DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

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KINGOONYA GEOPHYSICAL AND
STRATIGRAPHIC DRILLING PROJECT:
WELL COMPLETION REPORT

8

GEOLOGICAL SURVEY

by

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REGIONAL GEOLOGY

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ABSTRACT

Nine rotary drillholes, with bottom-hole coring, were drilled north of Kingoonya in order to provide more information on concealed Middle Proterozoic sediments and volcanics. The holes recovered dacites of the Gawler Range Volcanics, lithic sandstones of the Labyrinth Formation, sandstones of the Pandurra Formation, dolerite of the Gairdner Dyke Swarm and a probable weathered ultramafic rock of uncertain age. These rocks are overlain by Jurassic Algebuckina Sandstone in the east, and by variable thicknesses of Tertiary and Quaternary sediments.

Detailed geological logs and geochemistry of the drillholes are presented, and a ground magnetic and gravity survey is described. It is concluded that the area has potential for nickel, chromium, platinum-group-element, or possibly, gold, tin or lead-zinc mineralisation, but that further drilling is necessary to evaluate this potential.

INTRODUCTION

Geological mapping of the KINGOONYA 1:250 000 map sheet (Fig. 1) has revealed outcrops of Archaean to Early Proterozoic gneisses and iron formation and Middle Proterozoic volcanics and sediments in the area south and southeast of Lake Labyrinth on the Kingoonya 1:100 000 sheet (Fig. 2). The volcanics have been assigned to the Gawler Range Volcanics, and the sediments to the Tarcoola Formation and the newly-named Labyrinth Formation. Because of the isolated nature of these outcrops, their varied lithologies, and the rarity of observable contacts between the various units, it has proved difficult to establish the stratigraphic relationships between the volcanics and the sediments, and to resolve the concealed geology between the outcrop areas.

The Kingoonya geophysical and stratigraphic drilling project was therefore designed to establish the geology and economic potential of the concealed rocks between the mapped outcrops, and to assist in compiling the Middle Proterozoic stratigraphy. Results of the drilling have contributed to the tectonic sketch and cross section for the KINGOONYA geological map.

Because bedrock was interpreted to be within 50 metres of the surface based on previous company drilling, rotary drilling was undertaken down to solid rock, from which a few metres of core was taken to more accurately confirm the rocktype and observe attitudes of bedding and foliation.

Nine rotary drillholes, with bottom-hole coring (ERD-1 to ERD-9), were drilled along a ground-magnetic and gravity traverse which extended from west of Mt Eba to east of Rocky Hill (Fig. 2).

PREVIOUS INVESTIGATIONS

A preliminary 1:250 000 geological map of the KINGOONYA area was produced in 1972, following a short reconnaissance (Forbes, 1977); the region around Mt Eba and Wallabyng Range was visited only briefly. Significant mineral exploration within the Precambrian rocks of this region only commenced in 1979, when Carpentaria Exploration Pty Ltd drilled four percussion drillholes (BB1-BB4) on EL 458 north of Wallabyng Range (SADME open file Envelope 3509).

During the period 1980 to 1984, Amoco Minerals Australia Co. held three exploration licences over the area of interest (SADME open file Envelopes 3726, 3822, 4033). They carried out the first significant geological mapping of the area, together with rockchip and soil sampling, aeromagnetic and gravity surveying, and an eight-hole percussion-drilling programme (KRP1-KRP8). Broken Hill Proprietary Ltd. entered into a joint venture with Amoco on these licenses for a short time, during which they carried out heavy-mineral sampling and rotary drilling (PK1-PK38) in their search for diamonds.

Figure 2 shows the location of Amoco, BHP and Carpentaria drillholes which intersected Precambrian rocks in the vicinity of the Kingoonya drilling project area, together with the authors' interpretation of stratigraphic sequences encountered. Figures 4 and 5 show portions of the Amoco aeromagnetic and gravity surveys over the area of interest.

Regional geological mapping of the KINGOONYA 1:250 000 sheet area, including detailed mapping of the region around Mt Eba and Wallabyng Range, was carried out by the authors from 1985 to 1987. Outcrop geology of the project region is shown in Figure 2, and a stratigraphic table appears in Figure 3.

GEOLOGY OF THE PROJECT AREA

The Kingoonya rotary-drilling project area is located on the northern boundary of exposed Archaean to Middle Proterozoic rocks of the Gawler Craton. These rocks are overlain to the north and east by Pandurra Formation (Fig. 1) and by sediments of the Jurassic to Cretaceous Eromanga Basin (Fig. 3). The oldest basement in the Kingoonya area (Fig. 2) is the Archaean to Early Proterozoic Mulgathing Complex (Daly, 1981 and 1986), consisting of quartzofeldspathic gneisses, outcropping in a belt extending to the west of Mt Eba, and in a small area south of Mt Eba. Isolated outcrops of banded iron formation are present to the southwest of Mt Eba, and at Wallabyng Range, but their relationships to the basement gneisses are not seen. They are correlated with the Early Proterozoic Hutchison Group (Wilgena Hill Jaspilite, Daly, 1981). It is believed that the Mulgathing Complex and Hutchison Group have been locally deformed by the Early Proterozic Kimban Orogeny during which synorogenic granitoids equivalent to the Lincoln Complex were intruded.

Clastic and chemical sediments of the Middle Proterozoic Tarcoola and Labyrinth Formations crop out on Mt Eba, on a low range 6 kilometres southeast of Mt Eba, in the Wallabyng Range, and around Rocky Hill. Only on Mt Eba can the relationship between these units be observed; here the Labyrinth Formation unconformably overlies the Tarcoola Formation.

The Tarcoola Formation on KINGOONYA consists mainly of white to pink or green medium-grained to granular quartzite. The only exposure of the base of the Tarcoola Formation is at Wallabyng Range, where quartzite unconformably overlies banded iron formation of the Hutchison Group east of the old Stuart Highway. West of the old Stuart Highway, this quartzite sequence grades downwards into a white conglomerate containing pebbles of quartz, red jasper and iron formation, the base of which is not exposed. On Mt Eba there is an upper unit of red-brown to buff fine-grained sandstone, siltstone and shale with a distinct foliation.

The basal unit of the Labyrinth Formation, present on Mt Eba and on Rocky Hill, is a laminated pink or grey stromatolitic chert, which is often brecciated or mottled. It is overlain on Mt Eba by off-white and pink sericitic sandstone and pebbly sandstone to conglomerate with a large variety of clast lithologies, including greenish quartzite apparently derived from the underlying Tarcoola Formation. There is a lens of rhyolite interbedded with the sericitic sandstone on the southern flank of Mt Eba. The rhyolite has been dated approximately at 1600 to 1640 Ma (U-Pb; Fanning, 1987).

The Gawler Range Volcanics, considered to be broadly contemporaneous with the sediments of the Tarcoola and Labyrinth Formations, are represented by the Ealbara Rhyolite, composed of rhyolitic, rhyodacitic and dacitic tuff and ignimbrite, and by the Konkaby Basalt, consisting of basaltic to andesitic amygdaloidal lava, agglomerate and lapilli tuff. They outcrop mostly to the south and southwest of Mount Eba.

While the relationship between the Tarcoola and Labyrinth Formations appears to be clear, the relationship of these formations to the Gawler Range Volcanics is not as well established. Twelve metres of basalt resting upon fourteen metres of rhyolite are contained within lithic sandstone and siltstone equated with the Labyrinth Formation in Carpentaria percussion drillhole BB-2; similar lithic sandstone overlies rhyodacite in BB-1, and overlies dacite-andesite in BB-4. A highly weathered outcrop of amygdaloidal basalt immediately southeast of Mt Eba, is tentatively interpreted to be interbedded with the upper part of the Tarcoola Formation. Based on these occurrences, the Gawler Range Volcanics are interpreted to be partly contemporaneous with the Labyrinth Formation, and possibly partly younger, rather than being dominantly coeval with the Tarcoola Formation (Daly, 1981; 1985). It was hoped that the drilling programme would shed light on this problem.

The fact that the Gawler Range Volcanics directly overlie Mulgathing Complex basement south of Mt Eba, the scattered outcrop pattern of the Tarcoola and Labyrinth Formations, and the presence of reworked sediments in the Labyrinth Formation, together strongly suggest active faulting and erosion during deposition of the sediments, possibly directly related to extrusion of large volumes of magma during the volcanic episode. Outcrop patterns suggest faulting on northwest and northeast trends. In addition, the Tarcoola and Labyrinth Formations and the Gawler Range Volcanics have all been tilted, with dips ranging up to 75°. Foliation is developed in phyllosilicate-rich lithologies in the sediments, and trends northeasterly.

Granitic intrusives, equivalent to the Hiltaba Suite, crop out sporadically around Lake Labyrinth; the only intrusive relationship observed is into Tarcoola Formation, 20 kilometres northeast of Mount Eba (Fig. 2).

Pandurra Formation is known from exploration drilling to the north, northeast and east of the project area and prior to the Kingoonya drilling project was suspected to occur in the subsurface east of Rocky Hill. Northwest-trending dolerite dykes are indicated by aeromagnetic surveys (Fig. 4) to intrude both the Pandurra Formation and older units in the project area.

Jurassic Algebuckina Sandstone, Tertiary sands and clays (sands are often silcreted) and Quaternary clayey sands and lacustrine sediments have filled the topographically low areas between the present-day outcrops.

GROUND MAGNETIC AND GRAVITY SURVEYING

Prior to siting the drillholes, a 39.4 kilometre ground magnetic and gravity survey line was run to assist in accurate location of the holes in relation to magnetic or gravity features. This survey, carried out from 27/10/87 to 3/11/87 by SADME personnel, extended from 10 kilometres west of Mt Eba to 4.5 kilometres east of Rocky Hill (Fig. 2).

The line surveying and the gravity and ground magnetic observations were carried out simultaneously. Temporary stations were established every 100 metres, and numbered from 120 at the western end to 514 at the eastern end. Steel stakes with aluminium tags bearing the survey number (87A2) and the station number (120, 130, ...510) permanently mark the ends of the line and every kilometre between.

Gravity readings were taken at every second station, at a nominal spacing of 200 metres, while ground magnetic readings were taken at 100 metre intervals, with occasional 50 metre-spaced readings over mapped iron formations.

A gravity base station was established at the shearers' quarters at "North Well", and was tied to benchmark BM 2527 on the old Stuart Highway to the east. A ground magnetic base station was also established near the quarters, but, because excessive travel times did not permit return to this location during the day, subsidiary base stations were established at various locations along the line.

The ground magnetic, gravity and elevation data are presented in Appendix 1, the ground magnetic profile in Figure 7 and the gravity and elevation profiles in Figure 6.

While the ground magnetic profile could be closely matched to features visible on Amoco's aeromagnetics (Fig. 4), the gravity profile showed only a gentle rise to the centre from either end, with few anomalies being present. It was of limited use in providing drillhole targets.

Detailed fill-in ground magnetics at various spacings were run over the proposed sites for ERD-1, ERD-2 and ERD-4 to more accurately define the target anomalies before drilling commenced.

LOCATION AND GEOLOGY OF DRILLHOLES ERD-1 to ERD-9

Nine rotary holes, with bottom-hole coring, were drilled by Ray Febey during the period 20/11/87 to 9/12/87, using the Department's Mayhew RD-8 drillrig. Total metreage was 544.73 m, consisting of 529.5 m rotary and 15.23 m core drilling. Table 1 lists further drillhole data. Drillhole locations are shown on Figure 3, detailed geological logs are presented in Appendix 2 and petrographic details are taken from Farrand (1988). Geochemical analyses (Patterson, 1988) are presented in Appendix 3 and photographs of core appear in Appendix 4. Drillhole ERD-7 was drilled on Bon Bon station, owned by D.G. Blight Pastoral Co., and the other eight holes were drilled on North Well station, owned by A.J. & P.A. McBride. Water for drilling was obtained from North Well station either at the homestead or from a tank located 13 km to the north alongside the road to Bulgunnia.

Drillhole ERD-1 was sited to test a magnetic anomaly situated 0.8 kilometres northwest of Mt Eba trig point. It was initially believed that the northwestern side of Mt Eba was faulted against concealed Mulgathing Complex or Hutchison Group, and iron formation was expected to be intersected. Instead, ERD-1 recovered 18.5 m of highly porphyritic, distinctly magnetic, brown dacite, assigned to the Ealbara Rhyolite, below 21 m of Cainozic sand and sandy clay. Petrology indicates that the phenocrysts comprise altered plagioclase and possible K feldspar, pyroxene (altering to amphibole) and chlorite, with rare quartz and opaques. The magnetic nature of the dacite accounts for the magnetic anomaly present but it is nevertheless likely that it is underlain by iron formation.

The content of SiO_2 is low, at 61.6%, for a dacite, but this may be a result of alteration, perhaps reflected in the elevated Na_2O (4%) and K_2O (4.7%) values. While absolute values of the incompatible elements Zr, TiO_2, Nb and Y are typical of dacites, according to Winchester and Floyd (1977), certain ratios of these elements, when plotted on their discrimination diagrams, push this rock towards the andesite or trachyandesite field (Figure 8).

A magnetic anomaly located 1.5 kilometres south-east of Mt Eba was the target for ERD-2. While Labyrinth Formation was expected to be intersected as it crops out to the west and northeast, no magnetic lithologies were previously known within mapped areas of Labyrinth Formation, and a basic intrusive source could not be ruled out. ERD-2 intersected 12 m of pink, medium- to very coarse-grained, non-magnetic quartz-lithic sandstone of the Labyrinth Formation below 5 m of Cainozoic sand and sandy clay. In drillcore, the lithic sandstone dips 20°-25°, and a weak foliation is present, dipping 60°-70°. Petrology indicates a substantial sericite and clay matrix enclosing grains of quartz, sericitised lithic fragments, feldspar, chert and muscovite. The magnetic anomaly may be explained if the red haematite clots present in the drillcore result from near-surface alteration of an original magnetite detrital component of the sandstone, but it is also likely to be due to a strongly magnetic feature such as a mafic dyke or iron formation at a shallow depth below the Labyrinth Formation.

ERD-3 was sited to test for suspected Labyrinth Formation 1.5 kilometres southeast of ERD-2 in an area of low magnetic response. Instead of Labyrinth Formation sandstone, a dark green, soft, massive, non-magnetic rock was intersected, classified in the field as a chloritised basic rock. Petrographic inspection subsequently revealed the rock to be a talc + chlorite ± serpentine rock, which has apparently undergone further hydrothermal alteration in places. Logging of the drillcore failed to disclose any bedding, but there is a weak foliation and shearing dipping at about 70°, suggesting that this rock has been through the same deformation episode as the surrounding Labyrinth Formation, and therefore cannot be much younger.

This talcose rock is either a serpentinised ultramafic intrusion or an interbed of altered magnesian carbonate rock within the Labyrinth Formation. Geochemical analyses of this rock give equivocal results. The high contents of 12-16% MgO, 800-900 ppm Cr and up to 10 ppb Pt suggest an ultramafic precursor. However, the high SiO_2 (48 and 56%) and low Ni (210 ppm) do not support this interpretation, unless they have been altered from their original values by hydrothermal activity, and there apparently is no associated magnetic anomaly which would be expected with an ultramafic body. On the other hand, it is difficult to explain the elevated Cr and Pt contents, if the rock is derived from a Mg-carbonate rock, and so an ultramafic origin is preferred.

A sharp discontinuity in the background of the ground magnetic profile (Figure 7) just northwest of Wallabyng Range suggests that this side of the range is separated by a fault from more magnetic rocks to the northwest. ERD-4 was drilled to test an intense magnetic anomaly on the interpreted fault zone; banded iron formation or a basic dyke was expected to be responsible. Instead, the hole recovered 7.5 m of massive, grey-brown, strongly magnetic very fine-grained dacite lava, beneath 10.5 m of Cainozic sand, sandy clay and gravelly clay. A few small phenocrysts of plagioclase, and minor quartz, orthoclase, ferromagnesian minerals and opaques were identified in thin section. No bedding or foliation traces were observed in core or in thin section, and the orientation of the lava is unknown. While the lava was interpreted to be dacitic on the basis of thin section petrology, the rock is similar to the dacite/trachyandesite in ERD-1 in that it has high Na_2O (6%) and K_2O (3%) values and some trace element ratios not typical of dacites (Figure 8).

ERD-5 was sited approximately half-way between Wallabyng Range and the low hills 6 kilometres southeast of Mt Eba, to test the basement geology in this area of no outcrop. It recovered 11.6 m of blue-green, micaceous, medium- to coarse-grained lithic sandstone of the Labyrinth Formation below 4 m of Quaternary quartz sand and 76 m of Tertiary grey, dark-grey and yellow clay and silt with scattered quartz sand and rare carbonaceous fragments. The Tertiary sequence probably includes both Eocene (Pidinga Formation) and Miocene (Garford Formation) sediments; samples from 20-22 m and 32-34 m proved to be barren when examined for microfossils (N.F. Alley, pers. comm.). The underlying lithic sandstone is weakly foliated, with the foliation dipping approximately 50°, is non-magnetic and carries traces of pyrite. Petrology reveals that is is composed of poorly-sorted grains of quartzite, chert, quartz, plagioclase, microcline, muscovite and sericitised feldspathic lithic fragments set in a matrix of chlorite (giving the green colour of the sandstone), sericite and fine clastic material.

ERD-6 was drilled alongside the old Stuart Highway in an attempt to discover the nature of the basement to the Tarcoola Formation between the two portions of the Wallabyng Range east and west of the highway. However, the hole did not intersect basement, but finished at 111 m within Pandurra Formation. Four metres of Quaternary sand and clay and 40 metres of white to grey fine- to coarse-grained clayey sand and sandy clay of the Jurassic Algebuckina Sandstone overlie the Pandurra Formation, which consists of pale grey and red-brown, clayey, fine- to very coarse-grained quartz sand with rare, local, weathered feldspar and jaspilite or acid volcanic grains. The boundary between the Algebuckina Sandstone and the Pandurra Formation is taken to be the colour change from white and grey to grey and red-brown down the hole. Core was taken from 102-104 m and comprises interbedded reddish and white fine- to coarse-grained, clayey sandstone and siltstone and red-brown to grey-green mottled shale and micaceous siltstone. Cross-bedding and soft-sediment deformation are locally observed. It appears that the reddish colouration in these rocks results from oxidisation of the original reduced grey-green colour, patches of which remain in the less porous shale and siltstone interbeds.

ERD-7 was sited to the east of Wallabyng Range on the peak of a broad magnetic anomaly to investigate the nature of the basement in the non-outcropping area between there and Rocky Hill. Like ERD-6, however, ERD-7 bottomed in Pandurra Formation at 126 m (the limit of drillrods available), but in this case the rock was not cored. In ERD-7, the Pandurra Formation is composed of pale grey and red to pink sandy clay and very fine-grained to granular quartz sand with pebbly intervals and occurs below 2 m of Quaternary clay, 8 m of coarse Tertiary sand and 24 m of Algebuckina Sandstone as in ERD-6.

At this stage, plans to drill further holes towards Rocky Hill and east of there were dropped owing to the excessive depth to basement indicated by the drilling of ERD-7, by the featureless ground magnetic profile in that area, and also because of the presence, near Rocky Hill, of deep sand which had previously proved to hinder easy access by the drilling and support vehicles.

ERD-8 was drilled to investigate the basement between ERD-5 and the Labyrinth Formation outcrop located 6 kilometres southeast of Mt Eba, on the highest part of the gravity profile. It recovered 59.33 m of reddish-purple fine- to coarse-grained lithic sandstone with pebbly sandstone interbeds, assigned to the Labyrinth Formation. The lithic grains and pebbles are composed of white and reddish quartz, pink and grey chert, and minor red jaspilite, red to purple ?acid volcanics and local greenish-brown limestone, and are set in a sericitic matrix, which petrology indicates is also dolomitic. Minor heavy-mineral banding is present. Bedding dips at 65-70°, and the distinct foliation dips at 80-90°.

ERD-9 was sited on a sharp magnetic anomaly 1.5 kilometres southeast of ERD-3, and recovered 8.3 m of massive, blue-green, strongly magnetic, spheroidally-weathered, coarse-grained dolerite below 6 m of Cainozoic silty clay and clay. Petrological examination indicates the dolerite is composed of labradorite, ophitic augite and pigeonite, ilmenomagnetite and possible altered olivine. It may be part of the Gairdner Dyke Swarm, but no linear magnetic anomaly is seen passing through ERD-9, as is seen over interpreted dolerite dykes further to the northeast (Fig. 4).

CONCLUSIONS

The Kingoonya stratigraphic drilling project was designed firstly to establish the nature and economic potential of the concealed rocks between mapped outcrops in the project area, and secondly to assist in resolving Middle Proterozoic stratigraphic uncertainties.

Technically, the drilling was quite successful, the method adopted of rotary drilling with bottom-hole coring working well with shallowly-buried basement, providing useful information on rock types present between outcropping areas. The economic potential of the Kingoonya region has been upgraded with the discovery of a talc-chlorite-serpentine rock in drillhole ERD-3. Should this rock prove to be an ultramafic, then there is potential for Cr, Ni, and platinum-group-element mineralisation. Further drilling is warranted to follow up this possibility. The east-west-oriented anomaly approximately 800 m southeast of ERD-3 is considered to be due to a dolerite dyke of the Gairdner Dyke Swarm, but there is a possibility that this anomaly, or the larger circular anomaly located approximately 1 kilometre east-southeast of ERD-3 (Fig. 4), is due to an ultramafic intrusion less altered than that encountered in ERD-3.

Unfortunately the limited metreage possible in each hole did not allow any further interpretation of the relationship between the Tarcoola Formation, Labyrinth Formation and Gawler Range Volcanics beyond that already deduced from outcrop. However, this may be resolved by a deep, 400-500 m stratigraphic hole located at or near ERD-4. The known areal extent of the Labyrinth Formation has been greatly increased by the drilling, but the economic potential of this newly-recognised and little-known unit is largely untested.

The base of the Tarcoola Formation and its underlying basement west of the old Stuart Highway at Wallabyng Range are unknown. The basement may be Mulgathing Complex or non-magnetic stratigraphic equivalents of the Hutchison Group iron formation which crops out east of the highway. Alternatively, the base of Tarcoola Formation may be intruded by Hiltaba Suite granite, as at Tarcoola Goldfield. There is potential for lead-zinc mineralisation if graphitic or carbonate facies equivalents of the iron formation are present, for gold and tin if granite is present, or for nickel, chromium and platinoids if the Mulgathing Complex basement hosts ultramafic bodies such as those known on TARCOOLA (Daly, 1985). These possibilities could be tested by a 300-500 m cored drillhole located on the southeastern margin of Wallabyng Range, west of ERD-6.

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TABLE 1 - DRILLHOLE DATA ERD-1 to ERD-9, KINGOONYA

Hole No.	Unit No. (Prefix 5936000SW..)	AMG Coordinates Easting	AMG Coordinates Northing	Geophysical Line Coordinates	Elevation (m)	Date Commenced	Date Completed	Cuttings Taken (m)	Core Taken (m)
ERD-1	108	518180	6603230	214.2	130.8	20/11/87	24/11/87	0-36	36-39.5
ERD-2	109	519660	6601430	238.5	121.2	25/11/87	26/11/87	0-15	15-17
ERD-3	110	520360	6600390	251.5	123.8	26/11/87	27/11/87	0-45	46-48
ERD-4	111	531010	6596980	376.5	130.8	28/11/87	30/11/87	0-16	16-18
ERD-5	112	527540	6598650	335.5	125.0	1/12/87	2/12/87	0-90	90.5-91.6
ERD-6	113	533870	6595200	410.0	133.2	2/12/87	4/12/87	0-111	102-104
ERD-7	114	536530	6595840	436.5	122.6	5/12/87	7/12/87	0-126	-
ERD-8	115	525270	6598650	312.0	122.6	8/12/87	9/12/87	0-68	68-69.3
ERD-9	116	521370	6598890	270.0	127.4	9/12/87	9/12/87	0-23	23-24.3

N.B. AMG Coordinates and elevations taken from line survey data.

APPENDIX 1

GROUND MAGNETIC DATA

Values in gammas total magnetic field

Observers: W.M. COWLEY, A.J. SMITH

Station No.	Total ground magnetic field	Station No.	Total ground magnetic field
87A2-120	57567	87A2-170	57788
-121	551	-170.5	581
-122	549	-171	474
-123	565	-172	474
-124	566	-173	466
-125	605	-174	476
-126	596	-175	478
-127	720	-176	474
-128	429	-177	458
-129	866	-178	460
-130	750	-179	457
-131	674	-180	456
-132	610	-181	469
-133	535	-182	462
-134	520	-183	471
-135	496	-184	451
-136	489	-185	464
-137	488	-186	514
-138	482	-187	509
-139	489	-188	508
-140	486	-189	505
-141	58082	-190	511
-142	57544	-191	496
-143	505	-192	489
-144	474	-193	472
-145	439	-194	490
-146	383	-195	384
-147	57245	-196	575
-148	58035	-197	735
-149	58066	-198	614
-150	57795	-199	762
-151	655	-200	804
-152	597	-201	746
-153	581	-202	746
-154	569	-203	567
-155	554	-204	547
-156	553	-205	517
-157	547	-206	476
-158	536	-207	521
-159	528	-208	494
-160	522	-209	413
-161	520	-210	710
-162	511	-211	428
-163	496	-212	845
-164	494	-213	57915
-165	495	-213.9	58149
-166	518	-214	160
-167	490	-214.1	171
-168	482	-214.2	169
-168.5	478	-214.3	175
-169	493	-214.4	159
-169.5	474	-214.5	58133

Station No.	Total ground magnetic field	Station No.	Total ground magnetic field
87A2-215	57929	87A2-263	57543
-216	578	-264	546
-217	549	-265	469
-218	578	-266	566
-219	944	-267	589
-220	772	-268	642
-221	583	-269	57764
-222	570	-270	58491
-223	565	-271	57722
-224	569	-272	740
-225	578	-273	-
-226	582	-274	470
-227	588	-275	490
-228	599	-276	505
-229	597	-277	516
-230	617	-278	528
-231	601	-279	513
-232	589	-280	57501
-233	587	-281	58233
-234	581	-282	57972
-235	583	-283	833
-236	583	-284	811
-237	590	-285	794
-237.5	629	-286	787
-238	813	-287	760
-238.5	832	-288	753
-239	657	-289	746
-239.5	704	-290	744
-240	670	-291	745
-240.5	560	-292	749
-241	540	-293	760
-242	553	-294	770
-243	549	-295	778
-244	556	-296	772
-245	552	-297	813
-246	578	-298	819
-247	579	-299	841
-248	559	-300	874
-249	559	-301	899
-250	551	-302	933
-251	612	-303	57982
-252	644	-304	58030
-253	600	-305	100
-254	622	-306	172
-255	602	-307	219
-256	597	-308	198
-257	57716	-309	175
-258	58497	-310	135
-259	60684	-311	077
-260	60336	-312	58025
-261	57635	-313	57971
-262	045	-314	57937

Station No.	Total ground magnetic field	Station No.	Total ground magnetic field
87A2-315	-	87A2-367	57788
-316	57903	-368	828
-317	883	-369	849
-318	882	-370	883
-319	882	-371	923
-320	867	-372	57993
-321	853	-373	58054
-322	815	-374	108
-323	794	-374.5	58059
-324	785	-375	57834
-325	768	-375.5	57949
-326	764	-376	58121
-327	761	-376.5	57882
-328	765	-377	535
-329	781	-377.5	475
-330	790	-378	259
-331	795	-378.5	57063
-332	792	-379	56981
-333	787	-379.5	57293
-334	782	-380	421
-335	783	-380.5	498
-336	775	-381	513
-337	770	-382	549
-338	763	-383	568
-339	756	-384	602
-340	745	-385	631
-341	741	-386	587
-342	732	-387	569
-343	737	-388	597
-344	-	-389	626
-345	720	-390	647
-346	731	-391	668
-347	741	-392	687
-348	759	-393	698
-349	57843	-394	710
-350	58008	-395	715
-351	58016	-396	731
-352	57948	-397	735
-353	876	-398	744
-354	820	-399	740
-355	771	-400	753
-356	787	-401	755
-357	751	-402	754
-358	765	-403	749
-359	790	-404	765
-360	809	-405	748
-361	829	-406	755
-362	831	-407	749
-363	840	-408	742
-364	844	-409	736
-365	816	-410	722
-366	730	-411	57758

Station No.	Total ground magnetic field	Station No.	Total ground magnetic field
87A2-412	57789	87A2-460	57833
-413	822	-461	820
-413.5	850	-462	794
-414	888	-463	762
-414.5	57977	-464	739
-415	58009	-465	718
-415.5	57917	-466	693
-416	958	-467	676
-416.5	913	-468	660
-417	888	-469	653
-417.5	908	-470	640
-418	950	-471	632
-418.5	933	-472	630
-419	57903	-473	626
-420	58001	-474	623
-421	57874	-475	669
-422	707	-476	680
-423	657	-477	666
-424	631	-478	710
-425	625	-479	706
-426	624	-480	713
-427	629	-481	717
-428	630	-482	725
-429	674	-483	739
-430	695	-484	745
-431	730	-485	717
-432	801	-486	715
-433	870	-487	712
-434	57975	-488	723
-435	58040	-489	804
-436	088	-490	751
-437	087	-491	763
-438	062	-492	792
-439	58029	-493	830
-440	57987	-494	857
-441	972	-495	873
-442	938	-496	863
-443	925	-497	836
-444	898	-498	808
-445	886	-499	782
-446	878	-500	763
-447	868	-501	731
-448	861	-502	712
-449	853	-503	698
-450	850	-504	679
-451	844	-505	676
-452	846	-506	680
-453	839	-507	686
-454	841	-508	706
-455	845	-509	730
-456	852	-510	746
-457	843	-511	762
-458	858	-512	780
-459	847	-513	786
		-514	57784

GRAVITY AND ELEVATION DATA

Bouguer values calculated at density of 2.67 g/cc

Observer: P. SIFFLEET

STATION	METRES-ELEVATION	BOUGUER VALUES (Milligals)
87A2.0120	132.45	-22.76
87A2.0122	131.35	-22.71
87A2.0124	131.07	-22.62
87A2.0126	131.36	-22.30
87A2.0128	133.15	-21.98
87A2.0130	132.47	-21.70
87A2.0132	133.39	-21.53
87A2.0134	135.24	-21.48
87A2.0136	131.93	-21.24
87A2.0138	131.49	-20.94
87A2.0140	131.81	-20.55
87A2.0142	131.90	-20.43
87A2.0144	131.85	-20.35
87A2.0146	132.07	-20.01
87A2.0148	131.64	-19.61
87A2.0150	130.77	-19.60
87A2.0152	129.65	-19.34
87A2.0154	128.78	-18.82
87A2.0156	128.37	-18.58
87A2.0158	128.21	-18.42
87A2.0160	130.21	-18.26
87A2.0162	133.89	-18.22
87A2.0164	136.65	-18.09
87A2.0166	130.34	-17.82
87A2.0168	129.30	-17.07
87A2.0170	132.82	-16.31
87A2.0172	130.64	-15.64
87A2.0174	126.13	-14.98
87A2.0176	126.00	-14.44
87A2.0178	124.94	-14.08
87A2.0180	124.16	-13.11
87A2.0182	122.62	-13.16
87A2.0184	123.30	-12.85
87A2.0186	122.70	-12.96
87A2.0188	122.35	-13.00
87A2.0190	121.93	-12.95
87A2.0192	121.97	-12.52
87A2.0194	123.58	-12.20
87A2.0196	123.42	-12.10
87A2.0198	124.00	-11.85
87A2.0200	124.41	-11.64
87A2.0202	125.10	-11.46
87A2.0204	126.04	-11.15
87A2.0206	126.74	-11.14
87A2.0208	127.76	-11.00
87A2.0210	128.84	-10.99
87A2.0212	129.61	-10.79
87A2.0214	130.56	-10.67
87A2.0216	132.96	-10.65
87A2.0218	136.69	-10.09
87A2.0220	144.85	(-13.00 spurious value)
87A2.0222	197.92	-10.70
87A2.0224	231.00	-10.57
87A2.0226	197.19	-9.39
87A2.0228	149.37	-7.81
87A2.0230	133.65	-7.16
87A2.0232	134.72	-7.46

87A2.0234	126.68	-6.19
87A2.0236	120.87	-5.56
87A2.0238	120.70	-5.44
87A2.0240	122.53	-5.20
87A2.0242	121.87	-5.01
87A2.0244	123.28	-5.41
87A2.0246	122.81	-4.83
87A2.0248	123.72	-4.68
87A2.0250	123.49	-4.30
87A2.0252	123.86	-4.44
87A2.0254	123.32	-4.86
87A2.0256	121.64	-4.58
87A2.0258	123.18	-4.71
87A2.0260	122.11	-4.50
87A2.0262	123.92	-4.77
87A2.0264	123.51	-4.94
87A2.0266	124.62	-4.91
87A2.0268	125.13	-4.69
87A2.0270	127.41	-4.40
87A2.0272	131.06	-4.31
87A2.0274	133.84	-4.32
87A2.0276	134.45	-4.50
87A2.0278	133.93	-4.53
87A2.0280	130.68	-4.16
87A2.0282	132.10	-4.20
87A2.0284	130.44	-4.28
87A2.0286	130.29	-4.18
87A2.0288	133.73	-4.11
87A2.0290	137.98	-3.94
87A2.0292	138.24	-3.57
87A2.0294	136.62	-3.58
87A2.0296	135.48	-3.91
87A2.0298	123.47	-3.78
87A2.0300	120.28	-3.84
87A2.0302	119.74	-3.58
87A2.0304	119.73	-3.68
87A2.0306	122.98	-4.17
87A2.0308	123.55	-4.09
87A2.0310	122.18	-4.22
87A2.0312	122.61	-3.78
87A2.0314	123.14	-4.11
87A2.0316	123.92	-4.54
87A2.0318	124.71	-4.58
87A2.0320	125.41	-4.31
87A2.0322	126.40	-4.35
87A2.0324	126.69	-4.51
87A2.0326	124.81	-4.67
87A2.0328	124.02	-4.88
87A2.0330	124.05	-5.23
87A2.0332	124.10	-6.04
87A2.0334	124.85	-6.08
87A2.0336	125.00	-5.80
87A2.0338	124.84	-5.94
87A2.0340	124.88	-6.26
87A2.0342	124.50	-6.77
87A2.0344	125.12	-7.08
87A2.0346	125.29	-7.45
87A2.0348	125.08	-7.71
87A2.0350	125.01	-8.42
87A2.0352	124.67	-8.85

87A2.0354	124.58	-9.07
87A2.0356	124.32	-9.35
87A2.0358	121.17	-9.50
87A2.0360	128.73	-9.81
87A2.0362	126.98	-9.81
87A2.0364	125.85	-9.85
87A2.0366	125.41	-10.09
87A2.0368	126.60	-10.37
87A2.0370	127.06	-10.47
87A2.0372	127.78	-10.67
87A2.0374	128.83	-10.73
87A2.0376	130.28	-11.10
87A2.0378	132.33	-11.42
87A2.0380	134.25	-12.03
87A2.0382	137.15	-12.38
87A2.0384	140.06	-12.24
87A2.0386	143.93	-12.33
87A2.0388	156.89	-12.45
87A2.0390	190.15	-12.26
87A2.0392	213.75	-12.46
87A2.0394	212.19	-12.38
87A2.0396	210.04	-12.59
87A2.0398	209.75	-12.36
87A2.0400	207.01	-12.18
87A2.0402	197.85	-11.93
87A2.0404	171.09	-11.45
87A2.0406	152.86	-11.06
87A2.0408	137.52	-11.50
87A2.0410	133.16	-11.80
87A2.0412	133.44	-11.25
87A2.0414	135.02	-10.58
87A2.0416	142.73	-11.67
87A2.0418	148.51	-12.53
87A2.0420	152.45	-13.46
87A2.0422	147.25	-14.39
87A2.0424	138.46	-15.44
87A2.0426	134.61	-16.22
87A2.0428	130.20	-16.61
87A2.0430	129.90	-16.95
87A2.0432	126.55	-16.79
87A2.0434	123.14	-16.64
87A2.0436	122.71	-16.47
87A2.0438	122.35	-16.42
87A2.0440	125.14	-16.30
87A2.0442	125.07	-16.23
87A2.0444	123.97	-16.13
87A2.0446	125.66	-16.50
87A2.0448	125.96	-16.92
87A2.0450	125.65	-17.42
87A2.0452	125.64	-17.81
87A2.0454	126.20	-18.07
87A2.0456	127.07	-18.52
87A2.0458	128.32	-19.33
87A2.0460	131.33	-20.44
87A2.0462	132.79	-21.04
87A2.0464	131.57	-21.05
87A2.0466	131.55	-20.74
87A2.0468	133.99	-19.44
87A2.0470	134.75	-19.15
87A2.0472	137.14	-19.05

87A2.0474	139.05	-19.01
87A2.0476	149.20	-18.58
87A2.0478	150.26	-18.77
87A2.0480	138.33	-19.45
87A2.0482	138.25	-19.62
87A2.0484	144.37	-19.61
87A2.0486	153.39	-19.57
87A2.0488	153.79	-19.65
87A2.0490	145.98	-20.12
87A2.0492	142.74	-20.02
87A2.0494	141.51	-20.51
87A2.0496	145.90	-21.18
87A2.0498	150.80	-21.70
87A2.0500	141.23	-22.38
87A2.0502	133.18	-23.28
87A2.0504	130.69	-24.22
87A2.0506	133.84	-24.97
87A2.0508	133.95	-25.65
87A2.0510	135.58	-26.03
87A2.0512	136.54	-26.48
87A2.0514	136.53	-26.74

APPENDIX 2

DETAILED GEOLOGICAL LOGS

ERD-1 TO ERD-9

DEPARTMENT OF MINES AND ENERGY – SOUTH AUSTRALIA

ERD 1

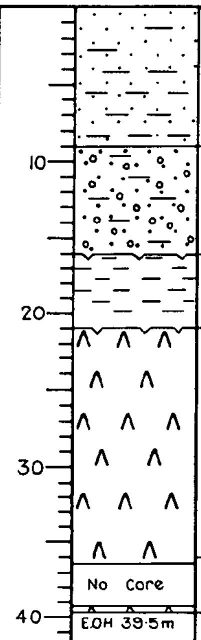
KINGOONYA
CORE DESCRIPTION

DEPTH 39·5m INCLINATION Vertical

LOGGED BY W. M. Cowley. DATE DRILLED 20-24 Nov. 1987

REFERENCE 5936000SW00108

	DEPTH (m)	GRAPHIC LOG		DESCRIPTION
QUATERNARY	0–9·0		Rotary	Red-orange, weakly calcareous, clayey, medium- to very coarse-grained QUARTZ SAND, grading down to slightly indurated red-brown SANDY CLAY. Minor gypsum-cemented sand.
QUATERNARY	9·0–16·0			Red-orange, indurated, non-calcareous, clayey, fine- to coarse-grained PEBBLY QUARTZ SAND and SILTY SAND. Granules and pebbles of quartz, silcreted sandstone and ferriginous sandstone, and white quartzite. Minor fibrous gypsum.
TERTIARY	16·0–21·0			Off-white, pale grey-green, pale yellow and minor mauve-grey, non-calcareous CLAY, with minor silt and fine- to medium-grained sand.
EALBARA RHYOLITE	21·0–36·0			Pale to mid-brown or orange, ACID-INTERMEDIATE VOLCANIC, composed of common orange to brown feldspar phenocrysts to 2mm, green chloritic clots to 1mm, and rare black magnetite grains in a very fine-grained siliceous matrix, which may be colour-mottled. Feldspars often altered to pale green sericite. Limonite on fracture surfaces.
EALBARA RHYOLITE	36·0–39·5	No core; E.O.H. 39·5m	Core	Core log 36·0–36·3m : DACITE : Composed of pale orange feldspar phenocrysts to 5mm and 50% of rock, altered to white or green, euhedral mafic phenocrysts altered to dull green fibrous mineral, tiny black magnetic grains, and rare tiny quartz in a very fine-grained orange-brown to brown matrix, often mottled. Broken; green chlorite on some joints. 36·3–39·3m : Core loss. 39·3–39·5m DACITE : As 36·0–36·3m, fresher, with euhedral mafic phenocrysts altered to dark green chlorite, and with a darker brown matrix.



Sampling

5936 RS 180	39·4m	Geochemistry
5936 RS 172	39·45m	Petrology

SHEET 1 OF 1

PLAN No. S 20120

MF 179

DEPARTMENT OF MINES AND ENERGY—SOUTH AUSTRALIA

ERD 2

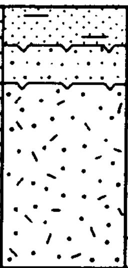
KINGOONYA
CORE DESCRIPTION

DEPTH 17·0m . . . . . INCLINATION Vertical . . .

LOGGED BY W.M Cowley . DATE DRILLED 25-26 Nov. 1987

REFERENCE 5936000SW00109

	DEPTH (m)	GRAPHIC LOG		DESCRIPTION
Q			Cuttings	Orange-red, fine-to medium-grained, weakly calcareous, clayey SAND, weakly indurated in part.
T	2·5			White, yellow and brown, slightly ferruginised, non-calcareous, weakly indurated, fine-to coarse-grained SAND and SANDY CLAY. Common rounded quartz granules and minor small pebbles of red to whitish quartzite and red, fine grained ? acid volcanics.
LABYRINTH FORMATION	5·0 – 15·0 (10)			Pink-red to pale pink, medium-to coarse-grained LITHIC SANDSTONE, composed of clear and reddish quartz, orange feldspar/acid volcanic, and rare dark green fragments in a sericitic matrix. Weathered, ferruginised with minor Mn oxide on fractures in upper part.
	15·0 – 17·0	E.O.H. 17·0m	Core	See Core Log



Core Log

15·0–17·0m: Mauve-pink, medium-to coarse-grained LITHIC SANDSTONE. Composed of clear and reddish quartz, minor red acid volcanic or chert, and rare green grains in a sparse sericitic matrix. Interbeds of very coarse-grained to granular lithic sandstone up to 2cm thick are present, with diffuse boundaries and no grading. Bedding is 65°–70° to core axis. Very faint foliation, 20°–30° to core axis at top, 50° to core axis at bottom. Common red haematite clots to 5cm. Not magnetic. Joints mostly coated by yellow-orange clay and minor quartz and Mn oxide.

16·6m: Angular 4cm pebble of mottled yellow and blue-green, streaky ?acid volcanic.

16·62–16·81m: Slightly coarser grained, with scattered quartz granules and small pebbles up to 1cm, and faint bands of haematite possibly after heavy-mineral banding.

16·88–16·90m: 2·5cm thick interbed of mottled dark yellow and purple-pink fine-to medium-grained lithic sandstone, gradational boundaries.

16·9–17·0m: Slightly finer-grained than most of interval; purple haematite band adjacent to heavy-mineral band.

17·0m: Portion of 1cm pebble of ? acid volcanic as at 16·6m, and of 1cm pebble of mottled purple and pink haematitic ? acid volcanic.

Sampling

5936 RS 181	16·05m	Geochemistry
5936 RS 173	16·92m	Petrology

Depth scale (m): 10, 20, 30

SHEET 1 OF 1

PLAN N° S 20121

MF 179

DEPARTMENT OF MINES AND ENERGY—SOUTH AUSTRALIA

ERD 3

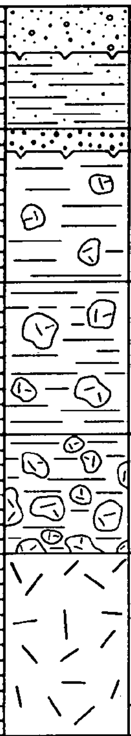
KINGOONYA
CORE DESCRIPTION

DEPTH 48·0m ...... INCLINATION Vertical ...

LOGGED BY W.M Cowley . DATE DRILLED 26-27 Nov. 1987

REFERENCE 5936000SW00110

	DEPTH (m)	GRAPHIC LOG		DESCRIPTION
Q			Cuttings 3·0	Red-orange, weakly calcareous, medium- to very coarse-grained, silty, clayey QUARTZ SAND; few small quartz granules.
TERTIARY				Greenish-white and yellow, non-calcareous SANDY CLAY; sand is subangular, fine- to very coarse-grained.
			8·0	Pale grey, very coarse-grained to granular, subangular to subrounded, clayey QUARTZ SAND; granules to small pebbles are of quartz, red ferruginous chert/iron formation and red quartzite.
? MIDDLE PROTEROZOIC ULTRAMAFIC ?	10		9·5	Dark brown to red-brown, ferruginous WEATHERED BEDROCK, with ferruginous veins; pale grey-green and yellow-brown CLAY and indurated CLAYSTONE.
	20		18·0	Brown, red-brown and yellow-brown SILTY CLAY; minor ferruginised, weathered bedrock.
	30		28·0	Brown and yellow-brown SILTY CLAY; proportion of yellow-green to dark green massive CHLORITIC ROCK increases down hole.
	40		36·0	Dark green to blue-green, CHLORITISED BASIC ROCK, with a weak preferred orientation and grain size approximately 0·1-0·5mm; minor brown or yellow-green clay.
		E.O.H. 48·0m	46·0 Core	Core Log 46·0-48·0 m: Dark blue-green, massive to weakly-foliated TALC-CHLORITE-SERPENTINE ROCK (altered ultramafic rock?). Foliation and weak shearing at 20° to core axis. Not magnetic. Scattered thin quartz ± haematite veins, often banded parallel to margins. Jointed above 46·8 m, strongly broken below. 47·1-47·2 m: Quartz ± haematite veins. 47·8 m: Quartz vein.
	50			
	60			



Sampling
5936 RS 174 46·1m
5936 RS 175 47·85m Geochemistry and Petrology

SHEET 1 OF 1

PLAN No. S20122

MF 179

DEPARTMENT OF MINES AND ENERGY—SOUTH AUSTRALIA

ERD 4

KINGOONYA

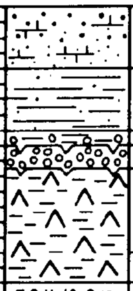
CORE DESCRIPTION

DEPTH 18·0m INCLINATION Vertical

LOGGED BY W. M. Cowley DATE DRILLED 28-30 Nov 1987

REFERENCE 5936000SW00111

	DEPTH (m)	GRAPHIC LOG		DESCRIPTION
QUATERNARY			Cuttings	Orange, calcareous, very coarse- down to medium-grained, clayey QUARTZ SAND.
			4·0	Dark red~brown, indurated, weakly calcareous SANDY CLAY; sand is medium-grained.
			8·0 / 9·0	Dark red~brown, indurated PEBBLY SANDY CLAY; pebbles of quartz, silcrete, green siltstone and ferruginous siltstone.
T	10		10·5	GRAVEL composed of broken pebbles and well-rounded granules of quartz, white and red quartzite and white silcrete; minor pale cream~grey clay.
EALBARA RHYOLITE			16·0 Core	Pale brown to orange~brown, massive, very fine-grained ACID~INTERMEDIATE VOLCANIC. Occasionally colour~mottled, finely speckled orange-on-brown or finely banded, (weathering feature ?).
	20	E.O.H. 18·0m		
	30			



Core Log

16·0~18·0m : Dark brown~grey, massive, very fine grained DACITE LAVA, with very rare tiny phenocrysts. Common, very fine orange speckling. No bedding or foliation observed. Commonly altered along network of fractures to yellow or orange colour. Later thin veinlets of white dolomite or calcite, dark red haematite or haematitic carbonate and bright orange~red material, with rare specks of pyrite near top. Strongly magnetic throughout.

16·5~16·6m : Altered to pink~grey and yellow~grey colour above and below a 2mm vein of calcite with a 5mm grain of black mineral.

16·95~17·2m : Altered to yellow~green and orange adjacent to fracture containing minor calcite and ? pyrite, and a thin calcite veinlet.

17·2~17·7m : Orange speckling more prominent.

17·8~17·9m : Area of alteration as at 16·95~17·2m adjacent to calcite veinlet.

Sampling

5936 RS 182 16·7m Geochemistry
5936 RS 176 16·95m Petrology
5936 RS 183 17·1m Geochemistry

SHEET 1 OF 1

PLAN No. S 20123

MF 179

DEPARTMENT OF MINES AND ENERGY – SOUTH AUSTRALIA

ERD 5

KINGOONYA

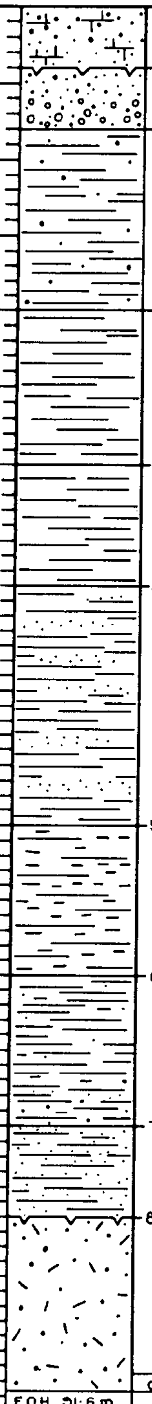
CORE DESCRIPTION

DEPTH 91·6m INCLINATION Vertical

LOGGED BY W M Cowley DATE DRILLED 1-2 Dec 1987

REFERENCE 5936000SW00112

	DEPTH (m)	GRAPHIC LOG		DESCRIPTION
Q			Cuttings	Orange, calcareous, slightly clayey, coarse- to very coarse-grained, down to medium-grained QUARTZ SAND. Rarely weakly indurated or gypsum-cemented.
TERTIARY			4·0	Pale green ~ grey, pale grey and pale yellow, clayey, medium- to coarse-grained QUARTZ SAND; common, well rounded granules and small pebbles of quartz in lower part. Non ~ calcareous.
	10		8·0	Pale green ~ grey to grey, slightly sandy CLAY. Sand is poorly sorted, fine-grained to granular, angular to subangular.
	20		20·0	Pale grey, dark blue ~ grey and black ~ grey CLAY. Black clay has rusty staining after pyrite and rare carbonaceous fragments.
	30		30·0	Pale grey and dark blue ~ grey CLAY.
	40		38·0	Grey, dark grey and yellow CLAY; dark brown to red LIMONITIC OR HAEMATITIC SILTSTONE and SANDSTONE; red ~ orange to red ~ pink haematitic CLAYEY SILT.
	50		54·0	Grey, red ~ pink and yellow CLAY and SILT, occasionally micaceous; minor red and yellow/red mottled, ferruginous rock, more common down hole.
	60		64·0	Grey and yellow CLAY; minor fine- to coarse-grained quartz sand, increasing down hole; minor ferruginous rock; rare ? pyrite below 70m.
	70		74·0	Grey and yellow CLAY; red ~ brown fine- to medium-grained SILTY SAND; minor yellow micaceous siltstone.
LABYRINTH FORMATION	80		80·0	Weathered BASEMENT: Green or green ~ brown MICACEOUS CLAY, plus weathered SILTSTONE, PHYLLITE or SANDSTONE increases down hole from 10% to 70% of sample; remainder is grey, pink and yellow clay and brownish fine sand (contamination).
	90	E.O.H. 91·6 m	90·5 core	Core Log 90·5 ~ 91·6m · Blue ~ green, massive, micaceous, medium- to coarse-grained LITHIC SANDSTONE, slightly coarser down hole. Indistinctly foliated, approximately 40° to core axis. Not magnetic. Scattered very fine pyrite grains in rock and on fractures. Fractures often subparallel to core axis, coated by black ~ green ? chlorite with local pyrite. Rare, faint, paler sandstone bands, suggesting bedding. 90·55m : Possible clast of darker green phyllite 1x6 cm aligned parallel to core axis and well foliated. 90·65m : Two indistinct paler green sandstone lenses 2 and 5 cm long, oriented approximately 30° to core axis. 91·35m : 5mm pyrite aggregate.
	100			



Sampling

5936 RS 177 91·5m Geochemistry and Petrology

5936 RS 184 20 ~ 22 m } Palynology

5936 RS 185 32 ~ 34 m } Palynology

SHEET 1 OF 1

PLAN Nº S 20124

MF 179

DEPARTMENT OF MINES AND ENERGY – SOUTH AUSTRALIA

ERD 6

KINGOONYA

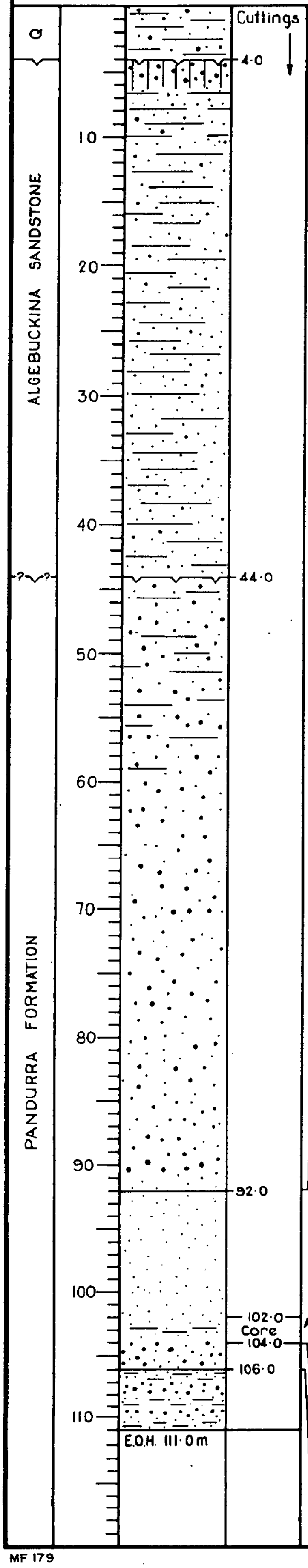
CORE DESCRIPTION

DEPTH 111·0m . . . . . INCLINATION Vertical . . .

LOGGED BY A.R. Martin, W.M. Cowley . . DATE DRILLED 2 - 4 Dec. 1987

REFERENCE 5936000SW00113

DEPTH (m)	GRAPHIC LOG		DESCRIPTION



Red~brown SAND and CLAY; sand is poorly-sorted, up to 1mm. Minor gypsum in lower part.

White to grey CLAYEY SAND and SANDY CLAY; sand is fine- to coarse-grained, with few grains up to 0·8mm, composed of quartz and minor feldspar, moderately well-sorted, subangular to subrounded. Very coarse-grained at top, probably silcreted.

Pale grey and brick~red, coarse- to very coarse-grained SANDSTONE and SAND. Sand is moderately well-sorted, subangular, composed of quartz with minor weathered feldspar and rare dark mineral grains.
Sandstone is clayey above 60m.

Brick~red to purplish~red, fine- to medium-grained QUARTZ SAND, well-rounded to subangular, mostly well-sorted, slightly clayey or silty.

Core Log

102·0 ~ 103·15m : White, medium- to coarse-grained, well-sorted QUARTZ SANDSTONE, with sparse clay or sericite matrix. Subhorizontal bedding and cross-bedding outlined by thin, greyish fine-grained sandstone beds. Scattered red and grey shale and siltstone intraclasts. Minor red haematite staining; rare green and white grains, possibly feldspar. Basal contact probably erosional.

103·15 ~ 103·55m : Green~grey and red~brown, mottled SHALE and micaceous SILTSTONE, interbedded with white, red~mottled, very fine- to fine-grained SANDSTONE. Red~brown colour results from oxidation of green~grey sediments, colour boundaries sharp in fine sediments, diffuse in sandstone. Bedding may be normally graded.
Gradational contact to :

103·55 ~ 103·8m : White, red~mottled, fine- to medium-grained SANDSTONE, grading to greenish~white, micaceous SILTSTONE or fine-grained SANDSTONE. Thin red~brown siltstone interbeds and intraclasts. Brown mineral in bedding parting at 103·62m.
Gradational contact to :

103·8 ~ 103·92m : Red and white, interbedded fine- to medium-grained micaceous SANDSTONE and medium- to coarse-grained SANDSTONE, with red~brown shale intraclasts. Bedding irregular and diffuse; rare green or yellowish granules.
Gradational lower contact.

103·92 ~ 104·0m : Pale red to red, fine-grained SANDSTONE with some diffuse medium-grained lenses. Bedding folded by soft~sediment deformation.

Poorly sorted, very fine- to coarse-grained, pale red QUARTZ SAND; minor red silty clay.

Brown~red, well-rounded to subangular, medium- to coarse-grained QUARTZ SAND, and bright red~brown fine- to medium-grained SILTY SAND. Rare jaspilite or acid volcanic grains.

SHEET . . 1 . . OF . . 1 . . .

PLAN Nº S 20125

MF 179

DEPARTMENT OF MINES AND ENERGY—SOUTH AUSTRALIA

ERD 7

KINGOONYA

CORE DESCRIPTION

DEPTH 126·0m

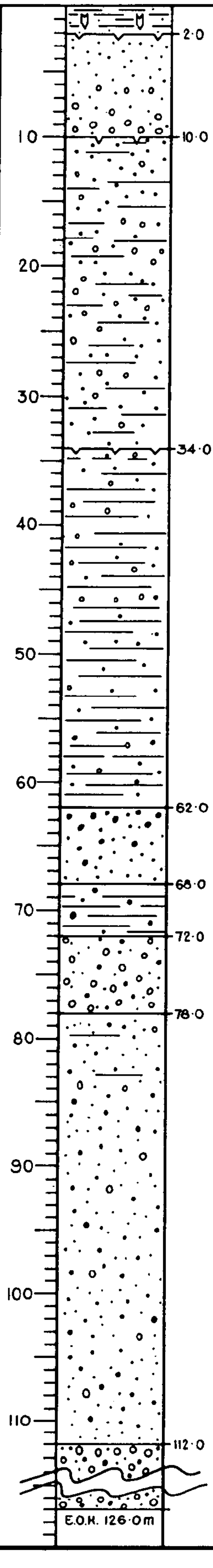
INCLINATION Vertical

LOGGED BY A.R. Martin, W.M. Cowley

DATE DRILLED 5-7 Dec 1987

REFERENCE 5936000SW00114

	Depth (m)	Description
Q	0–2·0	Red, gypsiferous CLAY, with minor quartz sand and silt.
TERTIARY	2·0–10·0	Pale grey to yellow, moderately poorly-sorted, very coarse-grained, down to pebbly, SAND. Fragments of white-translucent quartz and minor jaspilite at base. Possibly silcreted.
ALGEBUCKINA SANDSTONE	10·0–34·0	Pale grey to white, very coarse-grained to granular CLAYEY SANDSTONE, with scattered fine pebbles of quartz, minor feldspar and rare black ? chert. Sand is angular to subangular in upper part, subangular to subrounded below. Clay content 40~50%.
PANDURRA FORMATION	34·0–62·0	Pale grey and minor red SANDY CLAY; sand (20~40%) is quartz, angular down to subangular, very coarse-grained to granular, with rare small pebbles. Minor feldspar and iron~stained quartz grains.
	62·0–68·0	Pale grey, granular down to coarse-grained SANDSTONE; sand is quartz, moderately well-sorted, subangular, with few granules. Minor red clay.
	68·0–72·0	Pale grey and red SANDY CLAY; sand is very coarse-grained to granular, subangular.
	72·0–78·0	Poorly-sorted, subangular, pinkish, very fine- to very coarse-grained PEBBLY SAND with up to 50% quartz granules and pebbles to 1 cm.
	78·0–112·0	Pink, orange or red, poorly sorted, very fine-to coarse-grained silty SAND; minor granules and pebbles of quartz up to 2 cm. Trace pink~white clay in upper part.
	112·0–126·0	Red to pink, very fine- to coarse-grained, poorly-sorted, subangular PEBBLY SAND, with up to 60% quartz granules and pebbles to 1·5 cm. Rare red~brown siltstone. Rare pink, sandy, silty clay.



SHEET 1 OF 1

PLAN Nº S 20126

MF 179

DEPARTMENT OF MINES AND ENERGY – SOUTH AUSTRALIA

ERD 8

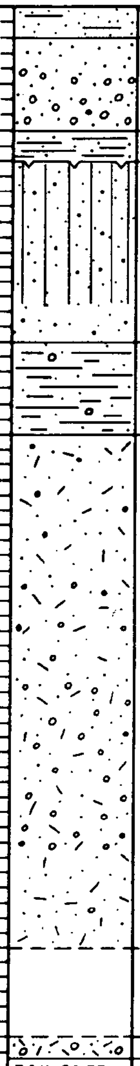
KINGOONYA
CORE DESCRIPTION

DEPTH 69.33m | INCLINATION Vertical

LOGGED BY A.R. Martin, W.M. Cowley | DATE DRILLED 8-9 Dec. 1987

REFERENCE 5936000SW00115

	DEPTH (m)	GRAPHIC LOG		DESCRIPTION
QUATERNARY			Cuttings 2.0	Red-brown, slightly indurated, clayey, fine- to medium-grained SAND. Calcareous. Very coarse-grained to granular QUARTZ SAND; minor red-brown sand and silt. Pebbles up to 8mm of quartz and silcreted sandstone in lower part.
			8.0	Red-brown SANDY CLAY; sand is poorly-sorted, up to very coarse-grained.
LABYRINTH FORMATION	10		10.0	Whitish and yellow, down to pink, fine- to medium-grained SILCRETED SANDSTONE; minor, angular, quartz sand and granules. Rare silicified pink siltstone. Silicification decreases downhole.
	20		22.0	Pink to white, SANDY, SILTY CLAY; sand is very fine- to medium-grained, with scattered granules and pebbles to 1cm.
	30, 40, 50, 60		28.0	Pink, white and red, subangular, fine- to medium-grained, LITHIC, SERICITIC SANDSTONE and fine-grained to granular SAND composed mainly of quartz, with fragments of purple-red chert and banded chert (54-58m), and common quartz granules and pebbles up to 2cm, (44-56m). Sandstone has scattered red-orange and white lithic and ? feldspar grains. Rare pink siltstone.
			62.0	No Sample
	70	E.O.H 69.33m	68.0 Core	



Core Log

68.0 – 69.33m : Red-purple, weakly-foliated, poorly-sorted, fine- to coarse-grained LITHIC SANDSTONE with pebbly sandstone interbeds. Composed of grains of clear and reddish quartz, common red, orange or pink chert or acid volcanics, occasional heavy-mineral grains and rare jaspilite in a sparse sericitic and dolomitic matrix. Not magnetic. Bedding revealed by concentrations of heavy-mineral bands or of the red-coloured grains, and is oriented 20-25° to core axis. No cross-bedding obvious. Foliation oriented 0-10° to core axis. Pebbly bands at 68.05m, 68.3m and 68.8m but pebbles may occur sporadically throughout; consist of white, pink or greyish quartz, pink or grey chert, bright red jaspilite, red, pink or purple ? acid volcanic and rare greenish-brown limestone up to 5cm in size. Smaller clasts may be stretched by foliation. Several coarsely-crystalline gypsum veins up to 4mm wide, rare calcite veins.

Sampling.

5936 RS 178 69.1m Geochemistry and petrology

SHEET 1 OF 1

PLAN Nº S 20127

MF 179

DEPARTMENT OF MINES AND ENERGY – SOUTH AUSTRALIA

ERD 9

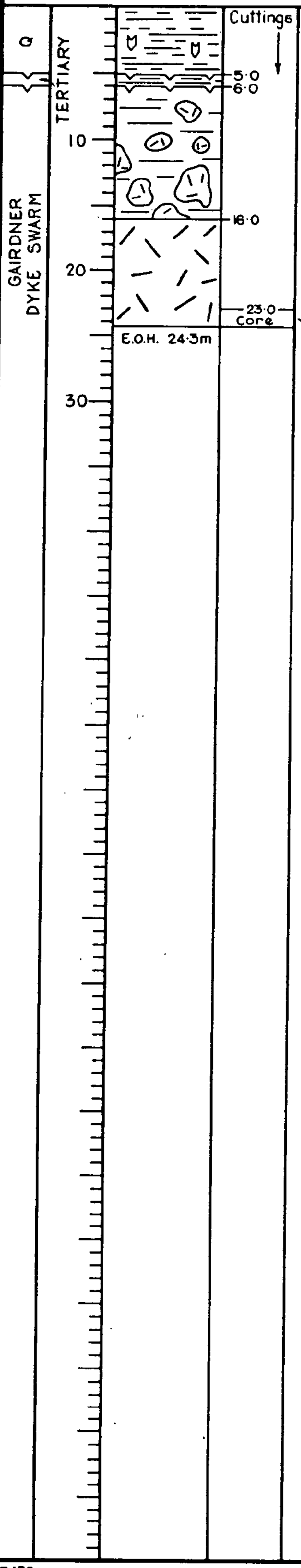
KINGOONYA
CORE DESCRIPTION

DEPTH 24·3m. INCLINATION Vertical

LOGGED BY W.M Cowley DATE DRILLED 9 Dec 1987.

REFERENCE 5936000SW00116

	DEPTH (m)	GRAPHIC LOG		DESCRIPTION



Red~orange and orange, SILTY CLAY, sandy and calcareous at top. Minor selenite gypsum.

Pale grey to white CLAY.

Weathered BASEMENT: Red~brown, yellow~brown and pale green CLAY and red~brown and dark~brown FERRUGINOUS ROCK.

Weathered dark brown~green and fresh green~black massive DOLERITE; minor green~brown CLAY.

Core Log

23·0~24·3m: Dark blue~green, massive, coarse~grained DOLERITE, largely altered to brown and yellow~orange by spheroidal weathering, which also induces a concentric fracture pattern around the less~altered cores. Strongly magnetic. Common limonite on fractures, accompanied by pale green clayey material at 23·55~23·85m. Strongly broken where spheroidal weathering strongest.

Sampling

5936 RS 179 23·15m Geochemistry and petrology

SHEET 1 OF 1

PLAN No S 20128

MF 179

APPENDIX 3

GEOCHEMICAL ANALYSES

			Au(ppb)	Pt(ppb)	Pd(ppb)
5936 RS 174	ERD-3	46.1 m	3	5	6
175	-3	47.85 m	2	10	6
177	-5	91.5 m			
178	-8	69.1 m			
179	-9	23.15 m	1	5	6
180	-1	39.4 m			
181	-2	16.05 m			
182	-4	16.7 m			
183	-4	17.1 m			

SILICATE AND TRACE ELEMENT ANALYSIS

ERD 1-9

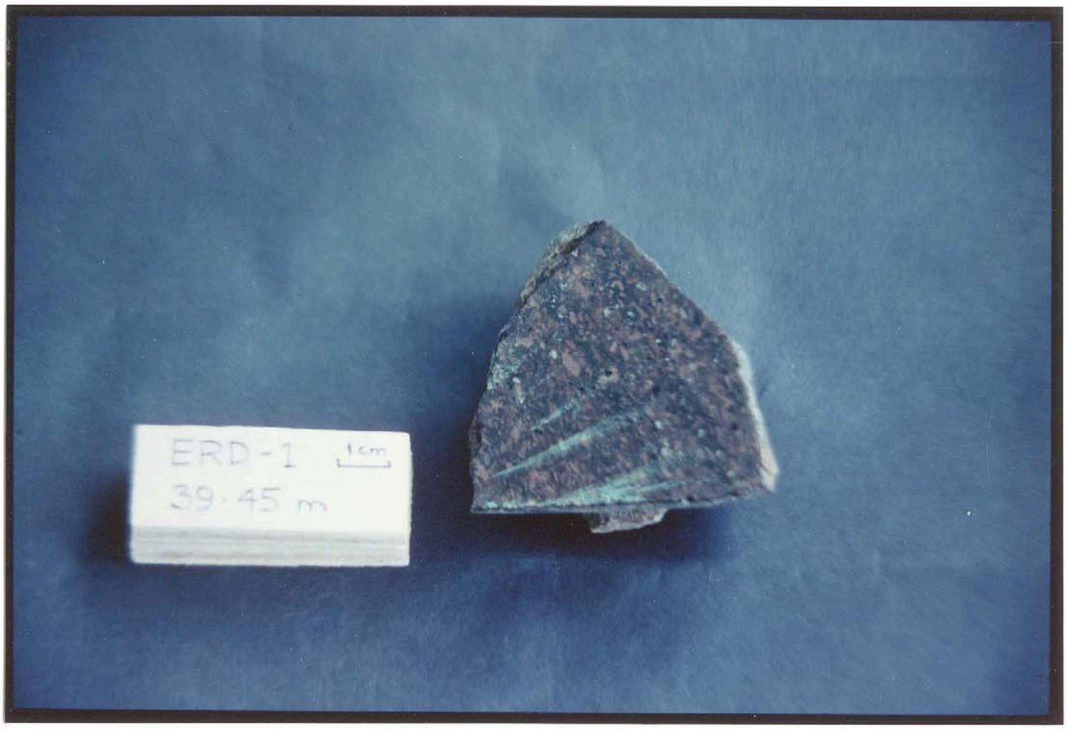
Major and Trace Elements Analysis

	5936 RS000174	5936 RS000175	5936 RS000177	5936 RS000178	5936 RS000179	5936 RS000180	5936 RS000181	5936 RS000182	5936 RS000183
SiO2	48.40	56.00	68.50	69.90	49.30	60.10	82.10	62.00	62.00
TiO2	0.60	0.53	0.57	0.35	1.65	0.77	0.13	0.98	1.00
Al2O3	9.95	10.50	12.40	6.40	13.70	16.10	8.75	16.20	16.10
Fe2O3	3.86	2.10	1.36	4.32	9.07	2.65	1.51	2.98	2.90
FeO	8.24	6.85	4.49	0.28	4.63	2.35	0.28	2.52	2.70
MnO	0.22	0.16	0.07	0.25	0.24	0.07	0.03	0.09	0.10
MgO	15.60	11.70	4.66	3.20	6.30	2.68	1.31	1.94	1.94
CaO	8.55	6.70	0.26	5.10	10.40	2.10	0.15	1.81	1.54
Na2O	1.16	2.76	2.20	0.11	2.22	3.96	0.58	6.00	5.95
K2O	0.21	0.15	1.77	2.40	0.45	4.72	2.74	3.20	2.86
P2O5	0.05	0.04	0.18	0.10	0.15	0.32	0.03	0.41	0.42
H2O+									
H2O									
CO2									
LOI	4.12	3.16	3.24	7.00	2.38	2.32	1.87	2.44	2.38
TOTAL	100.96	100.65	99.70	99.41	100.49	98.14	99.48	100.57	99.89
Ag	1.00	1.00	1.00	1.00	1.00	<1.00	1.00	<1.00	<1.00
As	45.00	45.00	<5.00	85.00	<5.00	<5.00	<5.00	<5.00	<5.00
Au	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ba	85.00	85.00	155.00	440.00	400.00	2100.00	400.00	990.00	2200.00
Bi	5.00	10.00	5.00	<5.00	15.00	15.00	<5.00	10.00	5.00
Ce	<20.00	<20.00	60.00	50.00	30.00	80.00	30.00	60.00	60.00
Co	30.00	55.00	30.00	40.00	75.00	60.00	85.00	40.00	30.00
Cr	920.00	840.00	55.00	40.00	130.00	70.00	45.00	30.00	15.00
Cs	<20.00	20.00	20.00	20.00	20.00	<20.00	20.00	<20.00	<20.00
Cu	35.00	100.00	10.00	15.00	140.00	55.00	40.00	10.00	5.00
La	<20.00	20.00	40.00	40.00	<20.00	50.00	30.00	40.00	40.00
Li									
Mo	5.00	5.00	5.00	<5.00	10.00	5.00	10.00	5.00	5.00
Nb	<2.00	5.00	11.00	7.00	6.00	12.00	5.00	<4.00	10.00
Nd									
Ni	210.00	210.00	25.00	15.00	110.00	35.00	35.00	5.00	5.00
Pb	45.00	45.00	20.00	30.00	35.00	30.00	45.00	20.00	20.00
Rb	9.00	7.00	92.00	84.00	62.00	140.00	105.00	86.00	72.00
Sb	50.00	45.00	10.00	10.00	25.00	15.00	20.00	15.00	15.00
Sc									
Sn	6.00	<4.00	10.00	4.00	<4.00	<4.00	<4.00	<4.00	4.00
Sr	52.00	72.00	64.00	32.00	170.00	1140.00	24.00	870.00	940.00
Th	<4.00	<4.00	6.00	12.00	<4.00	8.00	4.00	9.00	4.00
Ti									
U	<4.00	<4.00	6.00	<4.00	4.00	<4.00	<4.00	<4.00	<4.00
V	160.00	190.00	70.00	35.00	380.00	100.00	30.00	60.00	60.00
Y	6.00	8.00	16.00	6.00	12.00	18.00	6.00	16.00	18.00
Zn	210.00	140.00	95.00	30.00	120.00	70.00	45.00	85.00	80.00
Zr	32.00	26.00	185.00	140.00	92.00	200.00	62.00	200.00	160.00

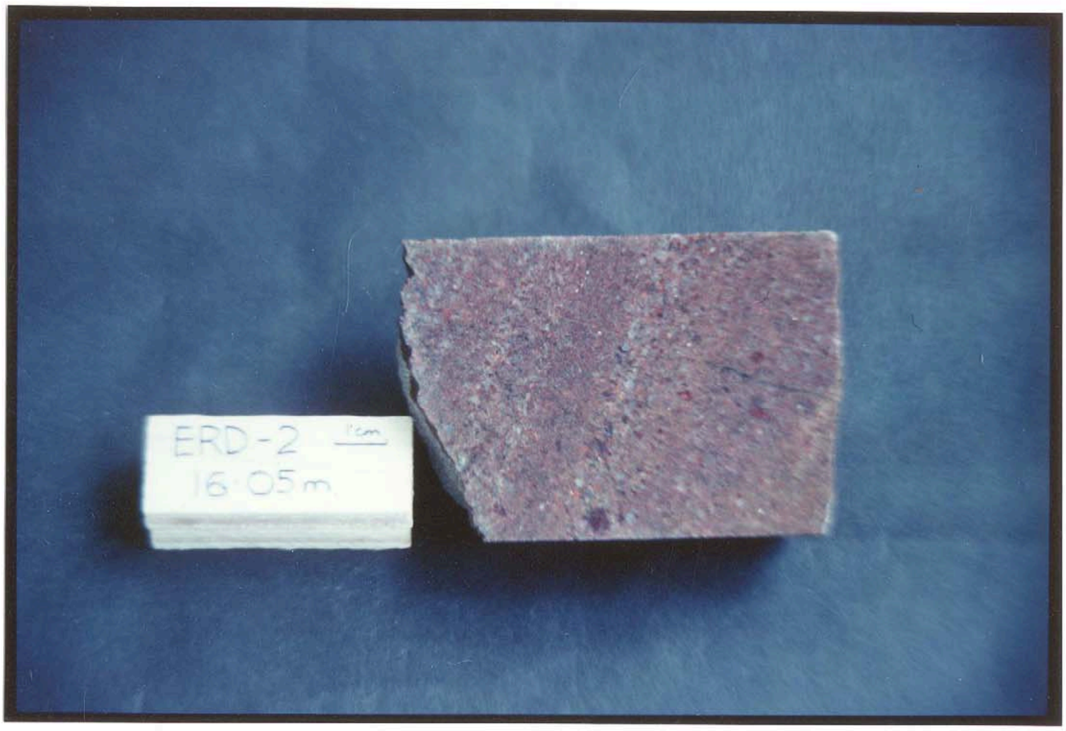
Major Elements expressed as weight % - Trace Elements expressed as PPM

APPENDIX 4

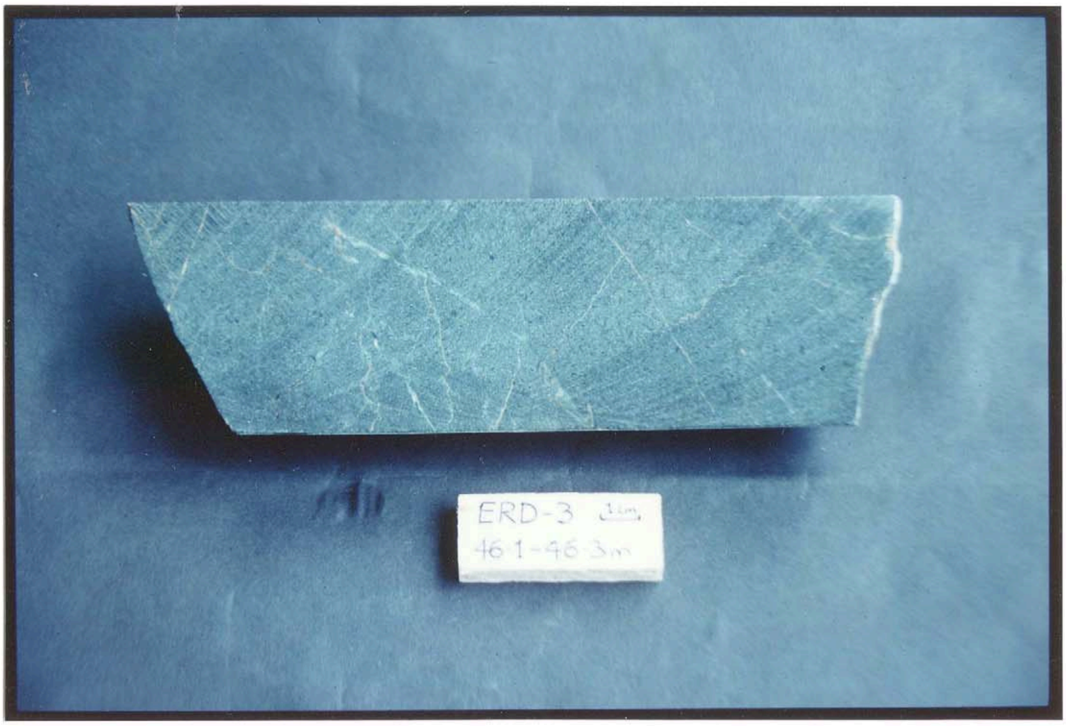
PHOTOGRAPHS



SLIDE 36454 : ERD-1, 39.45 m. Porphyritic dacite, Ealbara Rhyolite of Gawler Range Volcanics.

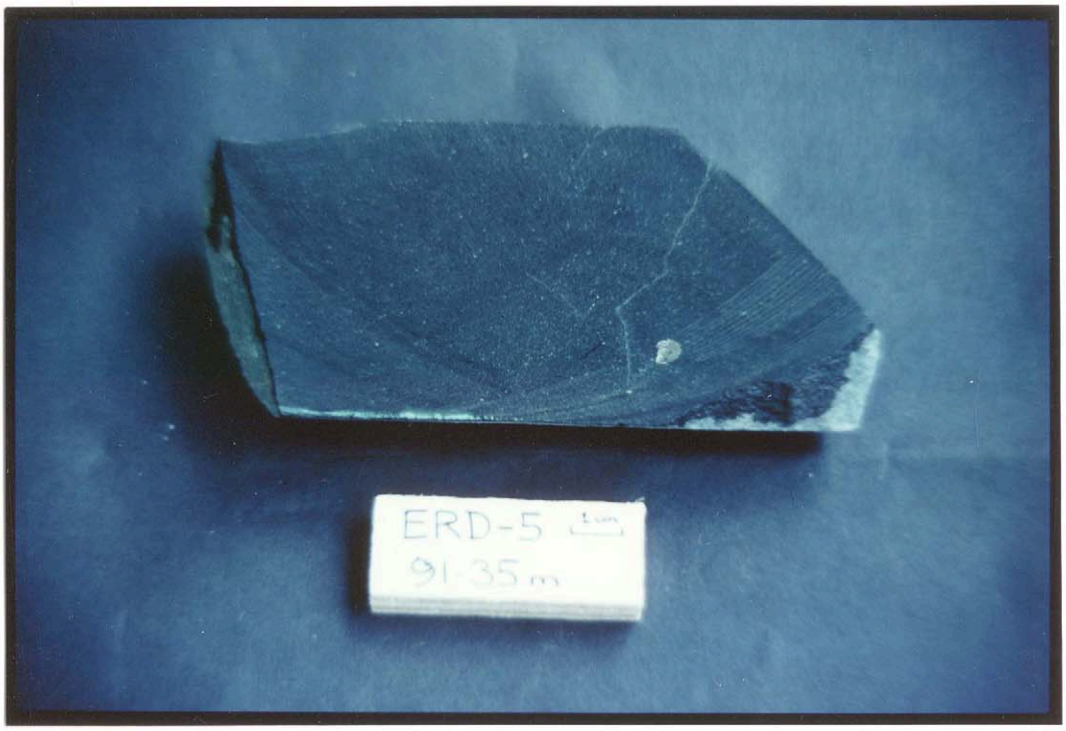


SLIDE 36455 : ERD-2, 16.05 m. Lithic sandstone of Labyrinth Formation. Bedding outlined by grainsize variation.

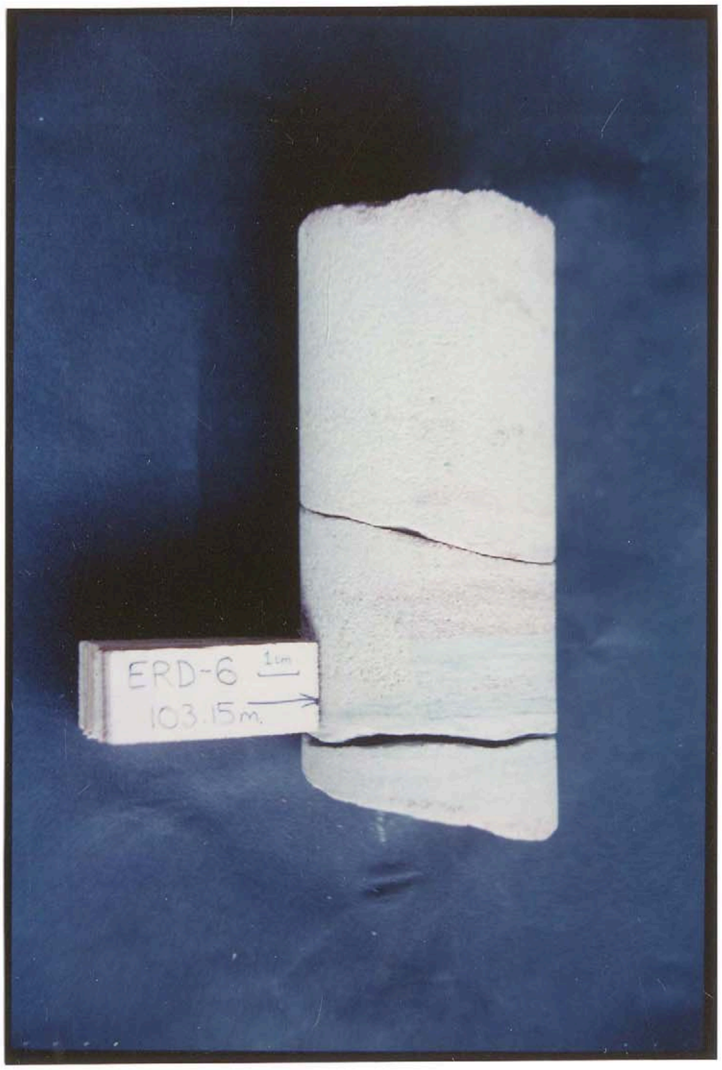


SLIDE 36456: ERD-3, 46.1-46.3 m. Blue-green, talc-chlorite-serpentine rock, possibly weathered ultramafic. No structure obvious. Marks are those made by saw.

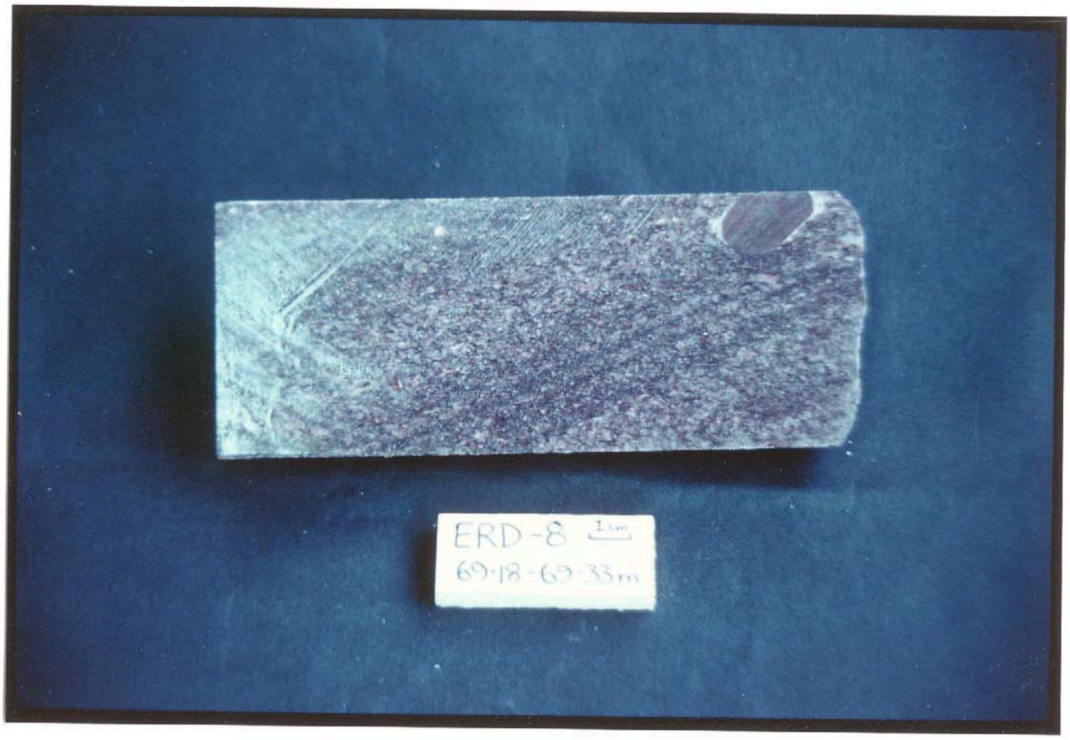
SLIDE 36457: ERD-4, 16.95 m. Massive dacite, Ealbara Rhyolite of Gawler Range Volcanics. Note orange and yellow alteration adjacent to fractures, and fine orange speckling.



SLIDE 36458: ERD-5, 91.35 m. Blue-green, massive lithic sandstone of Labyrinth Formation. Pyrite aggregate lower right.



SLIDE 36459: ERD-6, 103.15 m. White quartz sandstone overlying red-brown and grey-green shale, siltstone and fine-grained sandstone with erosional contact. Red-brown colour resulting from oxidation of grey-green colour in more porous sediments.



SLIDE 36460: ERD-8, 69.18-69.33 m. Lithic sandstone of Labyrinth Formation. Bedding outlined by heavy-mineral banding.

SLIDE 36461: ERD-9, 23.12-23.41 m. Dolerite of Gairdner Dyke Swarm. Note spheroidal weathering pattern.

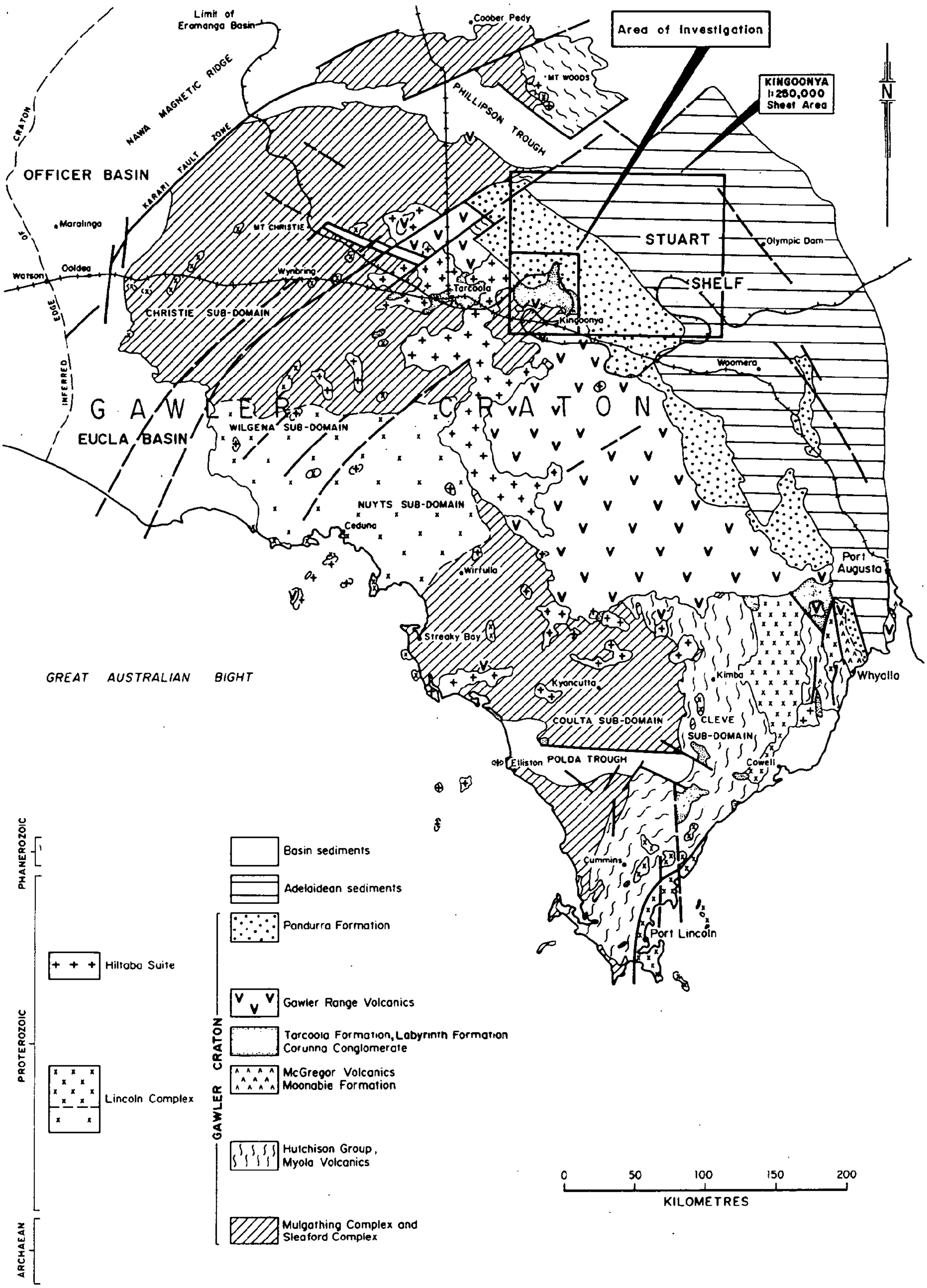
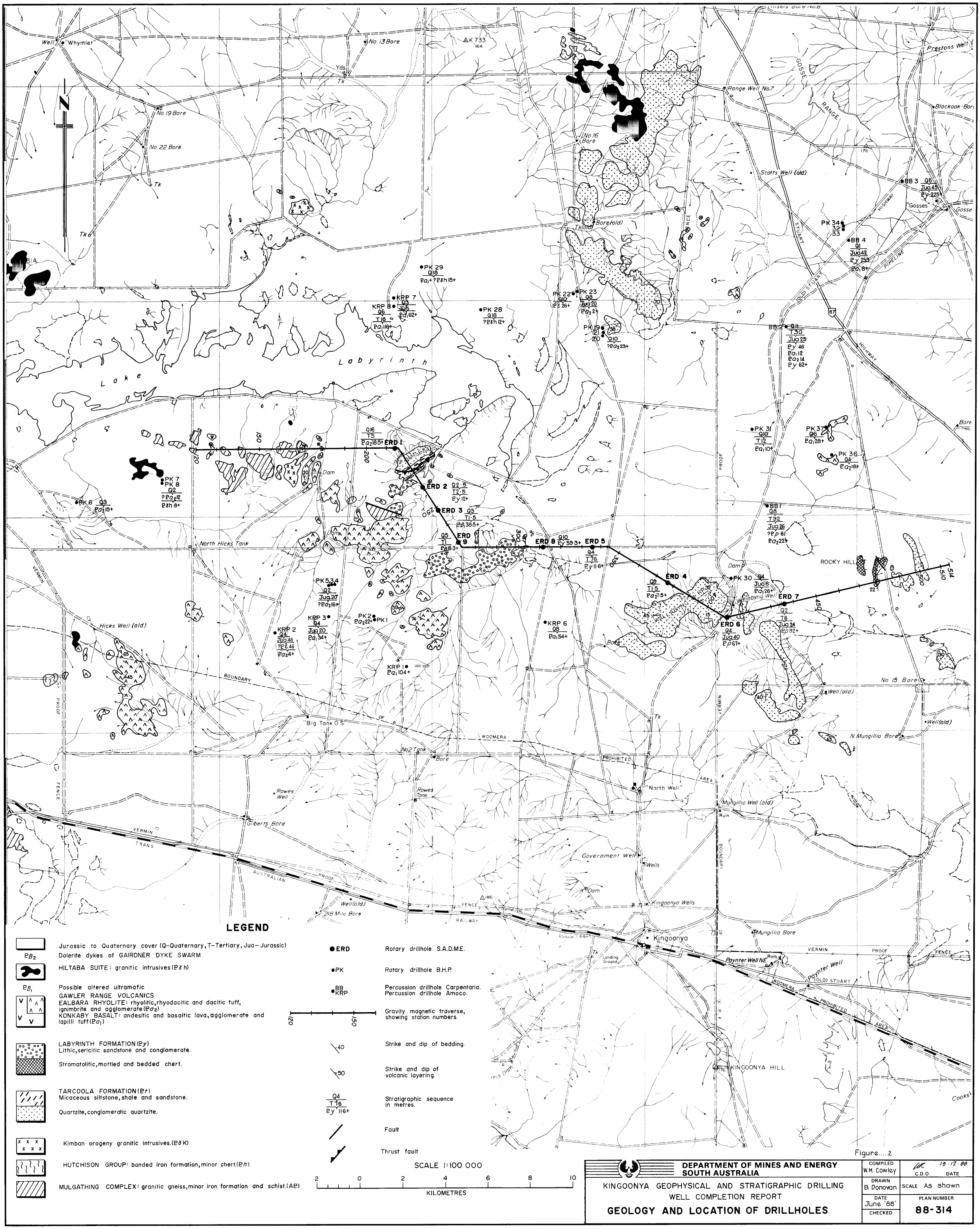


figure.....1

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED W.M. Cowley	C.D.O. 19·12·88 DATE
KINGOONYA GEOPHYSICAL AND STRATIGRAPHIC DRILLING WELL COMPLETION REPORT	DRAWN B. Donovan	SCALE AS shown
REGIONAL TECTONICS & LOCALITY	DATE June '88' CHECKED	PLAN NUMBER S 20117



N
"Whymlet"
Well
No.13 Bore
K733
No.19 Bore
No.22 Bore
Range Well No.7
Prestons Well
GOSSE RANGE
Blackoak Bore
No 16 Bore
Scotts Well (old)
BB 3
"Gosses"
STUART HIGHWAY
PIPELINE
PK 34 32 33
BB 4
PK 29
KRP 7
KRP 8
PK 28
PK 22
PK 23
PK 19 21 20
BB 2
Lake Labyrinth
PK 31
PK 37
PK 36
ERD 1
ERD 2
ERD 3
ERD 9
ERD 8
ERD 5
ERD 4
ERD 6
ERD 7
PK 7
PK 8
PK 6
BB 1
ROCKY HILL
North Hicks Tank
PK 30
PK 534
KRP 3
PK 2
PK 1
KRP 2
KRP 6
KRP 1
Hicks Well (old)
BOUNDARY
No 15 Bore
"Big Tank 0.5"
WOOMERA
PROHIBITED AREA
N. Mungillia Bore
No2 Tank
Bore
"North Well"
Rowes Well
Rowes Tank
Gilberts Bore
Mungillia Well (old)
Ruin
VERMIN
TRANS AUSTRALIAN RAILWAY
PROOF FENCE
Government Well
Wells
Dam
Well (old)
218 Mile Bore
Kingoonya Wells
Kingoonya
Landing Ground
Mungillia Bore
Paynter Well NE
Paynter Well
(OLD) STUART
KINGOONYA HILL
LEGEND
Jurassic to Quaternary cover (Q-Quaternary, T-Tertiary, Jua-Jurassic)
Dolerite dykes of GAIRDNER DYKE SWARM
HILTABA SUITE: granitic intrusives (Pɣh)
Possible altered ultramafic
GAWLER RANGE VOLCANICS
EALBARA RHYOLITE: rhyolitic, rhyodacitic and dacitic tuff, ignimbrite and agglomerate (Pa2)
KONKABY BASALT: andesitic and basaltic lava, agglomerate and lapilli tuff (Pa1)
LABYRINTH FORMATION (Py)
Lithic, sericitic sandstone and conglomerate.
Stromatolitic, mottled and bedded chert.
TARCOOLA FORMATION (Pr)
Micaceous siltstone, shale and sandstone.
Quartzite, conglomeratic quartzite.
Kimban orogeny granitic intrusives. (PɣK)
HUTCHISON GROUP: banded iron formation, minor chert. (Ph)
MULGATHING COMPLEX: granitic gneiss, minor iron formation and schist. (AP)
ERD Rotary drillhole S.A.D.M.E.
PK Rotary drillhole B.H.P.
BB Percussion drillhole Carpentaria.
KRP Percussion drillhole Amoco.
Gravity magnetic traverse, showing station numbers.
Strike and dip of bedding.
Strike and dip of volcanic layering.
Q4 T16 Py 116+ Stratigraphic sequence in metres.
Fault
Thrust fault
SCALE 1:100 000
2 0 2 4 6 8 10
KILOMETRES
Figure.....2
DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA
KINGOONYA GEOPHYSICAL AND STRATIGRAPHIC DRILLING
WELL COMPLETION REPORT
GEOLOGY AND LOCATION OF DRILLHOLES
COMPILED W.M. Cowley
C.D.O. DATE 19.12.88
DRAWN B. Donovan
SCALE As shown
DATE June '88
PLAN NUMBER 88-314
CHECKED

REFERENCE

CAINOZOIC

QUATERNARY

Q — Undifferentiated Quaternary sediments.

TERTIARY — *MIOCENE* / *EOCENE–MIOCENE*

Ts — Fine-grained to pebbly, mostly poorly-sorted grey sand,usually silcreted,grading to massive "grey-billy" silcrete. Commonly ferruginised to yellow-brown colour. Occasionally conglomeratic,with pebbles to boulders of quartzite and quartz, and local silcrete, chert, acid volcanics or greisen. White,saccharoidal, fine-to medium-grained, well-sorted silcreted sandstone,with prominent large-scale cross-bedding,minor pebbly interbeds and rare ripple-marks.

Te-m — Pale green,grey and brown, sandy or silty clay,often oxidised to red-brown colour and containing scattered carbonaceous fragments; white to yellow-orange, fine to medium-grained quartz sand with minor quartz pebbles; black, gypsiferous and carbonaceous clay and sand. Probably comprises Miocene GARFORD FORMATION and Eocene PIDINGA FORMATION.(Subsurface only).

Tfe — Yellow to dark brown lateritic ironstone,developed within ALGEBUCKINA SANDSTONE. Probably includes Tertiary sandstone.

EROMANGA BASIN

MESOZOIC

CRETACEOUS

Kmb — BULLDOG SHALE: Massive,white, kaolinitic mudstone and siltstone,rarely sandy. Rare interbeds of fine-to coarse-grained kaolinitic sandstone.

JURASSIC

Jua — ALGEBUCKINA SANDSTONE: White, kaolinitic,fine-grained to granular sandstone,with interbeds of white, kaolinitic mudstone and sandy siltstone. Quartz grains may be milky, smoky, orange or bluish. Local pebbly sandstone or conglomerate,with clasts of quartz and quartzite,and rare kaolinitic siltstone, acid volcanics, banded iron formation or chert. Usually massive; local trough cross-bedding. Commonly silicified where overlain by silcreted Ts sandstone.

GAWLER CRATON

PROTEROZOIC — *MIDDLE PROTEROZOIC*

$P\beta_2$ — Dolerite dykes of GAIRDNER DYKE SWARM (Subsurface).(ERD-9)

Pp — PANDURRA FORMATION: Pale grey and red—brown, fine to coarse—grained sandstone; minor red—brown and grey—green siltstone. (ERD-6,7)

HILTABA SUITE

$P\gamma hg$ — Quartz ± muscovite ± topaz ± pyrite ± fluorite ± zircon greisen, developed by alteration of porphyritic microgranite,and quartzite of TARCOOLA FORMATION.

$P\gamma h$ — Red to pink, fine- to coarse-grained microcline + quartz + plagioclase ± hornblende ± biotite granite — adamellite,and orthoclase + pyroxene + hornblende syenite, occasionally porphyritic or granophyric; dark red to pink, mafic-poor porphyritic microgranite. Biotite + hornblende granodiorite and quartz monzodiorite reported in drillholes.

Pa_4 — WILTABBIE VOLCANICS equivalent ?: Dykes of red-orange to pink rhyolite,grey porphyritic rhyodacite and grey, vesicular basalt.

$P\beta_1$ — Dark blue-green altered talc + chlorite ± serpentine rock,possibly ultramafic. (ERD-3)

GAWLER RANGE VOLCANICS

Pa_2 — EALBARA RHYOLITE(Pa_2): Brick-red,red-brown, grey and purple rhyolitic, rhyodacitic and dacitic welded tuff and ignimbrite, with common compaction layering and flattened lapilli. Generally porphyritic,with phenocrysts of quartz and red-orange K-feldspar in rhyolite and rhyodacite,and pink-white plagioclase in rhyodacite and dacite. Purple-red and brick-red porphyritic rhyolite and rhyodacite lava flows at Tomato Rocks, with prominent,large scale, contorted flow-banding. (ERD-1,4)

: Off-white,greenish and pink, massive and finely-banded (?tuffaceous) chert, fine to coarse rhyolitic lapilli tuff and agglomerate, and flow-banded, sparsely porphyritic, rhyolite lava; common finely-laminated siliceous concretions and geodes in cherts.

Pa_1 — KONKABY BASALT: Blue-green,dark green and black, andesitic and basaltic amygdaloidal lava, agglomerate and lapilli tuff. Mostly strongly altered.

LABYRINTH FORMATION

Py_2 — Dark red, orange and grey-green, indurated, fine to medium-grained lithic sandstone, and laminated and massive cherty and carbonaceous siltstone to very fine-grained sandstone. Interbeds of dark green-black magnetic basalt and pink-orange rhyolite in drillholes. (Stratigraphic position uncertain).

Py_1 — Off-white, pink and purple, sericitic pebbly sandstone, with pebbles to large boulders of white, red or dull green quartzite, quartz, quartzite-breccia, grey, brown or cream limestone or dolomite (some stromatolitic), and minor banded iron formation, mottled chert, shale, acid volcanics, granite or dolerite. Rare possible interbeds of pale brown, pink and buff rhyodacitic ignimbrite and rhyolitic welded tuff.

Off-white, pink and purple, sericitic, foliated medium- to very coarse-grained sandstone, with local interbeds of sericitic phyllite, siltstone, fine-grained sandstone and rhyolitic tuff. Local, prominent, moderate-scale high-angle cross-bedding, and heavy mineral laminae. Scattered quartz, quartzite and chert pebbles. (ERD-2,5,8)

Λ — Interbed of pink, foliated rhyolite and pink or white, mottled chert. Radiometric age ca. 1620 Ma (U-Pb).

Finely banded, stromatolitic, brecciated or mottled, pink, white and dark grey chert. Occasionally strongly ferruginised.

TARCOOLA FORMATION

Interbedded, foliated, red-brown to buff, micaceous siltstone, shale and fine- to medium-grained sandstone, commonly cross-bedded. Local highly weathered and ferruginised amygdaloidal basalt, possibly partly fragmental or tuffaceous.

Pr — White to very pale green or pink-brown, massive, medium-grained to granular, silicified quartzite, occasionally cross-bedded. Rare clay pellets. Occasional pebbly quartzite and local flaggy, silty quartzite interbeds. Thin, dark grey to red ferruginous quartzite bed at top.

White, medium-to coarse-grained silicified quartzite containing rounded pebbles of white quartz and quartzite, red jasper and grey-red iron formation. Grades upwards into overlying quartzite.

ARCHAEAN TO EARLY PROTEROZOIC — *EARLY PROTEROZOIC*

?KIMBAN OROGENY INTRUSIVES

$P\gamma k$ — Red to orange, medium-to coarse-grained quartz + plagioclase + K feldspar granitoid gneiss, occasionally porphyritic. Contains local flourite.

?HUTCHISON GROUP

Ph — WILGENA HILL JASPILITE: Blue-black, brown or red and black quartz + magnetite + limonite banded iron formation. Minor interbedded banded chert.

MULGATHING COMPLEX

$A Pmk$ — KENELLA GNEISS: Orange to red, fine to coarse-grained, quartz + microcline + plagioclase ± muscovite ± garnet gneissic granite and grey-pink, coarse-grained plagioclase + quartz + K-feldspar + biotite gneissic adamellite. Local hornblende + plagioclase amphibolite, and greenish quartz + muscovite schist.

$A Pmc$ — CHRISTIE GNEISS: Quartzofeldspathic gneiss with local garnet, sillimanite, magnetite or pyrite; chloritised and sericitised. (in drillholes)

$A Pmci$ — Brown, quartz + limonite + cummingtonite/grunerite ± magnetite banded iron formation. Rare ferruginous, pyritic banded chert.

Figure......3

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED W.M. Cowley	C.D.O.	19·12·88 DATE
KINGOONYA GEOPHYSICAL AND STRATIGRAPHIC DRILLING WELL COMPLETION REPORT	DRAWN B. Donovan	SCALE	
STRATIGRAPHY OF PROJECT AREA	DATE June '88' / CHECKED	PLAN NUMBER S 20118	

LEGEND

● ERD 5..........ROTARY DRILLHOLE S.A.D.M.E.

|———| ....GRAVITY MAGNETIC TRAVERSE

-150 ............AEROMAGNETIC CONTOUR WITH VALUE IN NANO-TESLAS

Survey flown for Amoco Minerals (Aust.) Co. by Geoex Pty. Ltd. in 1980.

SCALE 1:100 000

2 0 2 4 6 8 10

KILOMETRES

Figure....4.

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA

KINGOONYA GEOPHYSICAL AND STRATIGRAPHIC DRILLING

WELL COMPLETION REPORT

AMOCO AEROMAGNETIC CONTOURS

COMPILED W.M. Cowley	C.D.O.	DATE 19-12-88	
DRAWN B. Donovan	SCALE As shown		
DATE June '88'	PLAN NUMBER		
CHECKED	88-315		

LEGEND

● ERD	Rotary drillhole (S.A.D.M.E.)
○	Barometrically levelled gravity station (Amoco)
·	Optically levelled gravity station (Amoco)
—5—	Gravity contour with value in milligalls
┼┼┼┼	Gravity magnetic traverse (S.A.D.M.E.)
○ BM 2527	Base station for S.A.D.M.E. gravity traverse

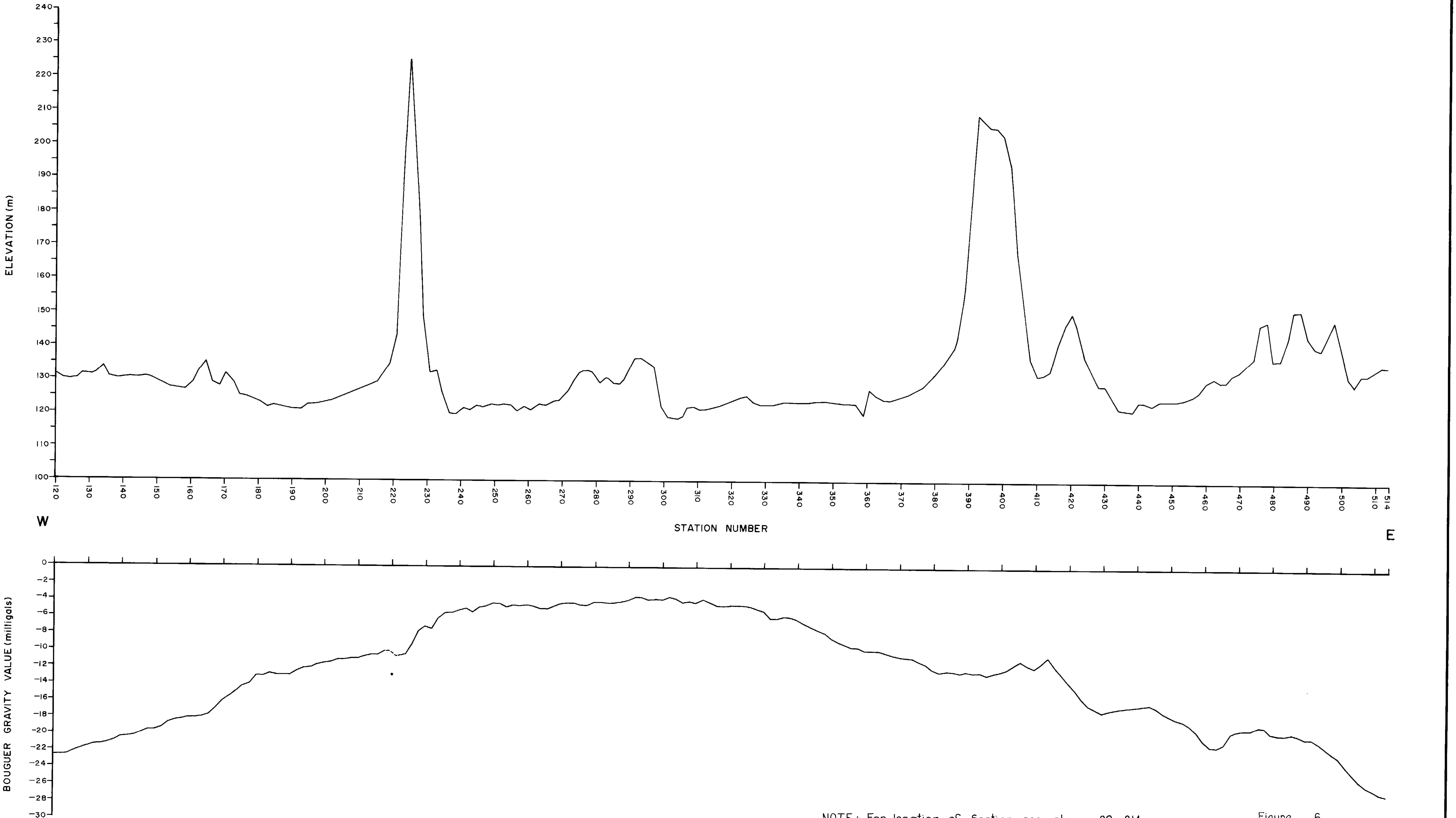
SCALE 1:100 000

2 0 2 4 6 8 10

KILOMETRES

Figure 5

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED W.M. Cowley	10.12.88 C.D.O. DATE
KINGOONYA GEOPHYSICAL AND STRATIGRAPHIC DRILLING WELL COMPLETION REPORT	DRAWN B. Donovan	SCALE As shown
	DATE June '88	PLAN NUMBER
AMOCO GRAVITY CONTOURS	CHECKED	88-316



NOTE: For location of Section see plan......88~314

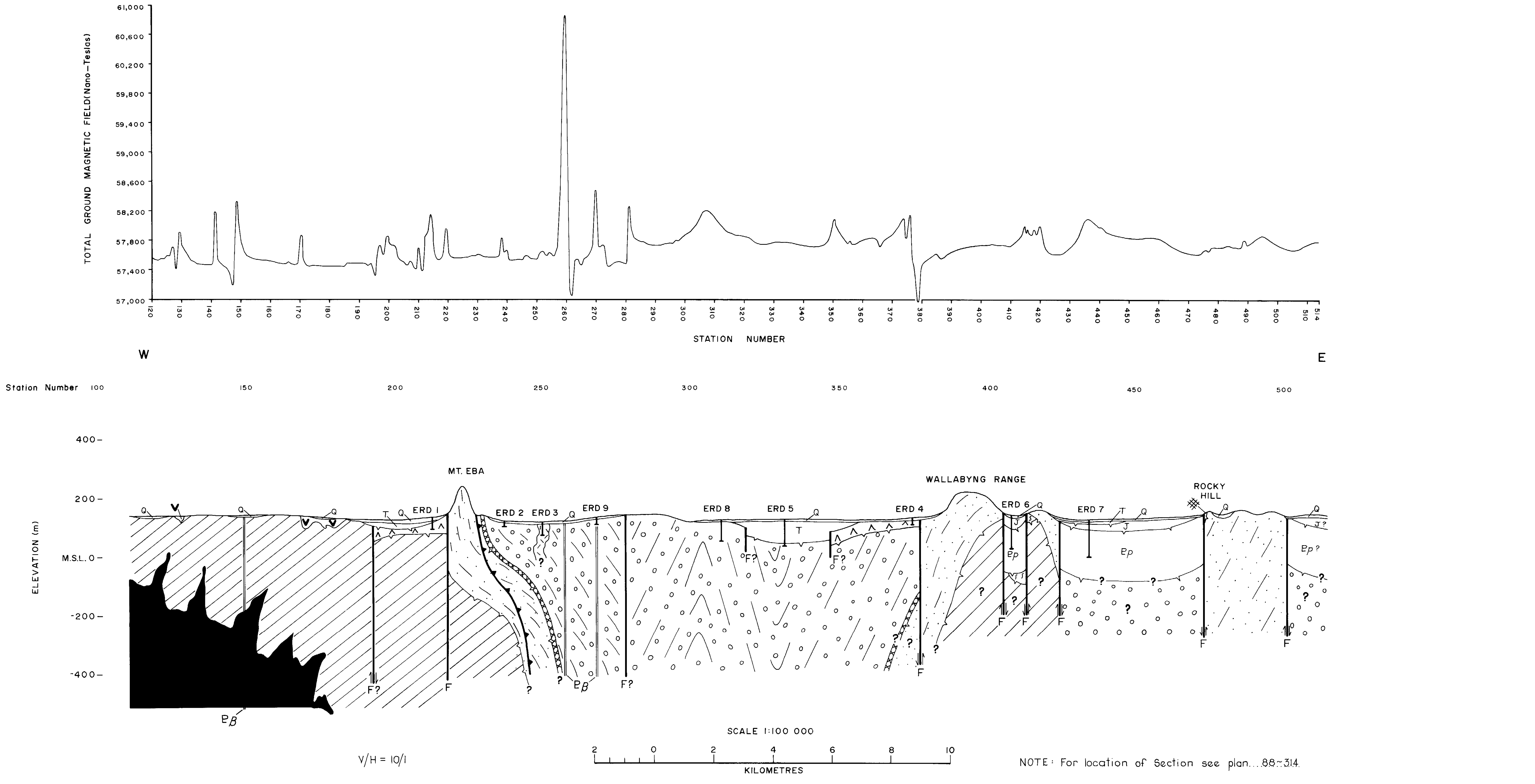
Figure......6.

SCALE 1: 100 000

2 0 2 4 6 8 10

KILOMETRES

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED W.M. Cowley	CDO	DATE 19.12.88
KINGOONYA GEOPHYSICAL AND STRATIGRAPHIC DRILLING	DRAWN B. Donovan	SCALE As shown	
WELL COMPLETION REPORT	DATE June '88'	PLAN NUMBER	
GRAVITY AND TOPOGRAPHIC PROFILES	CHECKED	**88-317**	



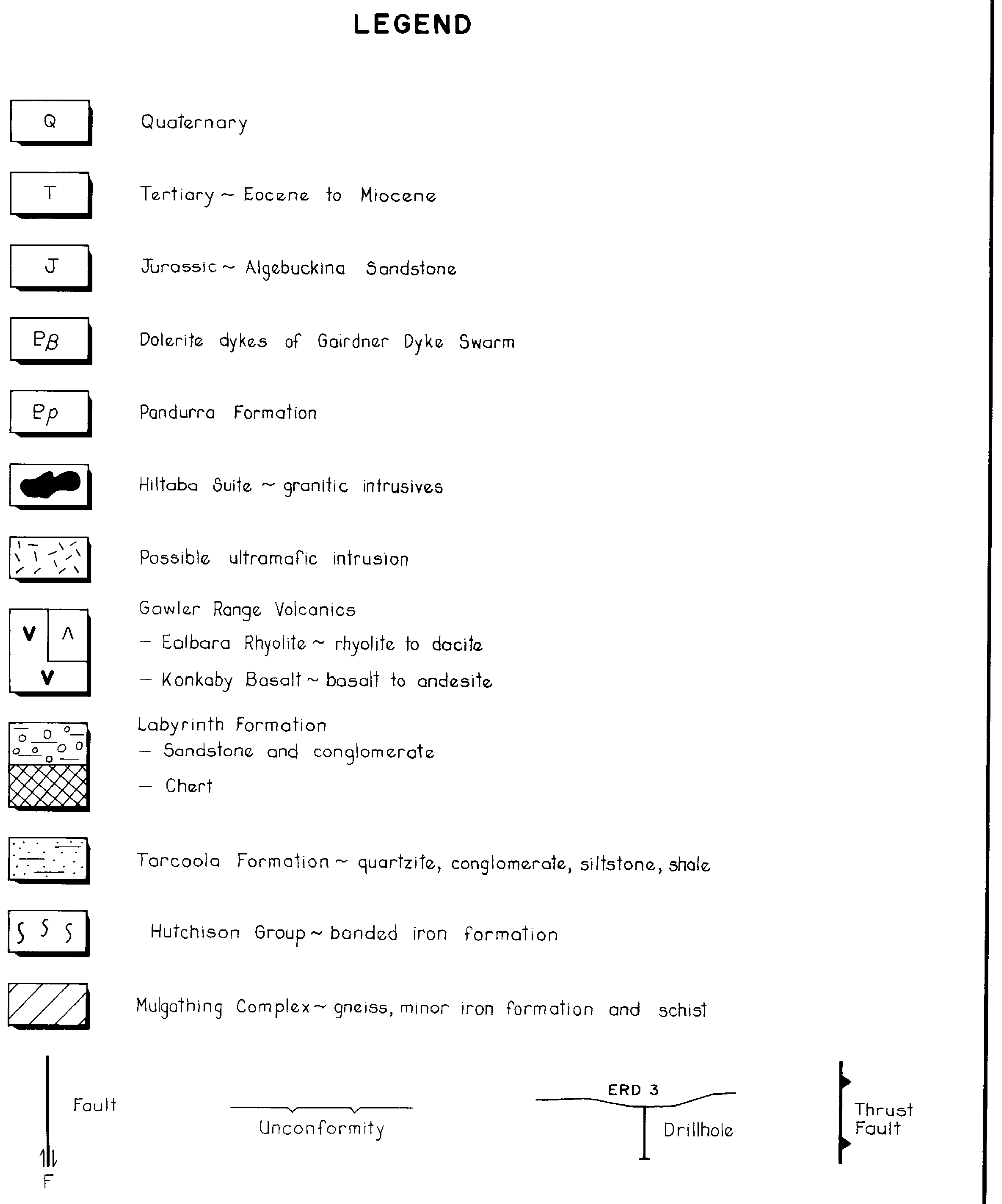
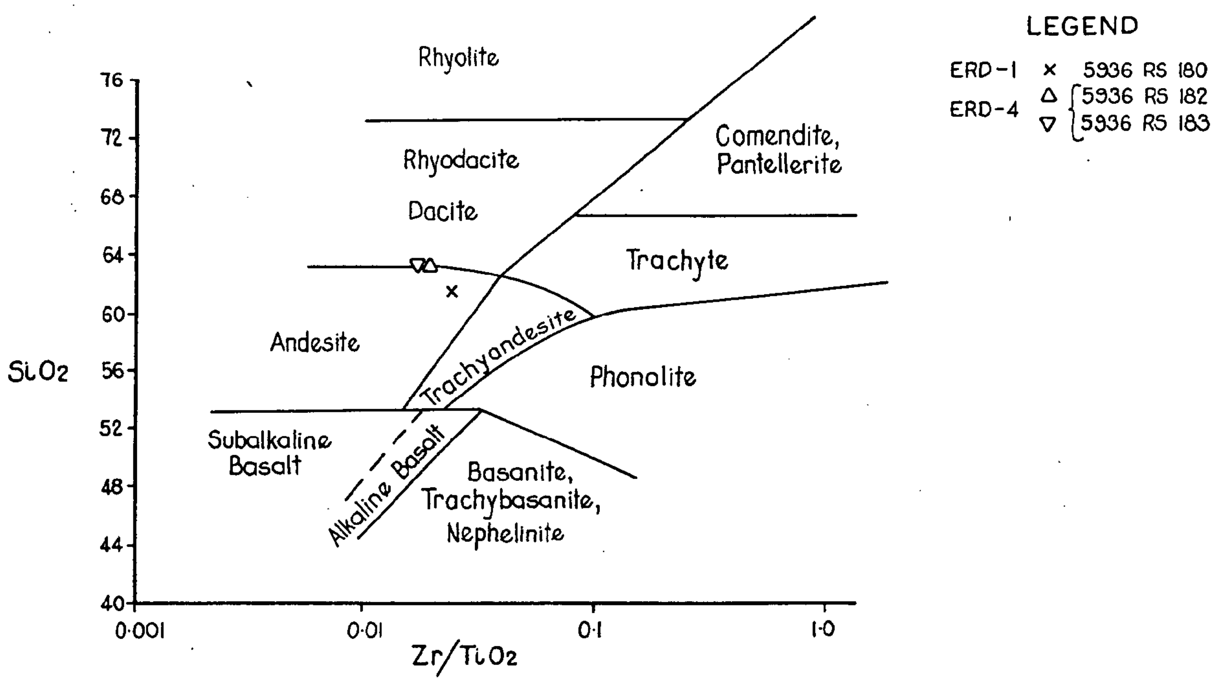
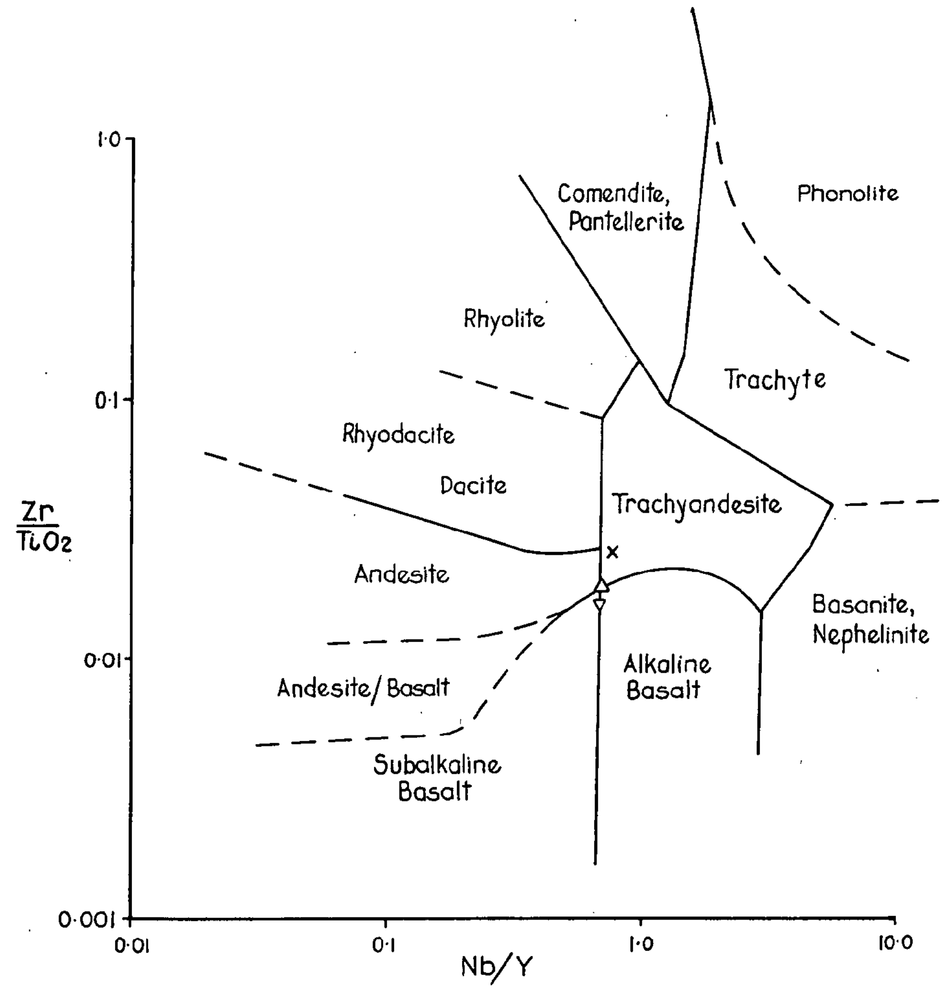


Figure...7

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED W.M. Cowley	CDO 19.12.88 DATE
KINGOONYA GEOPHYSICAL AND STRATIGRAPHIC DRILLING WELL COMPLETION REPORT	DRAWN B. Donovan	SCALE As Shown
GROUND MAGNETIC PROFILE AND GEOLOGICAL SECTION	DATE June '88'	PLAN NUMBER **88-318**
	CHECKED	





From Winchester and Floyd, 1977.

Figure 8

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED W.M. Cowley	C.D.O. 19.12.88 DATE
KINGOONYA GEOPHYSICAL AND STRATIGRAPHIC DRILLING WELL COMPLETION REPORT	DRAWN B. Donovan	SCALE As shown
TRACE ELEMENT DISCRIMINATION DIAGRAMS	DATE June '88	PLAN NUMBER
	CHECKED	S 20119