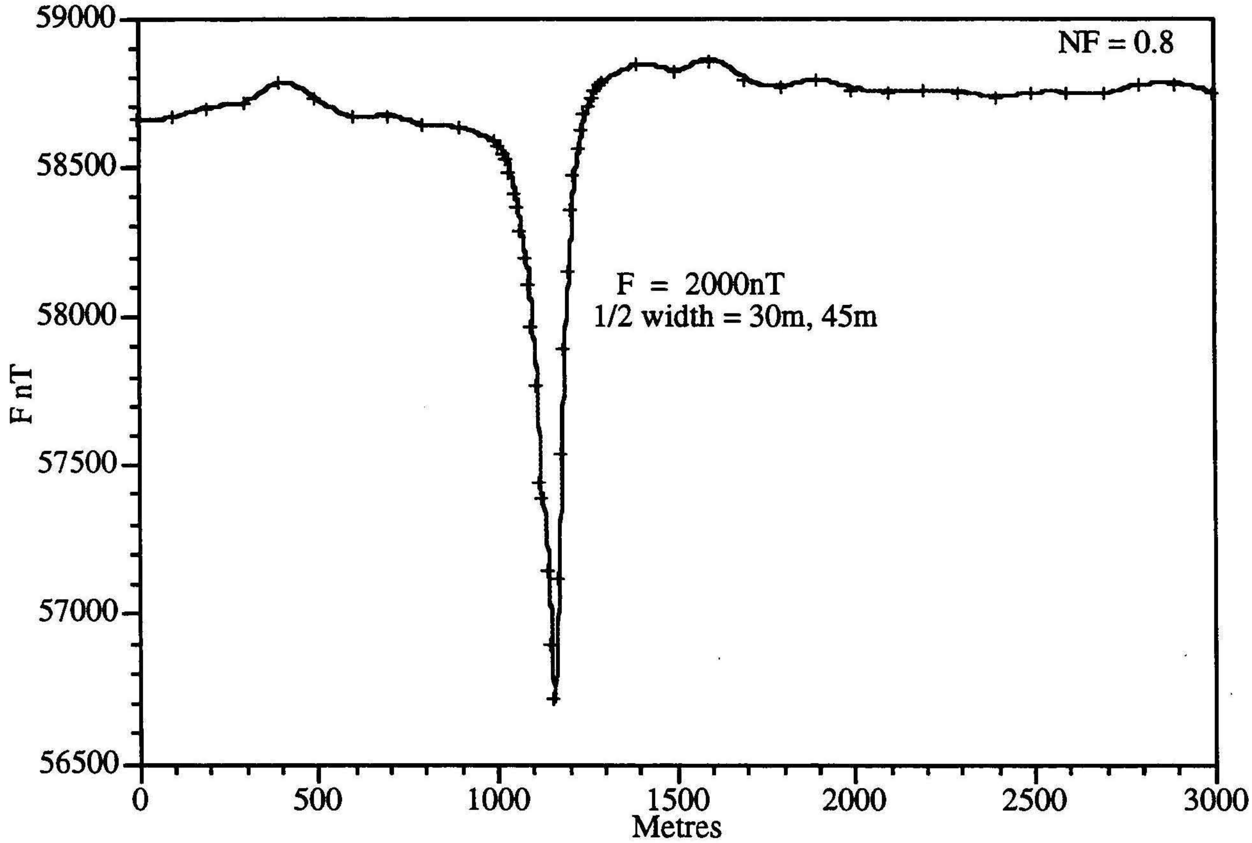

Fig. 15. Pidgeon Hole area E-W dyke anomaly
NF to obtain profile normal to dyke anomaly.

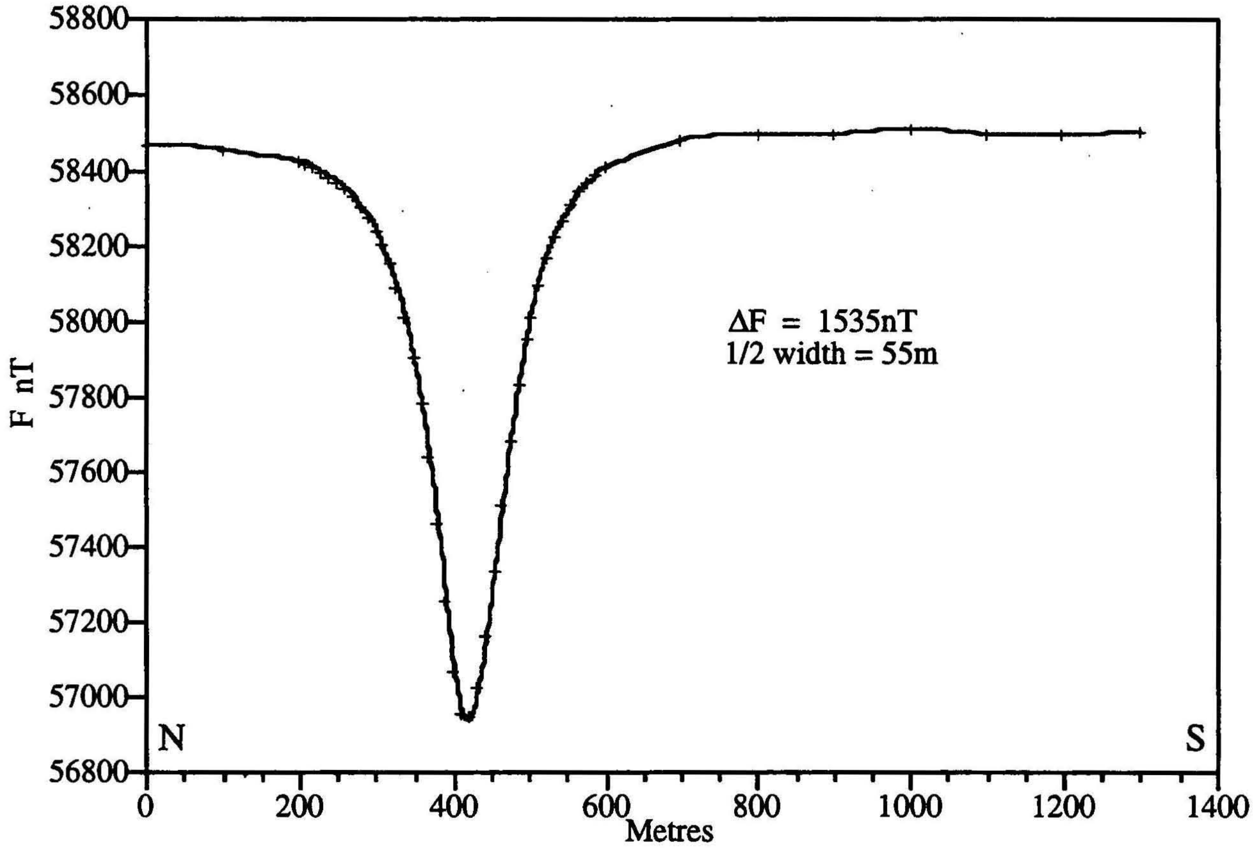

Fig. 16. Burbridge area -E-W dyke anomaly.

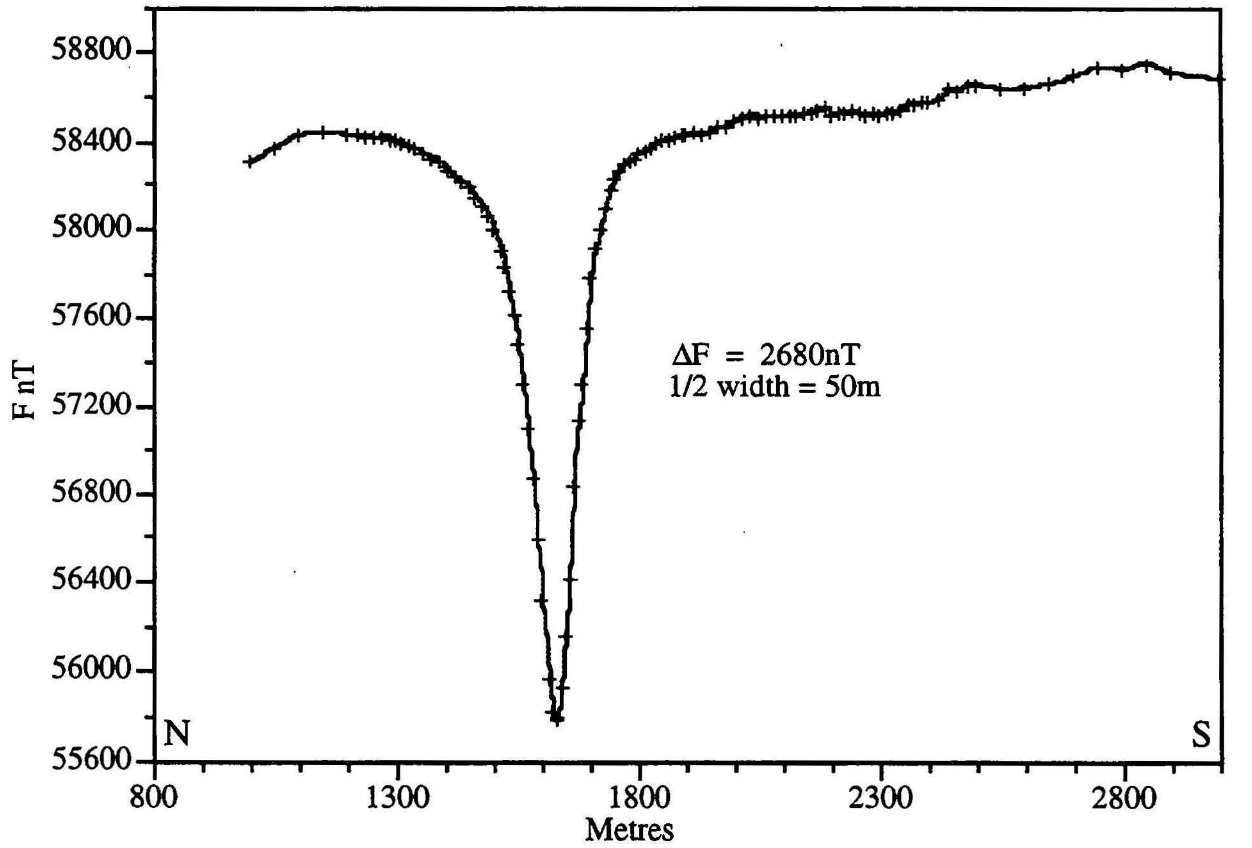

Fig. 17 Merredin - total force magnetic anomaly.

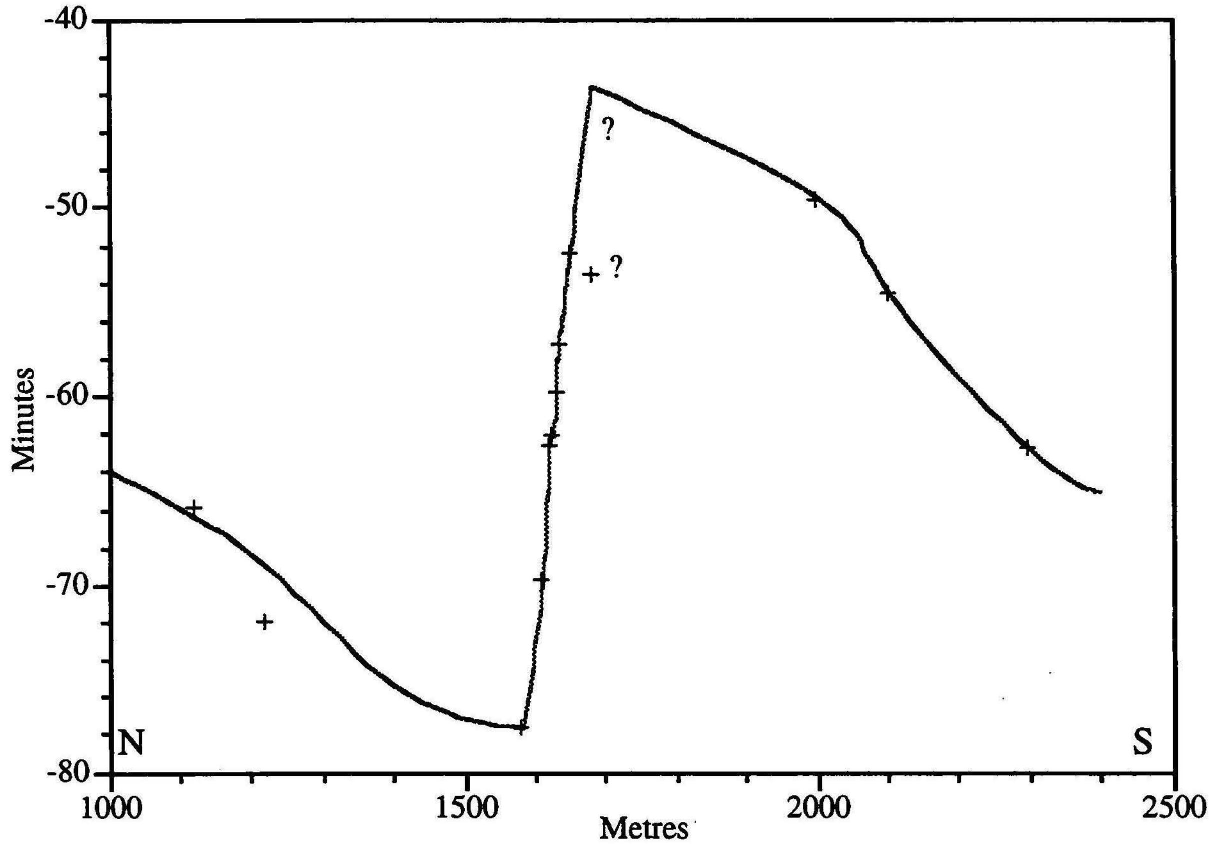

Fig. 18 Merredin - declination anomaly.

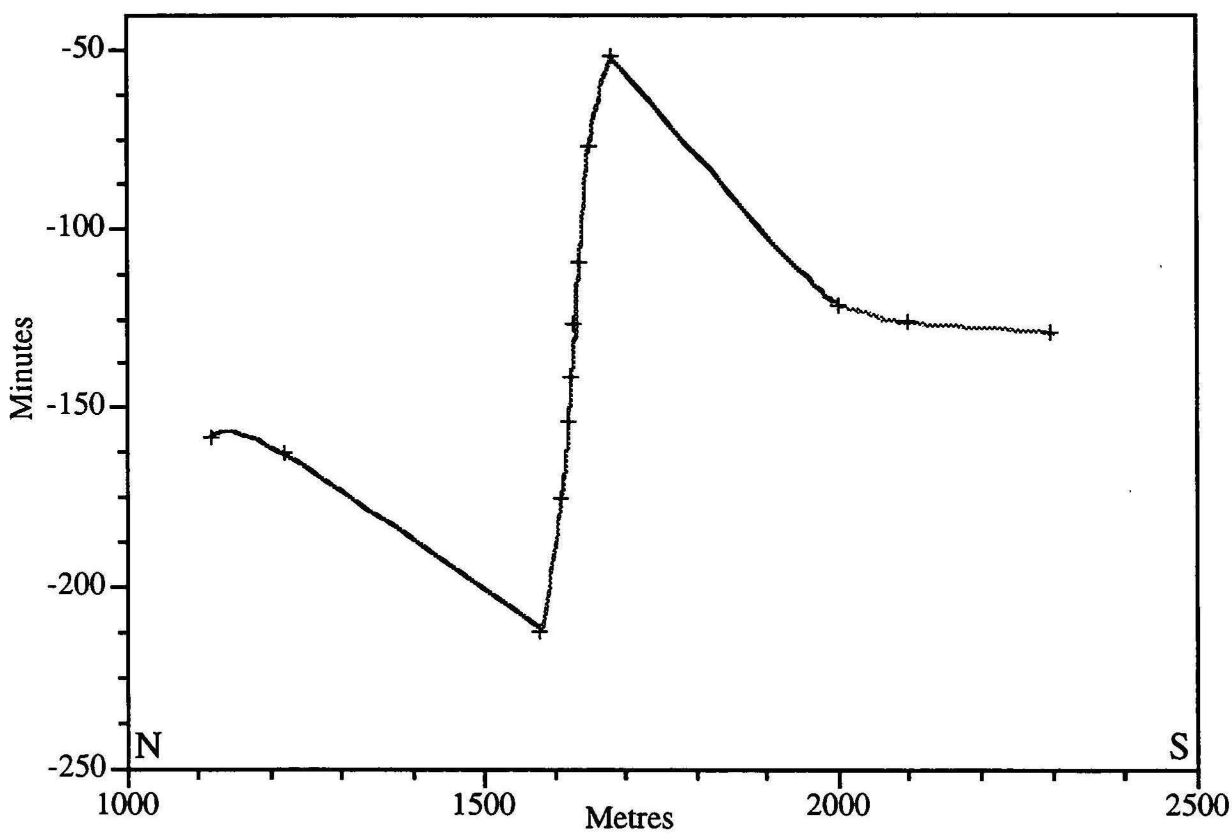

Fig. 19 Merredin - inclination anomaly.

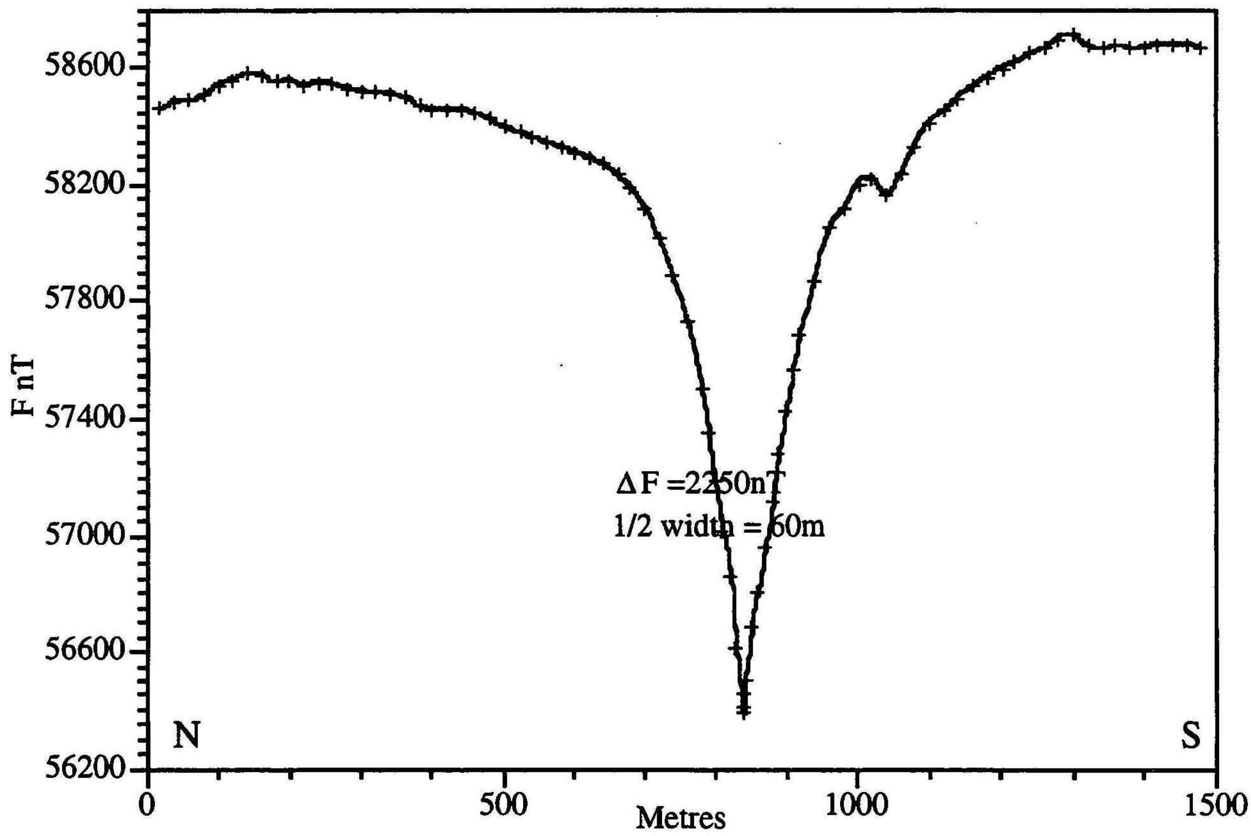

Fig. 20 Bruce Rock area E-W dyke anomaly

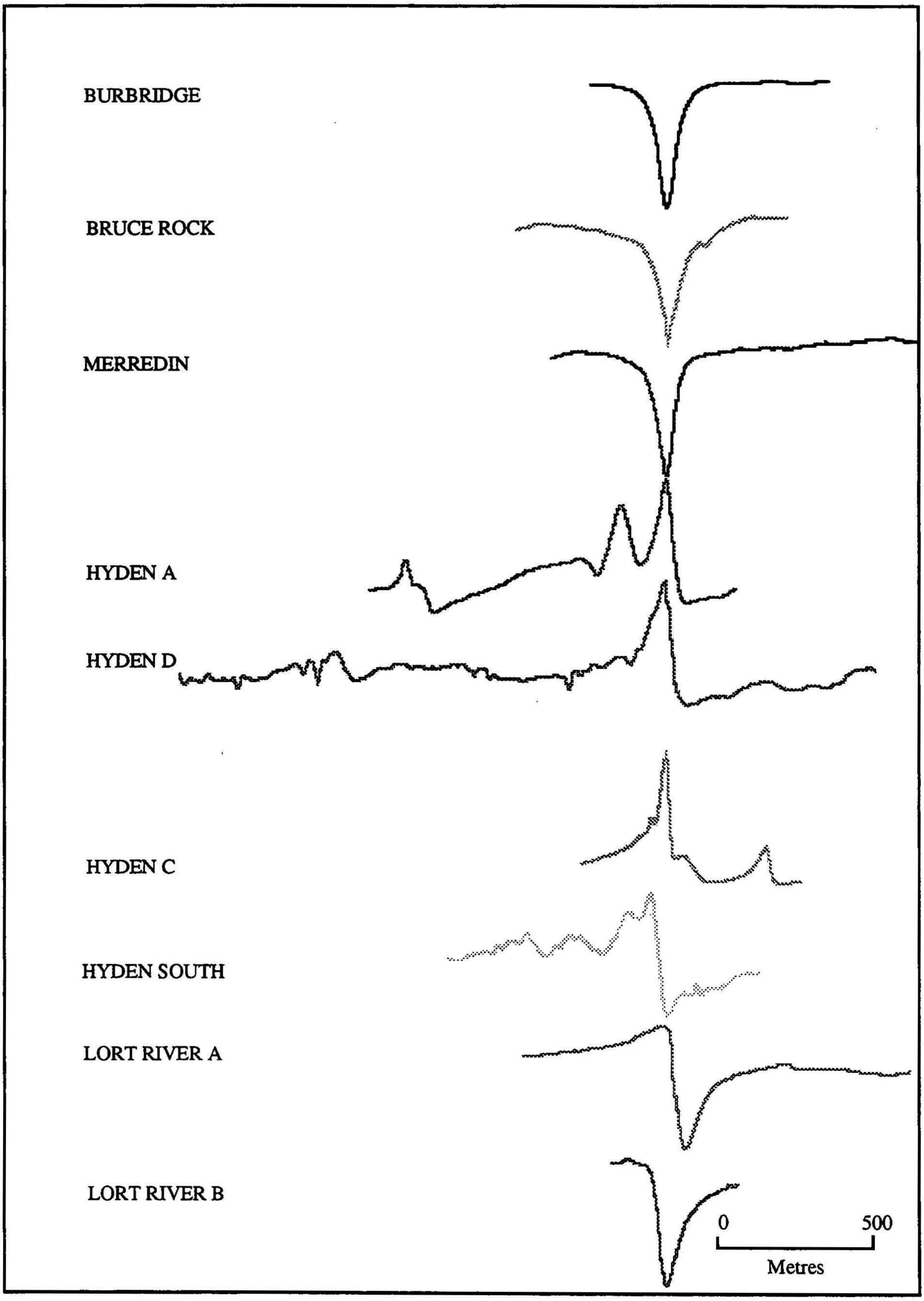

Fig. 21 Composite fault scarp - magnetic anomalies.

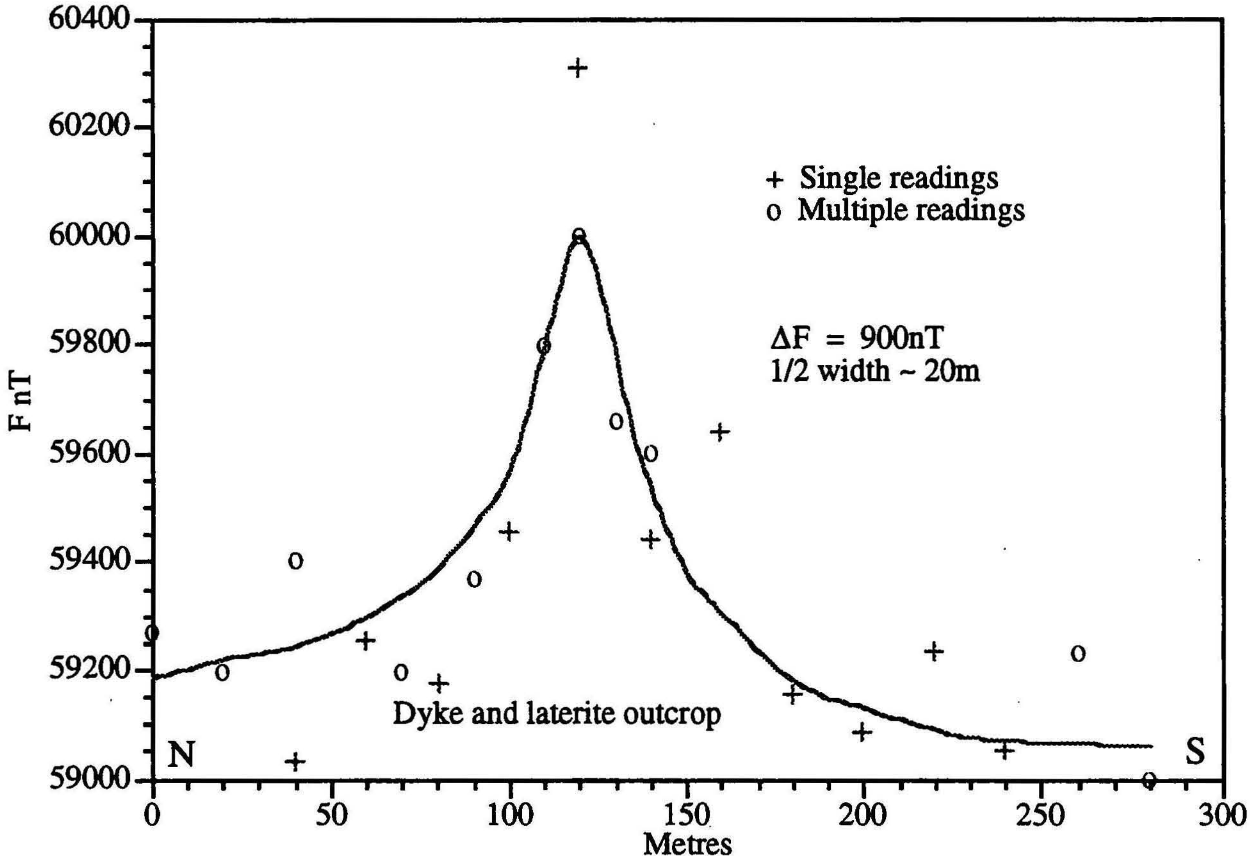

Fig. 22 Binneringie dyke anomaly near Hyden.

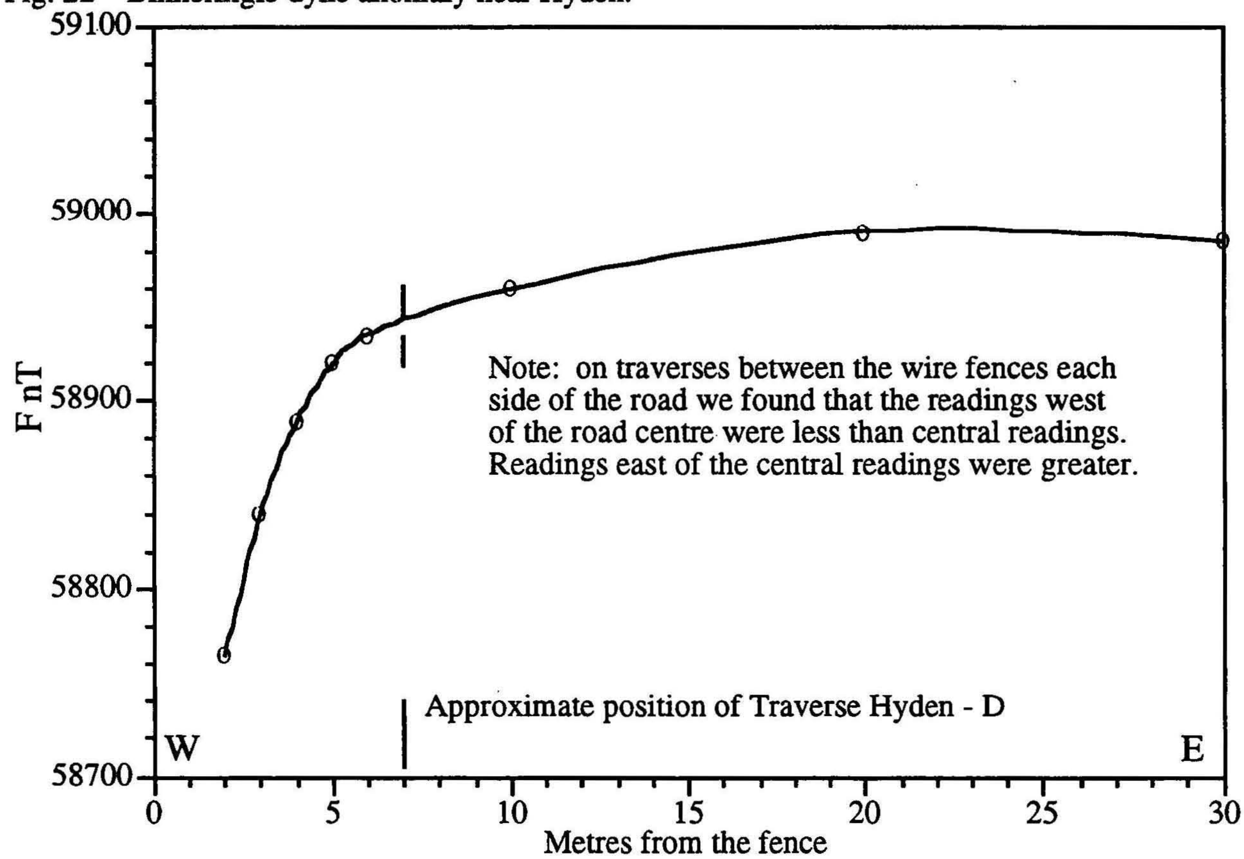

Fig. 23 Vermin proof fence anomaly.

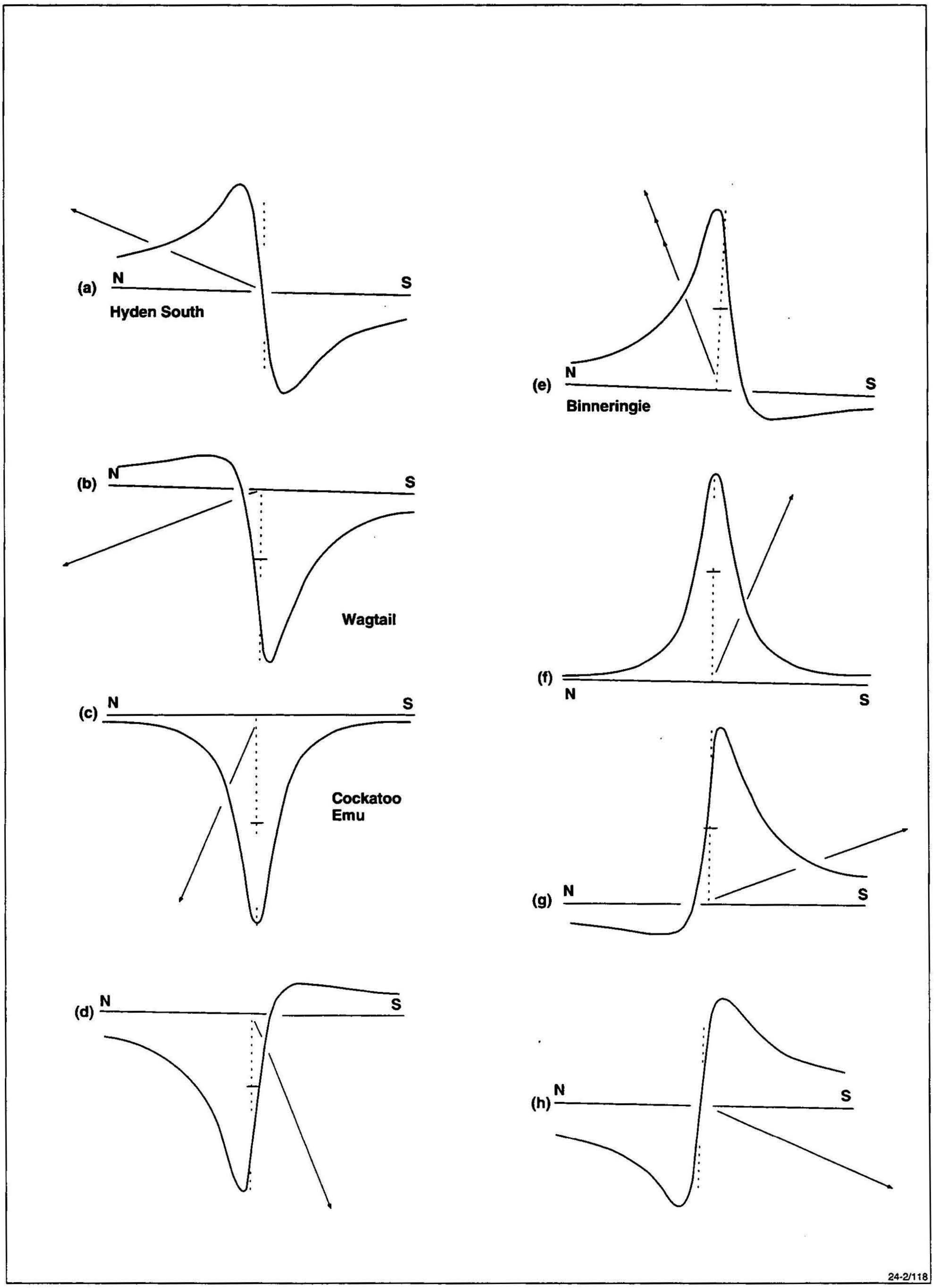

Fig 24. Total force anomaly shape versus anomalous field vector normal to a vertical east-west dyke (regional I = -67.5^{o}, D = 000^{o})