DEPARTMENT OF MINES
SOUTH AUSTRALIA

Progress Report No. 1

on

INVESTIGATION OF DAWESLEY AEROMAGNETIC ANOMALY

by

R. C. Mirams
Asst. Senior Geologist

GEOCHEMICAL SECTION

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10th April, 1962.

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& not bound with this report.

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ABSTRACT

This report summarizes the investigations as to the cause of an Aeromagnetic Anomaly near Dawesley. The ground investigations have indicated the probable presence of a sulphide mineralisation in a zone over 1 mile in length. Recommendations for diamond drilling are included. The testing of this anomaly will be the first to assess the value of induced polarization investigations in this state.

1. INTRODUCTION

The Dawesley Aeromagnetic Anomaly occurs near the eastern margin of the Echunga 1 mile Aeromagnetic Map. The anomaly was noted by Mr. Thomson who initiated the geological and geochemical investigations and requested certain geophysical traverses be carried out in conjunction with this work. The project has been carried on by the writer, in conjunction with the detailed investigation of mineralization in the Kanmantoo and Callington areas, and Mr. John Webb, Senior Geophysicist.

This report assembles the data recorded to date and reiterates the recommendations in minute RCM 19/2/62.

2. PREVIOUS WORK AND ACKNOWLEDGEMENTS

Departmental References

Minute	13/12/61	B.P. Thomson
"	18/1/62	R.C. Mirams
"	19/2/62	R.C. Mirams

The Dawesley Aeromagnetic Anomaly occurs within the area mapped by S.B. Dickinson for Bulletin 20 and falls on the edge of an andalusite schist zone shown on his map.

As the anomaly lies outside what was considered to be the mineralized zone no detailed work has been done in the area.

The writer is indebted to Mines Exploration Pty. Ltd. and Mr. E. Burnside of McPhar Geophysics Ltd. of Toronto, Canada, for the induced polarization traverses and their interpretation.

The three property owners most affected by the investigations, Messrs. J.L. Frame, H. Proctor, (Kallana Graziers Ltd.) and R.M. Chapman have been most helpful. Messrs. Proctor and Chapman both offered assistance and Mr. Proctor has made a water bore available.

3. LOCATION - TITLE AND MINERAL RIGHTS

The aeromagnetic anomaly is centred about 2 miles east of Dawesley, on the Princes Highway some 30 miles from Adelaide, on Sections 5353 and 5754 Hd. of Kanmantoo.

The land is all private freehold with minerals alienated from the crown. Plan 62-82 bound with this report shows the present owners of both the surface and mineral rights. The area coloured red on this plan is the probable limit of the anomalous material.

4. GEOLOGY

4.1 Regional Geology

The sediments outcropping in the vicinity of the anomalous zone are interbedded micaceous sandstones and pyritic schists of the Brukunga Formation (Thomson 1962). The pyritic schists are similar to the Nairne Pyrite member with a somewhat lower pyrite content. Near the centre of the anomalous zone the beds are intersected by a breccia zone up to 100 feet in width.

The breccia can be traced intermittently for several miles. It is by no means certain that there is one continuous structure, it is more likely that a major line of weakness in the basement is reflected by a zone of shears and breccias in the overlying Cambrian sediments. These shears are related to the N-S lode shears in the copper mines 2 miles to the southeast.

The regional setting of this anomaly is being studied in conjunction with the investigation of the regional geology of the Callington and Kanmantoo mines. Briefly the anomaly lies within a sequence of micaceous siltstones and greywackes with interbedded pyritic beds. These beds occur about the middle of the Brukunga Formation. The sediments are well cleaved and fall within the greenschist facies in metamorphic grade. Prominent andalusite schists occur stratigraphically above and below these beds. The lower andalusite schists, lying to the west and northwest of the anomaly, are those shown on the map published by Kleeman and Skinner (1959 P. 63). These authors suggest the andalusite indicates an original compositional variation in the rock rather than a variation in metamorphic grade. In the Dawesley Area this would appear to be an acceptable hypothesis, but this feature will be considered in more detail at the close of the investigation of the mines.

4.2. Detailed Mapping

Following a surface geological reconnaissance of the aeromagnetic anomalous zone in which a breccia was located, the zone was gridded normal to the breccia with lines spaced 1000' apart. This grid was used as a base for plane table mapping at a scale of 100' to 1" from 3000'N to 4000'S and some 500 feet either side of the breccia (L62-10, L62-101). Contours have been drawn at 10' intervals to facilitate the preparation of accurate topographic sections for design of drill-holes. This mapping was carried out by vacation students under the writer's supervision.

4.3. Geochemical Sampling

In conjunction with the geological reconnaissance T. Amtmanis took samples from three locations for spectrographic analysis to test for metals other than iron in the gossans. Samples were taken from the ferruginous cappings on two pyrite beds and from the breccia. Both samples from the breccia indicated 800 p.p.m. copper, no high values were recorded in the other samples.

Later, following the location of an electro-magnetic anomaly (see later) associated with the breccia, a grid sampling programme was laid out over the breccia and adjacent sediments.

The sampling was carried out by J.E. Johnston assisted by B.E. Chapple (Vacation Student). The early samples were taken with a hand auger and consequently a considerable number are soil samples. Later the proline drill was used and bedrock samples were taken. It was not considered necessary to use systematic geochemical sampling to locate the drilling target but rather to detect the metals present and their probable distribution along the breccia.

The results have been plotted in Plan (62-135, bound with this report). From these results it can be seen that copper is probably associated with the concealed conductor. The isolated high lead value has not been considered significant. The high values are restricted to the gossan on the breccia and where this is absent the values in the leached outcrop are very low. On line 1000'S the low values over the geophysical anomalous zone are thought to be due to the samplers being unable to penetrate the transported alluvium in the creek bed.

5. GEOPHYSICAL INVESTIGATIONS

5.1. Magnetic Observations

The Echunga 1 mile Aeromagnetic Map shows an area of higher readings about 2 miles east of Dawesley, in the northeast corner of the map. This area has been checked on the ground by the Geophysical Section. The anomaly has been shown to be the resultant of a number of smaller anomalies associated with pyrite (and probably pyrrhotite) beds. Small veins carrying magnetite have been found but are not thought to be significant. The breccia zone gave magnetite readings close to the regional values except to the south where symmetric low and high values are recorded about the estimated position of the shear. This is best shown on line 1000'S.

5.2. Electro-magnetic Traverses

Following the geological reconnaissance electrogmagnetic traverses were recommended to supplement the magnetic work. The results indicated a very strong anomaly associated with the breccia zone between 4000'N and 2000'S. There is a marked drop in the values outside these limits. The method did not pick out the pyrite beds with any certainty. This is thought

to be due to the depth of weathering and the disseminated nature of the sulphide.

To confirm this hypothesis a traverse was run over the Nairne Pyrite Member north of Brukunga (DD 11 section line) and only a low anomaly was recorded.

Mr. Burnside of McPhar Geophysics ran a few trial observations with the "Afmag", a device similar in effect to the electromagnetic equipment. The traverse confirmed the presence of a conductor below and slightly to the east of the gossan on line 2000N.

5.3. Induced Polarization Traverses

Three traverses over astrong electromagnetic anomalies have been run on lines 1000'S, 500'N and 3000'N. These traverses all confirmed the relatively shallow anomalies detected by the electromagnetic method, and they also recorded strong conductivities in the pyrite beds at depth.

To assist in the interpretation of the profiles a traverse was run at Brukunga (DD 11). This traverse showed the disseminated pyrite to have a strong conductivity.

6. APPRAISAL OF RESULTS TO DATE

The Dawesley Aeromagnetic Anomaly is the resultant of a number of smaller anomalies associated with pyritic beds and to an unknown extent with thin quartz magnetite veins.

Associated with this anomaly there is a body with higher electrical conductivity than the surrounding rock. This body has shown different physical properties to the sedimentary pyrite in beds. Several other conductors which would produce anomalous readings with some of the geophysical methods used have been excluded by combination of the results of various methods. The following table is included to illustrate the expected behaviour of various conducting bodies.

TABLE 1

EXPECTED GEOPHYSICAL RECORDING

Conductor	Magnetometer	Electro Magnetic	Induced Polarization.
Pyrite Beds	Slight to moderate	Low	(high (Low in weathered zone.)
Electrolyte (saline water)	Nil	High	Nil
Magnetite	V. high	Complex	High
Graphite ,	Nil	V. high	V. high
Sulphide body (including massive pyrite)	Nil to weak	High	High
Dawesley concealed body	Nil (complex to (south)	V. high	High

From this table it can be seen that the body is most likely to be either graphite or a sulphide body (not excluding pyrite). No significant concentrations of graphite are known in the vicinity. The geochemical sampling suggests that some of the minerals contain copper. The strike length of 6000 feet and widths in excess of 100 feet indicate a body of considerable size.

7. RECOMMENDATIONS

The investigations have reached a stage where subsurface information is required to ascertain the nature and value of the body causing the anomalies. The geological structure is such that angle diamond drilling from the east will be most effective. The strike length of 6000 feet and unknown extent in depth will require extensive drilling for a reasonable evaluation. The mineralization in the adjacent Kanmantoo Mines is unevenly distributed so that a negative result in one or two holes would not be sufficient to show the prospect valueless.

Initially 6 holes have been recommended, 4 to test along the electromagnetic anomaly at relatively shallow depth and 2 to test the electromagnetic and induced polarization anomalies on line 1000S. The first hole

has been pegged on line 1000'S at 100'E depressed 50° W, the hole has been designed to intersect the EM & IP anomaly below 00-200W and the deeper IP anomaly below 600W. A second hole has been pegged on line 1000'N to intersect the breccia zone. On this line there is a strong electro-magnetic anomaly and the geochemical results show copper and bismuth values.

Further holes will be pegged when the information gained from these holes has been studied.

8. CONCLUSIONS

In the Dawesley area adjacent to a known copper field there is an large conductive zone. The geophysical and geological investigations have indicated the prospect worthy of further testing. ~~It will be very discouraging if legal technicalities prevent this investigation reaching a final conclusion.~~

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GEOCHEMICAL SECTION

RCM:AGK
10/4/62

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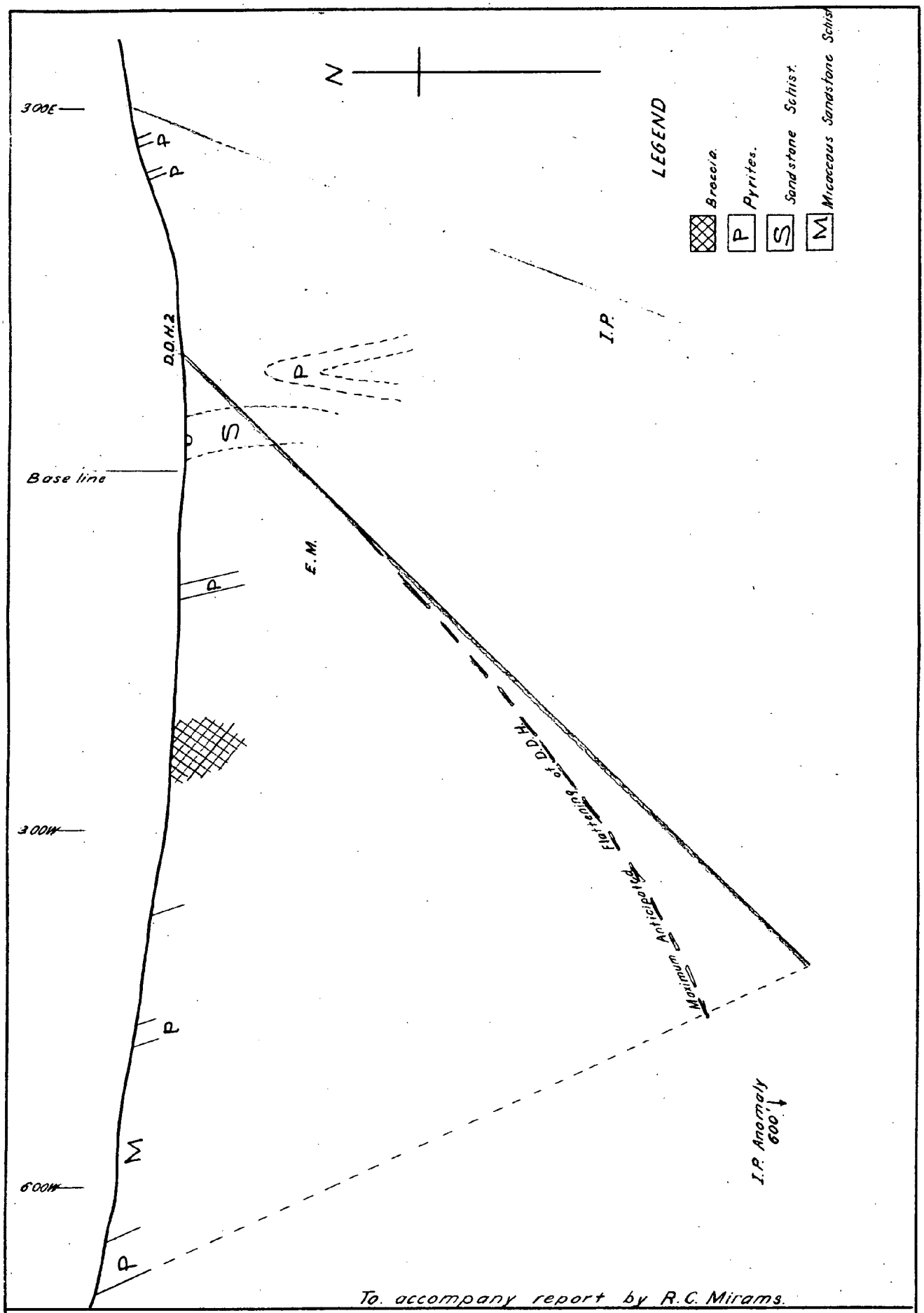
DICKINSON, S.B.	1943.	The Structural Control of Ore Deposition in some South Australian Copper Fields. Geol. Surv. S. Aust. Bull. No. 20
KLEEMAN, A.W. & SKINNER, B.J.	1959.	The Kanmantoo Group in the Strathalbyn - Harrogate Region, South Australia. Trans. Roy. Soc. S. Aust. 82, pp. 61-71.

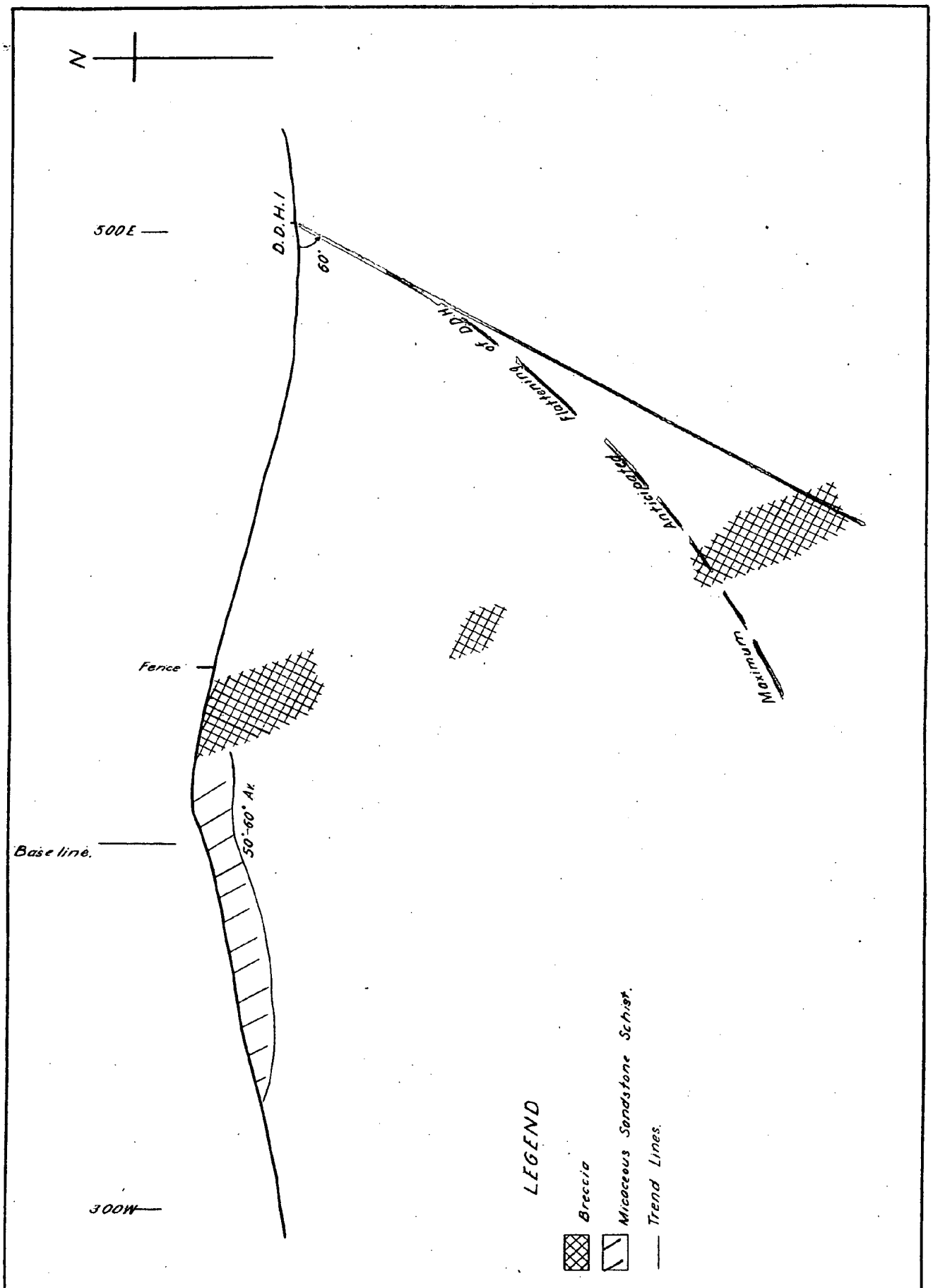


To. accompany report by R.C. Mirams.

S.A. DEPARTMENT OF MINES

Approved	Passed	Drn. R.C.M.	DAWESLEY AEROMAGNETIC ANOMALY	D.M.	Scale 100ft to 1in.
		Tcd. C.W.F.	Cross-section 1000S	Req.	S3048. H66
		Ckd.	Proposed Diamond Drilling		
Director		Exd.	Hd. Kanmantoo		Date 28-2-62

200—9·61 3805

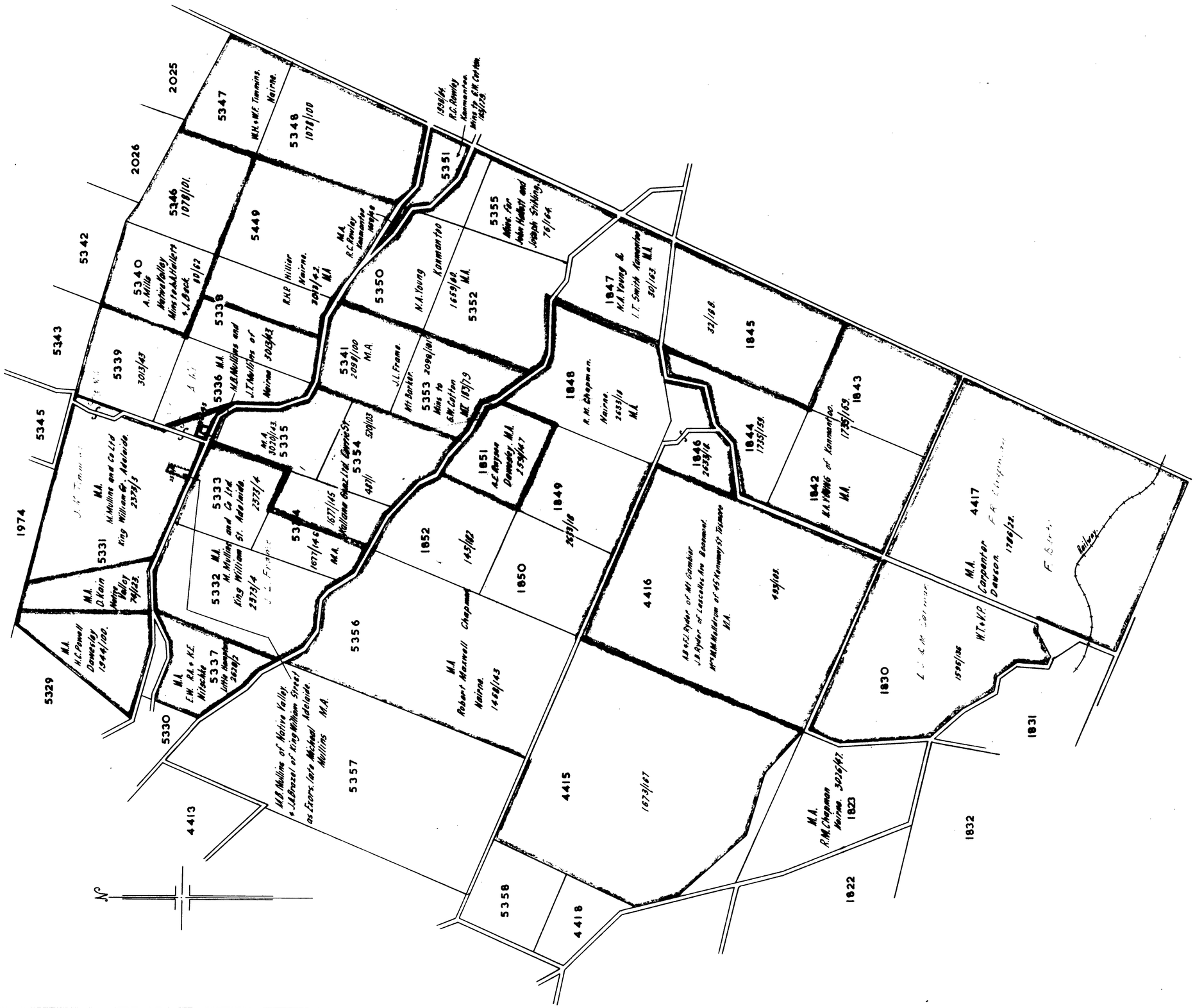


To accompany report by R.C. Mirams.

S.A. DEPARTMENT OF MINES

Approved	Passed	Drn. R.C.M	DAWESLEY AEROMAGNETIC ANOMALY	D.M.	Scale 100ft to 1in.
		Tcd. C.F	Cross-section 1000N	Req.	S3047 Hb 6
		Ckd.	Proposed Diamond Drilling		
Director		Exd.	Hd. Kanmantoo.		Date 28-2-62

200—2·61 3205



S.A. DEPT. OF MINES

200—10.57 6967

LAND SHOWING SURFACE OWNERSHIP AND MINERAL RIGHTS AT DAWESLEY AREA.

HD. KANMANTOO.

Req. No.
D.M.
Compiled from

Approved | Passed

Director of Mines

Drn. G.K.W.
Tcd. G.K.W.
Ckd. A.A.
Exd.

Scale 20 CHNS. TO 1 INCH.

62-82.
Hb 6

Date 9-2-62.

Associated Drawing No.

No.	Amendmen	Exd.	Date

A/62	Cu	Pb	Zn	Ag.	Bi
948-9	20	11	100	<0.1	<1
50-1	12	17	150	<0.1	<1
52-3	20	12	120	<0.1	<1
54-5	14	16	100	<0.1	<1
56-7	15	17	60	<0.1	<1
58-9	11	13	60	<0.1	<1
60-1	220	35	200	0.2	
62	30	12	80	<0.1	
63	25	12	60	<0.1	

1750N 500E

A/62	Cu	Pb	Zn	Ag.	Bi
832	20	10	60	<0.1	<1
831	25	8	100	<0.1	<1
830	30	8	40	<0.1	<1
829	50	8	50	<0.1	<1
828	25	8	30	<0.1	<1
827	60	8	30	<0.1	<1
826	50	8	50	<0.1	3
825	15	6	30	<0.1	<1
824	15	8	30	<0.1	<1
823	16	8	30	<0.1	<1
822	20	6	25	<0.1	1
821	25	8	30	<0.1	4
820	30	6	30	0.2	12
819	25	4	<20	<0.1	2
817-8	32	11	35	<0.1	10
815-6	37	10	35	0.1	2
813-4	25	10	20	<0.1	2
811-2	40	12	80	0.1	11
809-10	30	15	35	<0.1	3
807-8	35	15	35	<0.1	5
805-6	75	12	25	0.1	10
803-4	25	9	25	0.1	8
801-2	45	20	30	0.1	
799-800	135	13	60	0.3	
796	500	65	80	<0.1	
794-5	500	30	80	0.2	
792-3	270	30	90	0.2	
790-1	55	40	35	0.3	
788-9	90	45	45	0.8	
786-7	350	40	40	0.1	
784-5	300	40	30	0.2	
782-3	110	15	60	0.3	
780-1	80	15	50	1.1	
778-9	220	40	40	3.0	
776-7	500	40	30	0.2	
774-5	60	30	30	0.3	
772-3	20	15	30	0.2	
770-1	27	20	35	1.2	
768-9	27	20	40	1.2	
766-7	35	17	20	0.2	
764-5	25	20	35	1.5	
762-3	20	20	55	1.5	
760-1	17	20	50	1.5	
758-9	20	20	50	0.9	
756-7	25	40	40	1.1	
754-5	20	17	50	1.0	
752-3	20	17	45	0.2	
753	15	20	60	0.6	
754	10	5	25	2.6	
755	30	10	25	5.0	
756	25	18	30	0.3	
757	15	8	25	1.2	
758	50	8	60	<0.1	
759	25	12	60	2.5	
760	120	12	80	8.0	
761	15	15	40	5.0	
762	10	12	60	10.0	
763	15	12	50	2.0	
764	12	8	40	10.0	
765	10	15	80	8.0	
766	10	20	80	1.0	
767	10	6	50	0.6	
768	10	8	60	1.2	
769	12	12	40	2.5	
770	10	12	300	2.5	
771	15	16	20	0.2	
772	15	25	200	0.6	

500 W

1500N 500E

A/62	Cu	Pb	Zn	Ag.	Bi
1008	20	7	30	<0.1	<1
1007	15	7	40	<0.1	<1
1006	25	5	40	<0.1	<1
1005	8	3	25	0.2	<1
1004	8	10	<20	0.2	<1
1003	6	<1	30	0.2	<1
1002	50	8	40	<0.1	<1
1001	30	10	40	0.1	<1
1000	100	10	50	<0.1	<1
999	80	12	40	1.5	2
997-8	50	15	30	2.0	10
995-6	200	12	90	0.8	3
993-4	105	16	70	0.8	8
991-2	55	8	45	0.2	2
989-90	37	23	<20	1.6	8
987-8	170	28	150	0.8	3
985-6	115	35	60	1.7	8
983-4	950	25	125	4.5	30
981-2	200	17	110	1.2	27
979-80	650	21	50	0.3	15
977-8	750	27	90	2.6	40
975-6	950	27	75	1.1	27
973-4	25	19	25	0.1	16
342	25	18	22	0.6	5
963	12	15	25	<0.1	4
964	20	75	120	2	2
965	40	12	40	0.7	2
966	60	8	50	<0.1	2
967	12	8	50	<0.1	2
968	30	60	200	8	<1
969	30	10	80	0.6	<1
970	40	12	30	5	<1
971	8	10	30	<0.1	<1
972	40	3	40	2	<1

500 W

1250N 500E

A/62	Cu	Pb	Zn	Ag.	Bi
1041	8	4	40	<0.1	<1
1040	10	2	40	<0.1	<1
1039	25	3	40	<0.1	<1
1038	30	4	40	<0.1	<1
1037	20	<1	40	0.2	<1
1036	25	<1	30	0.2	<1
1035	30	7	50	<0.1	<1
1034	25	7	30	<0.1	<1
1033	150	10	40	<0.1	10
1032	12	8	40	<0.1	<1
1031	20	8	30	<0.1	<1
1029-30	27	12	45	0.8	5
1027-8	22	3	<20	1.6	15
1025-6	38	12	45	3.0	14
1023-4	25	17	50	<0.1	17
1021-2	27	18	25	5.0	20
1019-20	300	17	35	0.1	18
1017-8	500	30	50	1.6	27
1015-6	300	35	30	0.6	29
1013-4	250	30	35	0.2	24
1011-2	37	18	70	0.2	7
1010	15	20	25	<0.1	15
1009	12	10	30	0.2	3
1042	20	4	30	0.3	<1
1043	8	4	25	<0.1	<1
1044	20	7	30	<0.1	<1
1045	25	10	80	1.0	<1
1046	25	15	80	1.0	<1
1047	8	8	40	<0.1	<1
1048	30	10	40	1.0	<1
1049	25	10	50	<0.1	<1
1050	50	8	100	1.5	<1
1051	100	25	120	3	<1

500 W

1000N 500E

A/62	Cu	Pb	Zn	Ag.	Bi
961	8	8	30	<0.1	<1
960	25	30	50	5.0	<1
959	30	15	30	1.0	<1
958	20	20	100	2.0	<1
957	60	20	40	0.1	10
956	40	12	150	0.6	2
955	70	25	80	3.0	2
954	60	8	40	8.0	3
953	50	15	50	1.0	15
952	30	30	150	2.0	2
951	30	12	12	2.0	2
950	50	15	30	6.0	2
949	40	10	30	4.0	2
948	70	8	25	0.3	3
893-4	45	11	35	<0.1	1
891-2	85	11	95	<0.1	6
889-90	15	12	30	<0.1	15
887-8	25	13	32	<0.1	32
885-6	55	17	40	<0.1	27
883-4	35	35	70	<0.1	25
881-2	256	5000	55	0.1	32
879-80	40	12	45	<0.1	16
877-8	87	22	40	<0.1	19
875-6	11	10	22	0.8	5
873-4	16	8	<20	0.1	5
871-2	10	7	50	0.1	8
869-870	75	25	65	<0.1	32
867-8	50	22	50	<0.1	32
865-6	156	22	55	0.6	35
863-4	550	22	55	0.1	22
861-2	225	40	50	<0.1	25
859-60	30	15	27	0.2	9
831	80	15	40	<0.1	12
834	30	12	40	0.1	4
835	25	12	30	0.2	3
836	8	10	60	<0.1	<1
837	10	12	40	<0.1	12
838	10	15	80	0.1	5
839	8	12	30	<0.1	5
840	20	20	40	<0.1	5
841	40	25	50	<0.1	5
842	20	20	30	<0.1	5
843	15	25	40	<0.1	20
844	20	15	40	<0.1	18
845	8	8	<20	0.2	20
846	8	8	30	<0.1	12
847	8	8	<20	0.2	25
848	20	10	50	<0.1	40
849	12	12	50	<0.1	25
850	10	10	50	<0.1	25
851	25	15	60	<0.1	30
852	20	15	40	<0.1	25
853	18	12	30	<0.1	25
854	12	20	30	<0.1	20
855	12	20	30	<0.1	15
856	12	15	30	<0.1	15
857	12	15	30	<0.1	10
858	10	5	20	<0.1	<1

500 W

Soil samples shown by line under A/62 number.

To accompany report by R C Miranis.

S.A. DEPT. OF MINES

Associated Drawing No.	No.	Amendment	Ext.	Date	Reg. No. D.M. Compiled from

DAWESLEY AEROMAGNETIC ANOMALY.

Geochemical Sampling Plan

Hd Kanmantoo

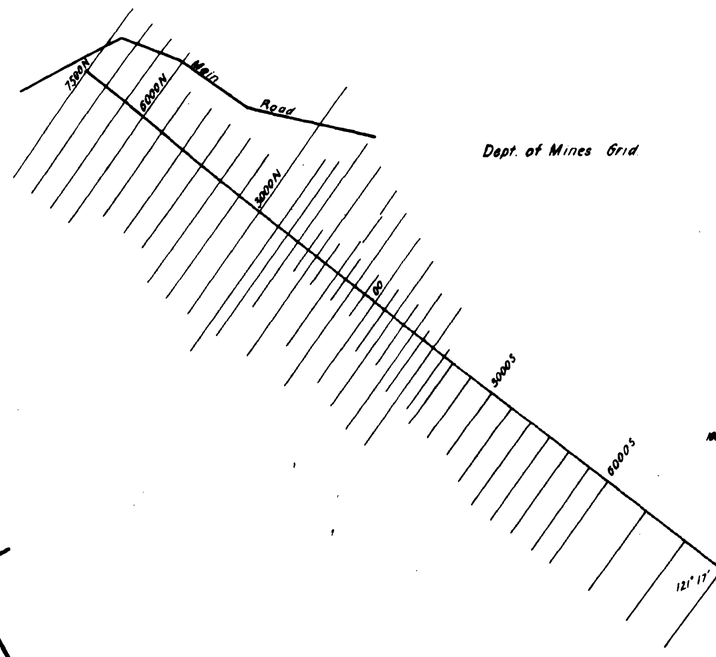
Drawn CWF Traced CWF

Scale 100 feet to 1 inch

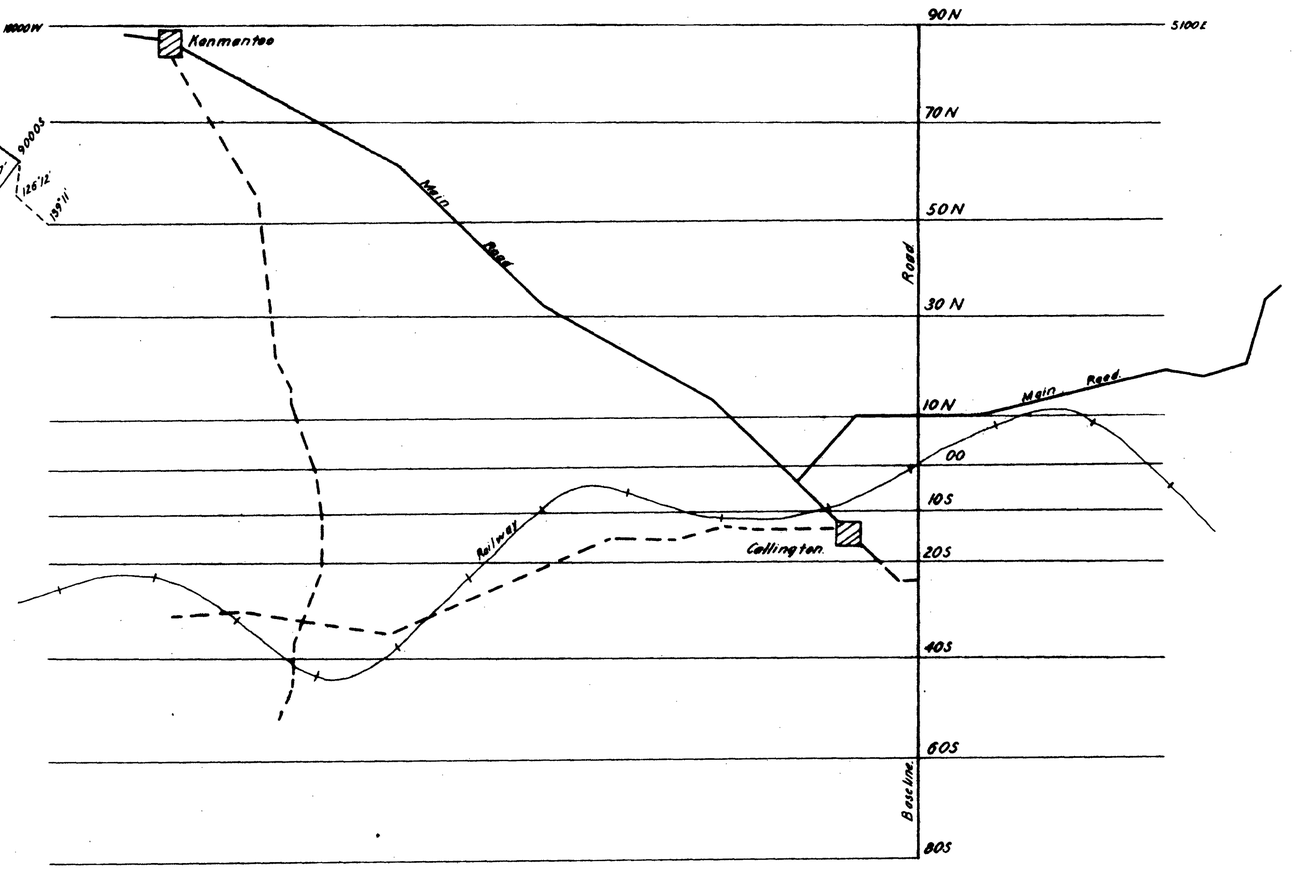
62-135 Hb6

19-3-62

Dept. of Mines Grid



Broken Hill South Grid.



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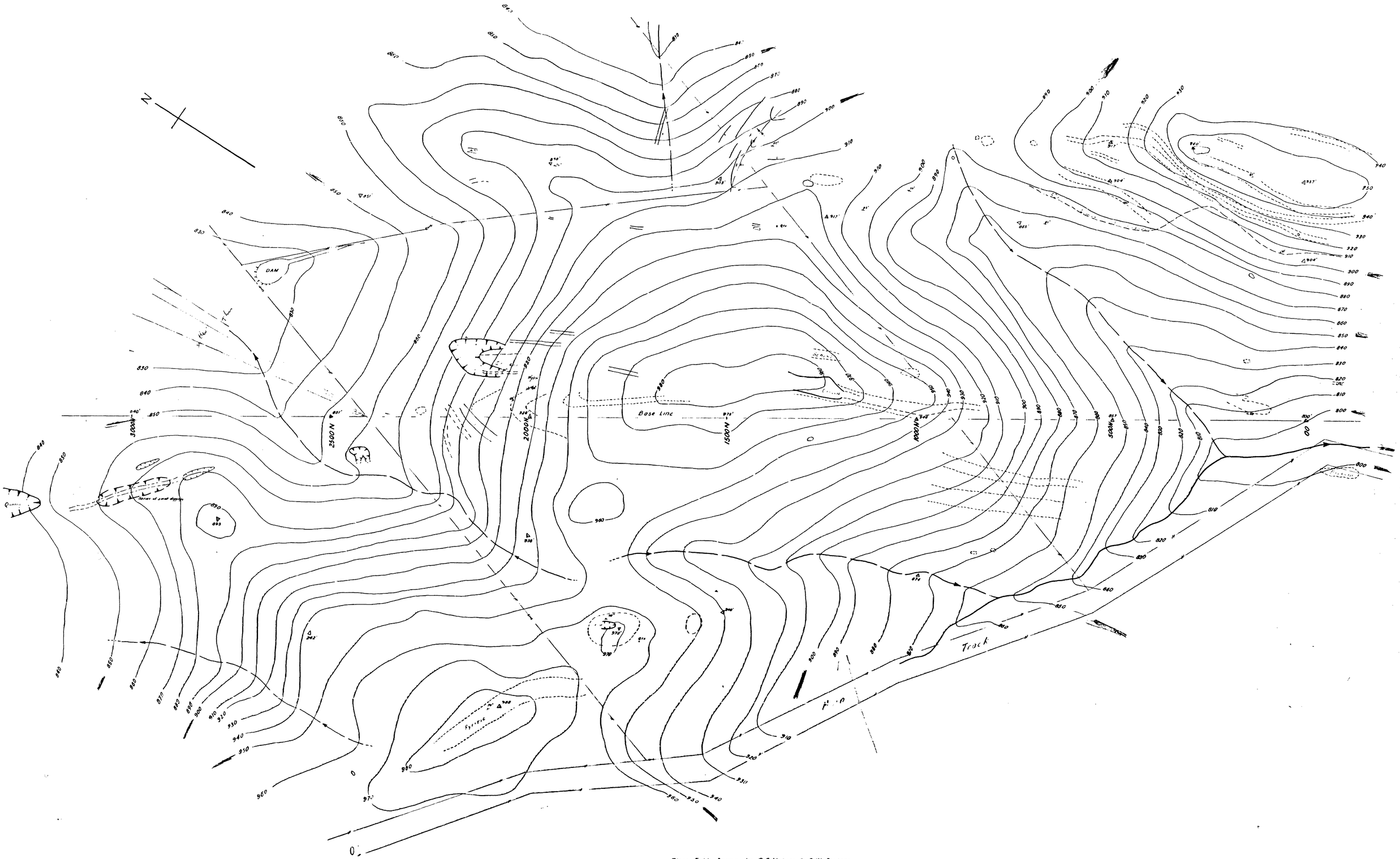
To accompany report by R.C. Mirams

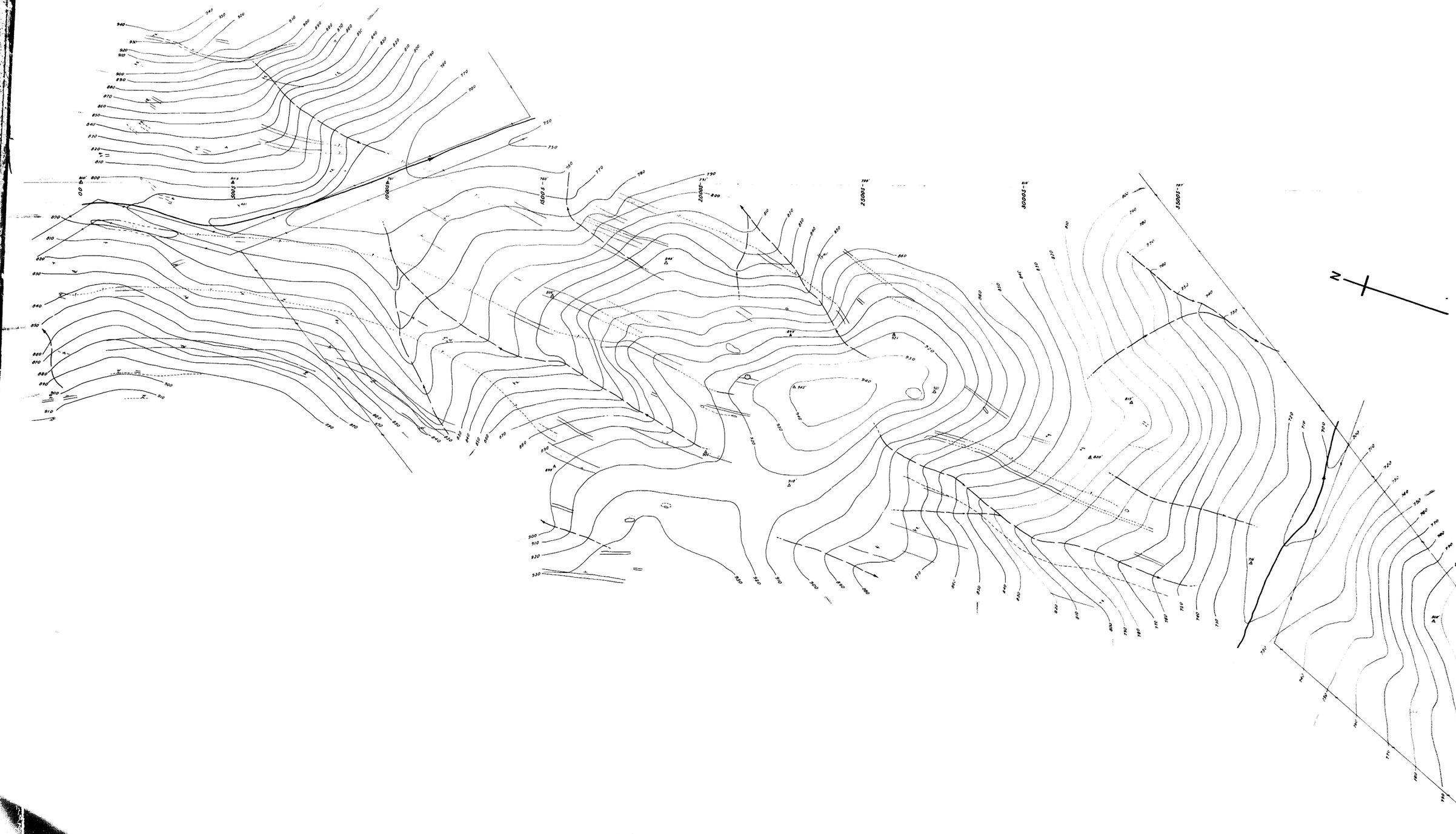
S.A. DEPT. OF MINES

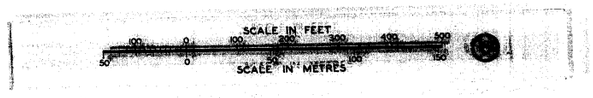
		Req. No.	KANMANTOO – DAWESLEY AREA	Approved	Passed	Scale 2000 Ft. to 1in.
		D.M.	Plan showing Broken Hill South & Dept. of Mines Grids.			62-143 HB6
		Compiled from	Hd. Kanmantoo.		Dm. C.W.F.	
					Tcd. C.W.F.	
					Cbd.	
Associated Drawing No.	No. Amendment Exd. Date			Director of Mines	Exd.	Date 19-3-62



S.A. DEPT. OF MINES

Cassiterite Anomaly South Sheet 62-10		Req. No.	DAWESLEY AEROMAGNETIC ANOMALY	Approved / Passed	Scale 100 ft. to 1in
		D.M.	Geological & Contour Plan (North)		62-101
Associated Drawing / No.	Amendment / Exd. / Date	Compiled from	Hd Kanmantoo	Director of Mines	Drn. C.W.F. Tcd. C.W.F. Ckd. Exd. Date 20-2-62





Plane Table Survey by C.W. Fryers
Geology by B.E. Chapple
See Inset base No 152 for Baseline Legend

To accompany report by R.C. Mellor

S.A. DEPT. OF MINES.

Dawesley Anomaly North Sheet	62-101						Req. No	DAWESLEY AEROMAGNETIC ANOMALY	Approved	Passed		Scale 100 Ft to 1in.
							D.M.	Geological & Contour Plan. (South)			Drn. C.W.F.	L62-10
							Compiled from	Hd Kanmantoo			Tce. C.W.F.	
Associated Drawing	No	No	Amendment	Exd	Date				Director of Mines		Chd.	
											Enq.	Date 27-2-62

BLACK SNAKE
GOLDEN VIEW
FAULT
TUNGKILLO
N
FAULT
ECLIPSE
NEW ERA
TWO IN A BUSH
BLACKBIRD
BIRD IN HAND
HARROGATE
BALHANNAH
BRUKUNGA
GIBRALTAR
GREAT GUN
NAIRNE
DAWESLEY
2000
1800
1600
PREAMIMMA
LADY JANE
MT. BARKER
MENKOO
EMILY
KANGAROO
KANMANTOO
PARINGA
WHEAL MARIA
WHEAL MARGARET
WHEAL FRIENDSHIP
WHEAL PROSPER
BREMER
PIONEER
FAULT
ACLARE
Railway
LOCALITY MAP
Mount Pleasant
Tungkillo
Railway
VINCENT
ADELAIDE
River
Harrogate
Road
35° Glenelg
River
Sturt
35°
Dawesley
Nairne
Mount Barker
GULF ST.
Onkaparinga
Callington
Noarlunga
Macclesfield
McLaren Vale
Strathalbyn
Willunga
SCALE
MILES 8 0 8 16 MILES
MACCLESFIELD
WHEAL ELLEN
GLENALBYN
STRATHALBYN
STRATHALBYN
LEGEND
Pyrite beds and Nairne Pyritic member
Base of Kanmantoo Group on Proterozoic
Boundary of Murray Plain
Crush zone
Trend lines showing dip
Mine workings
Aeromagnetic anomalies
Dykes
SCALE
MILES 1 0 1 2 3 4 5 6 7 8 9 10 MILES
62-136
R. C. Mirams Geologist
S. A. Department of Mines