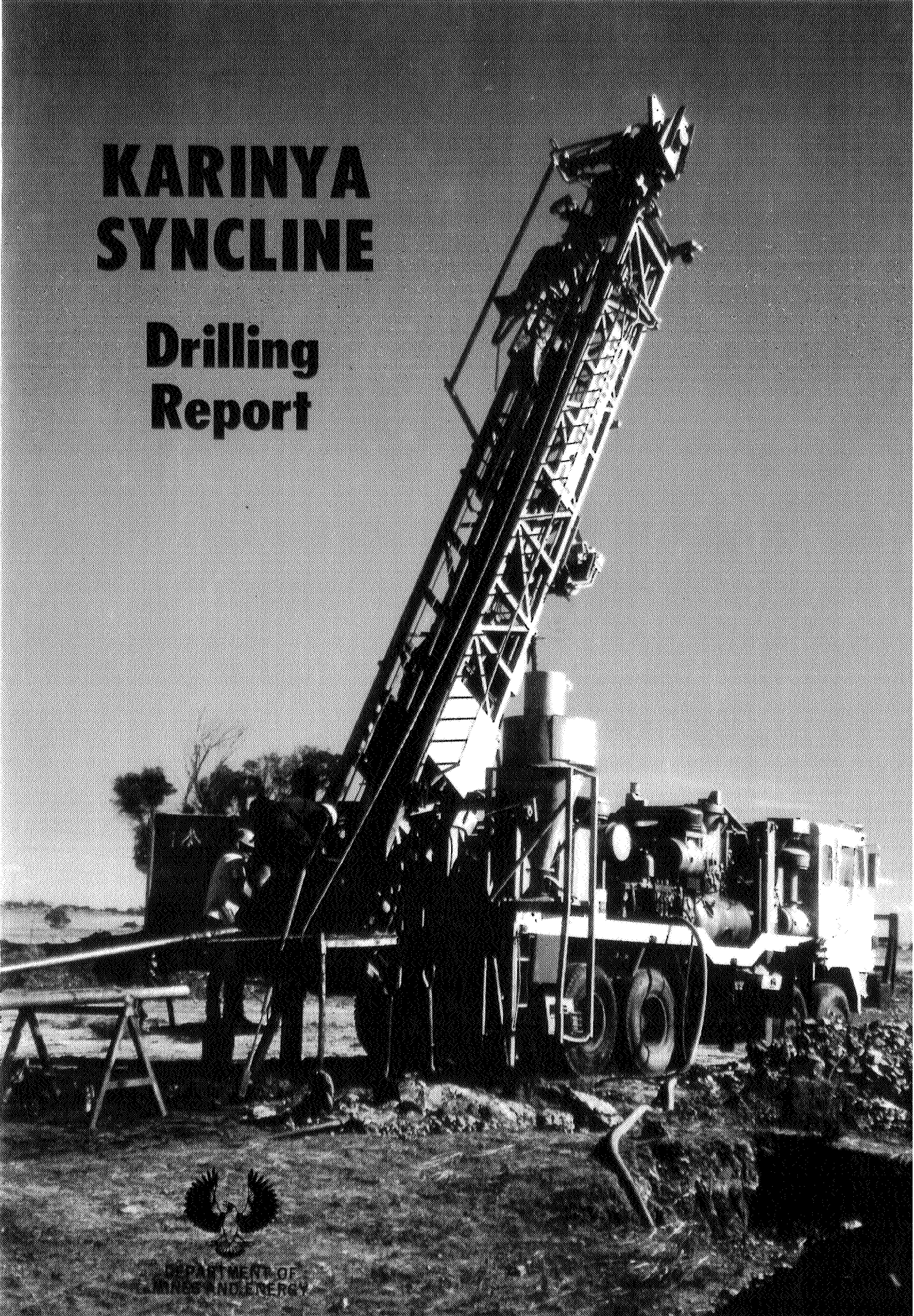
KARINYA SYNCLINE

Drilling Report



DEPARTMENT OF MINES AND ENERGY

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SOUTH AUSTRALIA

REPT BK NO. 91/20

KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS KARINYA SYNCLINE DRILLING REPORT

GEOLOGICAL SURVEY

by

BRIAN J MORRIS
SENIOR GEOLOGIST
MINERAL RESOURCES

FEBRUARY 1991

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FIGURES

FIGURES (cont.)

Front Cover: Diamond Drilling, Frankton (Photo No. 39281).

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KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS, KARINYA SYNCLINE DRILLING REPORT

ABSTRACT

Four prospective areas have previously been identified in the Karinya Syncline with Frankton, The Gap and Accommodation Hill Prospects having potential for base and precious metal mineralization and a possible igneous intrusive the target at the Malabena Prospect.

Two inclined diamond drill holes, totalling 395.1m, were drilled at the Frankton Prospect, eight inclined RC-hammer drill holes, totalling 398m, were drilled at The Gap Prospect, five inclined RC-hammer drill holes, totalling 258m, were drilled at the Accommodation Hill Prospect and one vertical RC-hammer drill hole, to 138m, was drilled at the Malabena Prospect. The drilling programme confirmed that Cu, Pb, Zn, As and Au soil anomalies reflect underlying mineralization and the diamond drill holes obtained good sections of the lower Karinya Shale and its contact with the underlying Backstairs Passage Formation.

Mineralization at Frankton and The Gap Prospects was found to be stratigraphically controlled at the transition from black shale to calc-siltstone near the base of Karinya Shale and at the contact zone between calc-siltstone and underlying meta-sandstone of Backstairs Passage Formation. The best intersection was at the northern end of The Gap Prospect with 4m of 2.14% Pb, 2250 ppm Zn, 1863 ppm Cu, 1450 ppm As and 27 ppb Au at the top of Backstairs Passage Formation. At the Accommodation Hill Prospect supergene ferruginization at the

top of Milendella Limestone Member is weakly mineralized by the scavenging action of iron oxides. No evidence was found for a possible igneous intrusive at the Malabena Prospect.

The lower Karinya Shale and upper Backstairs Passage Formation is identified as prospective and detailed follow up exploration is recommended at the northern closure of a secondary fold structure of The Gap Prospect and regional follow up exploration is recommended around the southern closure of the Karinya Syncline.

INTRODUCTION

Following recommendations of the lead-zinc task force (Morris, 1988 and Horn and Morris, 1988) a regional soil sampling programme was completed over Karinya Shale during February and May 1989 (Morris, 1990) which identified three prospect areas for detailed investigation: Frankton, The Gap and Accommodation Hill. A fourth area, Malabena Prospect, was identified from airborne geophysics for possible follow up. Detailed soil sampling, mapping and geophysical surveys were conducted at the three main prospects between September 1989 and March 1990. On appraisal of results diamond and reverse circulation drilling were recommended to test geochemical anomalies and obtain stratigraphic sections of Karinya Shale and top of underlying Backstairs Passage Formation (Morris, 1990).

Due to availability of a diamond drill rig and incomplete assay results for The Gap and Accommodation Hill Prospects at the time, two diamond drill holes, totalling 395.1m, were drilled at the Frankton Prospect during April and May 1990 by Rockdril Contractors Pty Ltd. During August and September 1990 fourteen reverse circulation - hammer drill holes, totalling 794m, were drilled at The Gap, Accommodation Hill and Malabena Prospects by

Northbridge Drilling. Drill core and cuttings are stored at the SADME Core Library.

For assay purposes 2m intervals of 1/4 core were cut and bagged by Technical Assistants W.P. Fradd and A.J. Smith while 2m intervals of drill cuttings were split and bagged by Technical Assistants S.J. Ewen and R.J. South. All samples were pulverised and analysed by ANALABS Laboratories for Cu, Pb, Zn and As by atomic adsorption spectroscopy and Au by acid digestion with carbon rod finish. Thin sections of selected core samples were prepared and routinely described by Pontifex and Associates Pty Ltd., while detailed descriptions were completed by M.G. Farrand (SADME Petrologist).

Downhole geophysical logs were run down both diamond drill holes by SADME Geophysics Section and comprised IP-resistivity, chargeability, magnetic susceptibility, gamma, neutron, self-potential and resistance logs.

LOCATION

The general area of investigation is approximately 80km northeast of Adelaide via the Sturt Highway (Fig. 1). The four prospect areas are shown on figure 2 with the Frankton and Malabena Prospects being 13km and 8km respectively northeast of Truro while The Gap and Accommodation Hill Prospects are 6km and 8km respectively east of Truro.

Drill hole locations are shown on figures 2, 3, 8 and 15.

REGIONAL GEOLOGY AND MINERALIZATION

The geology of the Karinya Syncline, at the northern end of the Cambrian Kanmantoo Trough (Fig. 1), is shown on Truro 1:63 360 (Coates, 1959) and ADELAIDE 1:250 000 (Thomson, 1969) and presented on figure 2. A stratigraphic column is shown on Table 1 and the rock units targeted for the drilling programme are:

- Milendella Limestone Member, a grey-pink saccharoidal marble within meta-siltstone and meta-sandstone of Carrickalinga Head Formation. The member hosts Pb-Zn-Ag, and Au mineralization along the eastern margin of the Karinya Syncline between Palmer and Truro (Fig. 1). Mineralization is largely confined to fault zones, with the limestone acting as a chemical trap.

- Backstairs Passage Formation comprises cross bedded medium to coarse grained meta-sandstone with meta-siltstone and shale interbeds towards the base. No significant mineralization is known to be within this formation.

- Karinya Shale, equivalent to Talisker Calc-siltstone in main Kanmantoo Trough, comprises black, pyrite and graphite shale grading to banded calc-siltstone towards the base in the main Kanmantoo Trough (Plate 1). A sub-economic resource of 700 000 tonnes of 6.42% Pb, 1.6% Zn and 41 g/t Ag were found by CRA Exploration Pty Ltd (1979), near Mount Torrens, at the base of Talisker Calc-siltstone within calc-siltstone and sandstone below black shale (Fig. 1).

- Tapanappa Formation comprises grey meta-siltstone and fine grained, meta-sandstone and, in the main Kanmantoo Trough, hosts significant Cu, Pb, Zn, Ag and associated Au mineralization within quartz-garnet-andalusite-mica schist between Strathalbyn and Kanmantoo (Fig. 1).

TABLE 1

Stratigraphic Column

SOUTHERN KANMANTOO TROUGH		KARINYA SYNCLINE	
Top not exposed MIDDLETON SANDSTONE			
PETREL COVE FORMATION			
BALQUHIDDER FORMATION			
TUNKALILLA FORMATION			
TAPANAPPA FORMATION (with pyrite beds)		Top not exposed TAPANAPPA FORMATION	
TALISKER CALC-SILTSTONE (includes Nairne Pyrite member)		KARINYA SHALE	
BACKSTAIRS PASSAGE FORMATION		BACKSTAIRS PASSAGE FORMATION	
	CAMPANA CREEK MBR		CAMPANA CREEK MBR.
CARRICKALINGA HEAD FORMATION	BLOWHOLE CREEK SILTSTONE (B.C.S.) MBR	CARRICKALINGA HEAD FORMATION	B.C.S. MEMBER (includes Milendella Limestone Member)
	MADIGAN INLET MBR.		MADIGAN INLET MBR (equivalent)
NORMANVILLE GROUP		NORMANVILLE GROUP	

DIAMOND DRILLING - FRANKTON PROSPECT

Target

Two inclined diamond drill holes (Plate 2), Frankton No. 1 and No. 2, were sited in an area of tightly folded Karinya Shale on the eastern limb of the Karinya Syncline to test weak geochemical anomalies and obtain a stratigraphic section of Karinya Shale and underlying meta-sandstone of Backstairs Passage Formation (Fig. 3). The Frankton area is contained within a northwest trending Landsat linear corridor (Fig. 2).

Frankton No. 1, inclined 60° to the east, was drilled to a depth of 201m and was sited on coincident low order Pb (70 ppm), Zn (190 ppm), As (35 ppm) and Au (4 ppb) anomalies over Karinya Shale at around the 350m mark on lines 7 and 8 (Figs. 4 and 5). A lamprophyre dyke about 1m wide and striking 060° is exposed near the drill site (Appendix A, sample 6729 RS 3292).

Frankton No. 2, inclined 60° to the east, was drilled to a depth of 194.1m and was sited on a Pb anomaly up to 680 ppm at the 1050m mark on line 8 with weakly anomalous Zn (85 ppm) and Cu (45 ppm) 200m to the north on line 7 (Figs. 4 and 5).

The induced polarization and Sirotem surveys gave strongly anomalous responses over both drill sites (Dodds, 1991). The response is from the pyritic-graphitic Karinya Shale which masks any response that may be from sulphide mineralization.

Drilling Results

Geological drill logs with assay results and geophysical down hole logs are presented in Appendix B and drill hole sections are shown on figures 6 and 7. Routine petrological descriptions of selected samples marked on geological drill logs are included in Appendix B and detailed descriptions are reported by Farrand (1990).

- Frankton No. 1 was collared in Karinya Shale that contains about 1.5% graphite and about 3% pyrite. The pyrite appears to be syngenetic but is realigned and redistributed along cleavage planes (Plate 3). The black shale has interlayered fine sandstone and siltstone and grades down through calcareous black shale to interlayered black shale and grey calc-siltstone with shale and fine sandstone interbeds (Plate 4). The hole was completed at 201m in

weakly calcareous pale grey siltstone and would appear to be just short of the Backstairs Passage Formation.

Two cross cutting lamprophyre dykes, described as flow textured quartz-bearing minettes (Appendix A, sample 6729 RS 3258), were intersected, the largest of which is between 7m and 11m depth and is exposed at the surface.

It can be seen on the drill hole section (Fig. 6) that the highest Pb-Zn assays are over the transition zone from black shale to calcareous black shale and calc-siltstone with the best intersection being 1235 ppm Pb and 1425 ppm Zn from 88m to 90m depth. Apart from pyrite and minor pyrrhotite no other sulphides were observed.

- Frankton No. 2 was collared in Karinya Shale that grades down from black shale to calcareous black shale to pale grey calcareous shale with interlayered calc-siltstone near the base and underlain by impure meta-sandstone of Backstairs Passage Formation.

Several cross cutting lamprophyre dykes from 2cm to 90cm thick were intersected. The largest is described as a flow textured carbonate-rich minette veined by leucocratic microsyenite (Appendix B, sample 6729 RS 3290) and the others are flow textured phlogopite-apatite porphyritic fine grained minettes with secondary quartz and carbonate (Appendix A, samples 6729 RS 32987 and 6729 RS 3289). These dykes contain up to 380 ppm Cu, 395 ppm Pb, 625 ppm Zn, 2.5 ppm Ag and 23 ppb Au.

It can be seen from the drill section (Fig. 7) that the best assays are associated with calcareous shale/calc-siltstone layers at the base of the Karinya Shale and with siderite/ankerite veins at the top of Backstairs Passage Formation. Best intersections are:

104m - 108m, 2m of 645 ppm Zn
114m - 118m, 4m of 650 ppm Zn, 188 ppm Pb
120m - 130m, 10m of 767 ppm Zn, 298 ppm Pb (including 2m of 1050 ppm Zn, 415 ppm Pb, 125 ppm Cu, 240 ppm As).
130m - 140m, 10m of 620 ppm Zn, 159 ppm Pb (includes 2m of 1040 ppm Zn and 315 ppm Pb.
174m - 176m, 2m of 645 ppm Cu.

Sulphides observed were mainly pyrite in black shale and quartz-calcite veins, minor pyrrhotite in quartz-calcite veins and minor chalcopyrite in siderite/ankerite veins.

REVERSE CIRCULATION DRILLING

THE GAP PROSPECT

Target

The prospect covers an unusual secondary fold structure on the eastern limb of the Karinya Syncline that is crossed by an interpreted northeast trending Landsat linear corridor (Figs. 2 and 8). Regional and detailed soil geochemistry has shown the area to be highly anomalous for Cu, Pb, Zn, As and Au particulary the northern end between 400m and 650m on line 6 where coincident Cu (80 ppm), Pb (635 ppm), Zn (520 ppm), As (120 ppm) and Au (6 ppb) anomalies overlie the contact between ferruginous calc-siltstone at the base of Karinya Shale and meta-sandstone of underlying Backstairs Passage Formation (Figs.

9 and 10). A rock chip sample of ferruginous calc-siltstone gave 1.45 Cu, 2105 ppm Pb, 1557 ppm Zn, 3000 ppm As, 16.5 ppm Ag and 6 ppb Au (Sample 6729 RS 3306). Four RC holes (TG2, 3, 4 and 5) inclined 50° to depths of 50m-60m were drilled in this area (Fig. 8) (Plate 5).

One RC hole (TG2) inclined 50° to a depth of 50m was drilled at the 650m mark on Line 8 where coincident Pb (400 ppm) As (67 ppm) and Au 13 ppm) anomalies are located over an exposure of black shale (Figs. 9 and 10).

Three RC holes (TG6, 7 and 8) inclined 50° to depths of 18m-60m were drilled on Line 14. Hole TG8 tested an exposure of black shale with weak Pb (70 ppm) and Au (11 ppb) anomalies while holes TG6 and TG7 tested the contact between Karinya Shale and Backstairs Passage Formation (Figs. 8, 9 and 10).

Drilling Results

Geological drill logs with assay results are shown in Appendix B and drill hole sections with selected assays are presented on figures 11, 12, 13 and 14. Significant drill intersections are:

TG1 8m - 14m, 6m of 1253 ppm Pb (includes 2m of 2465 ppm Pb)
28m - 36m, 8m of 766 ppm Cu.

TG2 0m - 2m, 2m of 925 ppm Zn
4m - 8m, 6m of 842 ppm Zn
20m - 22m, 2m of 700 ppm As
22m - 24m 2m of 360 ppm Cu, 1085 ppm Pb, 985 ppm Zn

TG3 0m - 4m, 4m of 1198 ppm Zn
18m - 20m, 2m of 845 ppm Cu, 600 ppm As

TG4 6m - 10m, 4m of 1863 ppm Cu, 2.14% Pb, 2250 ppm Zn, 1450 ppm As, 27 ppb Au (includes 2m of 3.32% Pb).
10m - 12m, 2m of 1500 ppm Pb, 305 ppm Zn

TG5 14m - 20m, 6m of 1235 ppm Zn
20m - 24m, 4m of 115 ppm Cu, 1120 ppm Pb, 2100 ppm Zn, 1150 ppm As
24m - 26m, 2m of 875 ppm Zn, 360 ppm Pb
52m - 54m, 2m of 500 ppm Cu, 2660 ppm Pb, 715 ppm Zn
56m - 58m, 2m of 1700 ppm As.

TG6 No significant assays.

TG7 18m - 20m, 2m of 600 ppm Cu, 215 ppm Zn, 225 ppm Pb

TG8 No significant assays.

The best intersections (TG2-TG5) are around the northern closure of the secondary fold structure with Pb, Zn, Cu and As concentrations mainly occurring at two stratigraphic locations (Figures 11, 12 and 13):

- the contact between black shale and calc-siltstone near the base of Karinya Shale.

- the contact between calc-siltstone of Karinya Shale and the underlying meta-sandstone of Backstairs Passage Formation with the best intersection being within the meta-sandstone.

The calc-siltstone of Karinya Shale is not always present as hole TG7 at the southern end of the prospect passed from black shale through at thin horizon of non calcareous shale and siltstone into the underlying Backstairs Passage Formation.

ACCOMMODATION HILL PROSPECT

Target

The prospect area covers a section of folded Milendella Limestone Member of Carrickalinga Head Formation on the eastern limb of the Karinya Syncline and is crossed by an interpreted northeast trending Landsat linear corridor (Fig. 2). Ironstone up to 2m wide is patchily developed along the upper contact of the limestone and assays up to 1% Cu, 465 ppm Pb, 1545 ppm Zn, 2.5 ppm Ag and 0.5 ppm Au. Along the western margin of the prospect ironstone coincides with a possible shear zone indicated by the induced polarization survey. A lamprophyre dyke about 60cm wide also intrudes the limestone near the western margin (Fig. 15).

Five reverse circulation drill holes (AH1 - AH5) inclined 50° to 60° were drilled to depths of 50m to 54m to test the ferruginized (ironstone) upper surface of the limestone at several localities (Figs. 15, 16 and 17).

Drilling Results

Geological drill logs with assay results are shown in Appendix B and drill hole sections with selected assays are shown on figures 18, 19 and 20. Significant drill intersections are:

AH1 No significant assays

AH2 0m - 2m, 2m of 205 ppm Zn, 415 ppm Pb
6m - 8m, 2m of 175 ppm Zn, 360 ppm Pb, 13 ppb Au

AH3 6m - 10m, 4m of 323 ppm Zn, 698 ppm Pb, 8 ppb Au
22m - 24m, 2m of 490 ppm Pb

AH4 No significant assays

AH5 30m - 32m, 2m of 260 ppm Pb
34m - 36m, 2m of 210 ppm Pb

Drill holes AH1 and AH4 sited near ironstone exposures that gave the best rock chip assays did not intersect the ironstone or Milendella Limestone Member at depth because of access problems and the variable dip of the limestone. All other drill holes AH2, AH3 and AH5 intersected the ironstone and passed into the limestone. High base metal values are associated with the ironstone at the upper contact of the limestone and reflect the weakly anomalous soil sample results. The ferruginization appears to be largely a localised weathering feature being about 7m thick at the surface and with depth, reducing in intensity and thickness, to about 2m at 30m depth in AH5.

MALABENA PROSPECT

Target

An aeromagnetic dipole anomaly was identified by CRAE as a possible target (Bubner, 1982 and Lewis, 1984) and confirmed by SADME Geophysics Section as the site of a possible igneous intrusion within 100m of the surface. The aeromagnetic anomaly is centred on meta-siltstone and fine meta-sandstone of Tapanappa Formation near the axis of the Karinya Syncline. Anomalous base metal values have been detected in the area from regional soil, stream sediment and rock chip samples (Morris, 1990).

A vertical drill hole (MB1) to 138m depth was sited at the centre of the magnetic anomaly (Fig. 2).

Drilling Results

Geological drill logs with assay results are shown in Appendix B. Assay results were low with maximum values of 210 ppm Cu, 100 ppm Zn, 10 ppm Pb and 7 ppb Au. The drill hole passed through a sequence of meta-siltstone, fine meta-sandstone and minor shale layers. Minor pyrite was present along cleavage planes below 100m depth. There was no indication of intrusive activity.

CONCLUSIONS AND RECOMMENDATIONS

The drilling programme has confirmed that Cu, Pb, Zn, As and Au soil anomalies reflect underlying mineralization.

At Frankton and The Gap Prospects mineralization appears to be stratigraphically controlled and mainly concentrated at:

- the transition from black shale to calc-siltstone near the base of Karinya Shale.

- the contact zone between calc-siltstone of Karinya Shale and meta-sandstone of underlying Backstairs Passage Formation.

In the main Kanmantoo Trough, at Mount Torrens, base metal mineralization occurs at an equivalent stratigraphic position at the base of Talisker Calc-siltstone.

The Gap Prospect gave the most encouraging results particularly at the northern closure of a fold structure with a 4m intersection of 2.14% ppm Pb, 1863 ppm Cu, 1450 ppm As and 27 ppb Au in meta-sandstone at the top of Backstairs Passage Formation.

Calc-siltstone at the base of Karinya Shale is not a continuous horizon and where absent black shale directly overlies Backstairs Passage Formation.

Several lamprophyre dykes were intersected in the Frankton diamond drill holes, although they contain anomalous base and precious metal values they are not directly associated with mineralization. A spatial relationship of lamprophyres to diamond, base metal and precious metal deposits has been recognised world wide (Rock, 1986).

The presence of lamprophyre dykes and prominent Landsat lineaments indicate deep seated crustal weaknesses that may act as channelways for rising deep seated metalliferous fluids that could then migrate along permeable horizons of the cover rocks, such as sandstone beds, and deposit mineralization in structural and chemical traps represented by folded black shale and calc-siltstone.

At the Accommodation Hill Prospect ferruginization at the top of Milendella Limestone Member appears to be a localised weathering feature that is weakly mineralized by the scavenging action of iron oxides and no further work is recommended for this area.

At the Malabena Prospect no evidence was found for an indicated igneous intrusive and no further work is recommended for this area.

Results at the Frankton Prospect showed anomalous Cu, Pb, Zn, As and Au and along with the presence of tightly folded prospective stratigraphy, lineaments and lamprophyre dykes the large anticlinal structure here represents an exploration target.

Further detailed exploration is recommended at the northern end of The Gap Prospect to determine the shape of the northern closure of the secondary fold structure and the nature of primary mineralization. Exploration would include detailed mapping, RC and diamond drilling.

There are about 50km of strike length of Karinya Shale which warrant exploration and the southern half of the Karinya Syncline, in particular, is considered most prospective with high base metal geochemistry and tight secondary folding.

BRIAN J MORRIS
SENIOR GEOLOGIST
MINERAL RESOURCES BRANCH

REFERENCES

Bubner, G.J., 1982. CRA Exploration Pty Ltd. Second Quarterly Report for Mt Karinya EL 947, S. Aust. for period ending 10 June 1982, South Australian Department of MInes and Energy Open File Env. 4596 (unpubl).

Coats, R.P., 1959. Truro map sheet, *Geological Atlas of South Australia*, 1:63 360 series, Geol. Surv. S. Aust.

CRA Exploration Pty Ltd., 1979. Exploration Licences 247 and 467 Kanmantoo Trough. South Australian Department of Mines and Energy Open File Envs. 2838 and 3531 (unpubl.).

Dodds, A.R., 1991. Karinya Syncline, Detailed Geophysical Surveys. South Australian Department of Mines and energy report. In Press.

Farrand, M.G., 1990. Outcrop and Drill Core from the Truro-Frankton Zone of Lamproite - Alkaline Intrusion. South Australian Department of Mines and Energy report 90/57 (unpubl.).

Horn, C.M. and Morris, B.J., 1988. Summary Review of Lead-Zinc Mineralization In South Australia. South Australian Department of Mines and Energy report 88/76 (unpubl.).

Lewis, P., 1984. CRA Exploration Pty. Ltd. Tenth Quarterly Report for Mt. karinya EL 947, S. Aust. for period ending 10 June 1984. South Australian Department of Mines and Energy Open File Env. 4596 (unpubl.).

Morris, B.J., 1988. Review of Lead-Zinc Mineralization in South Australia, Kanmantoo Trough. South Australian Department of Mines and Energy report 88/22 (unpubl.).

Morris, B.J., 1990. Kanmantoo Trough Geological Investigations, Karinya Syncline, Regional Soil Sampling. South Australian Department of Mines and Energy report 90/76 (unpubl.).

Morris, B.J., 1991. Kanmantoo Trough Geological Investigations, Karinya Syncline. Detailed Geochemical Surveys. South Australian Department of Mines and Energy report. In Press.

Rock, N.M.S., 1986. Kimberlites As Varieties of Lamprophyres: Implications for Geological Mapping, Petrological Research and Mineral Exploration. In: Ross, J., Jaques, A.L., Ferguson, J., Green, D.H., O'Reilly, S.Y., Danchin, R.V. and Janse, A.J.A. (Editors) Proceedings of the Fourth International Kimberlite Conference Perth 1986. Volume 1. GSA Special Publication No. 14.

Thomson, B.P., 1969. ADELAIDE map sheet. *Geological Atlas of South Australia* 1:250 000 series, Geol. Surv. S. Aust.

APPENDIX A

Petrological Reports

Pontifex & Associates Pty. Ltd.

TEL. (08) 332 6744
A.H. (08) 31 3816
FAX (08) 332 5062

26 KENSINGTON ROAD, ROSE PARK
SOUTH AUSTRALIA

P.O. BOX 91, NORWOOD
SOUTH AUSTRALIA 5067

MINERALOGICAL REPORT NO. 5682
by A.C. Purvis, PhD.

July 20th, 1990

TO : Mr B.J. Morris
S.A. Dept of Mines & Energy
PO Box 151
EASTWOOD SA 5063

YOUR REFERENCE : Order No. EX 999

MATERIAL : 16 samples, Kanmantoo Trough

IDENTIFICATION : 6729 RS 3254 to 6729 RS 3258 inclusive
6729 RS 3287 to 6729 RS 3297 inclusive

WORK REQUESTED : Preparation of normal thin sections and petrographic description.

SAMPLES & SECTIONS : Returned to you with this report.

Ian R. Pontifex
PONTIFEX & ASSOCIATES PTY LTD

6729 RS, 3254 – Layered graphitic quartz-plagioclase-biotite-muscovite schist with carbonate rich layers.

Field Note : Effect of cleavage on bedding

	A (sandstone)	B (shale)
Quartz	45-55%	5%
Plagioclase	35%	-
Biotite	3-10%	45-50%
Muscovite	2-7%	35-40%
Carbonate	0-25%	-
Graphite	1-5%	10%

This rock retains a sedimentary fabric with detrital quartz > plagioclase grains 0.1 - 0.4mm in the sandstone layers (A), and detrital muscovite flakes to 0.5mm long, particularly in the more graphitic layers (B) which appear to have shaly and lack detrital quartz and felspar. The layers are from 2 to 10mm wide with sandstone dominant over shale and the layering is defined by variations in the amount of graphite and mica, or by the presence of a minor to abundant carbonate cement.

The detrital muscovite is layer parallel as are lenses of fine graphite. The biotite is decussate but very fine grained muscovite occurs as (1) fringes or detrital grains (2) within plagioclase and (3) defining a weak schistosity at 30-40° to layering.

Very thin quartz carbonate veins are present.

This rock has only a weak tectonic schistosity and the principal layering appears to be bedding.

6729 RS 3255

Very fine quartz-sericite ± carbonate ± magnetite schists with grading and ?slumping (or a tectonic contact). Thin vein of quartz ± carbonate ± pyrite.

Field Note: Thin clastic? interbed within siltstone shale.

Part of this sample is a weakly graded schist with schistose fine sericite as the main component but with lenses of quartz and unoriented sericite flakes in the coarser silty part of the layer. Euhedral crystals of magnetite occur throughout. A slightly darker zone adjacent to the contact with more quartz rich schist is about 3mm wide and contains scattered pyrite crystals on or adjacent to the contact. Pyrite in the paler part of this rock is in, or attached to, quartz-carbonate veins.

The rock adjacent to this unit has a layering defined by quartz-rich vs. sericite rich laminae 2-5mm wide, with rare laminae rich in fine grained opaque oxide (?magnetite). This layering is at a high angle to the contact between the lithologies and has been folded about an axial plane schistosity at about 15° to the main contact. This layering may be an oversteepened (slumped or tectonically deformed) cross bedding. Alternatively, the contact between the two lithologies could be tectonic with folding adjacent to a tectonic slide plane.

This paler schist consists of quartz and sericite with minor carbonate and accessory probable magnetite, with most grains smaller than 0.05mm. It has been cut by veins of carbonate ± quartz ± pyrite.

These rocks were probably siltstones to claystones, possibly with crossbedding or slumping.

6729 RS 3256

Quartz-plagioclase-muscovite-biotite schist with accessory carbonate, pyrite, opaque oxides, zircon and tourmaline. Metamorphosed very fine grained sandstone.

Field Note : Spotted siltstone, original composition of spots.

Quartz	55%
Plagioclase	25-30%
Muscovite	15%
Biotite	1-2%
Pyrite	1%
Carbonate	< 1%
Tourmaline, Zircon ?Graphite, ?Ilmenite	trace

This was a similar sandstone to 3254 but finer grained, with detrital quartz > plagioclase as grains 0.05mm to 0.15mm in size (silt to very fine sand). Detrital muscovite flakes are present to 0.3mm long ang there are traces of possible graphite. Detrital heavy minerals include tourmaline and zircon and possible ilmenite. Abundant metamorphic sericite and accessory biotite are present defining a single (? layer parallel) schistosity.

Stringers of pyrite occur in a zone 4mm wide at about 20° to the schistosity and there are small patches of intergranular carbonate which may be the spots referred to, but are not obvious in hand specimen.

6729 RS 3257 Finely laminated pyritic quartz-sericite-graphite schist with very minor biotite.

Field Note : Black shale, pyrite on bedding or cleavage

Sericite is the dominant mineral in this rock defining a layer parallel schistosity. There is about 10-15% quartz as grains to 0.05mm in size and abundant graphite (The abundance of graphite is not easily determined due to its extremely fine grain size and opacity and is very easily overestimated.)

About 2-3% pyrite is present in thin laminae parallel to the foliation, generally less than 0.2mm wide, together with quartz and carbonate (?siderite). In some laminae it appears that the carbonate (± limonite) has replaced some of the pyrite.

6729 RS 3258 Flow textured quartz bearing minette with magnetite and leucoxene.

Field Note : Lamprophyric dyke

Biotite	20%
Orthoclase	70%
Quartz	5%
Magnetite	2%
Leucoxene	3-4%
Apatite	accessory

The biotite in this rock defines a strong flow texture and occurs predominantly as flakes 0.5-1mm long and 0.05mm wide. Rare phenocrysts 1.5 - 5mm long and up to 2mm wide have battlemented ends and zoning with olive-brown cores and yellow-brown rims. The matrix is dominated by subhedral to euhedral orthoclase grains and crystals 0.2 to 2mm long with interstitial quartz. Apatite is a relatively minor component in this rock compared with others in this batch, suggesting that this rock is more highly fractionated.

6729 RS 3287

Phlogopite-apatite porphyritic fine grained minette with secondary quartz and carbonate.

Phlogopite		24%
Apatite		7%
Orthoclase		65%
Opaque oxides		3%
Quartz	}	accessory
Carbonate	}	

Unoriented phenocrysts of zoned phlogopite are abundant in this rock and range from 0.4 to 4mm in length. They show weak kinking and undulose extinction but are apparently fresh. Phenocrysts of apatite to 0.6mm long (rarely 1.5mm) are also abundant and are locally flow oriented. They are rarely hollow. The groundmass is mostly fine grained orthoclase with granular to dendritic opaque oxides and minor biotite. Patches of quartz ± carbonate are common but probably of secondary origin, and some of the quartz is prismatic or in veins. Some of the quartz grains have deformation lamellae.

This is apparently a less fractionated minette than No 3258.

6729 RS 3288

Graphitic-free claystone layer in graphitic slate, with minor biotite, pyrite and carbonate.

Field Note: Thin pale interbed within black shale. Why so pale? Volcanic?

The pale layer in this rock consists of sericite with a dominant schistosity at 10° to the layering and a minor schistosity at 40° to the layering and 50° to the dominant schistosity. Flakes of partly chloritised biotite scattered through this layer are mostly layer parallel. Lenses of filamentous pyrite are, by contast, parallel to the dominant schistosity.

The dark layers are similar but contain layer-parallel laminae of graphite and scattered small quartz grains but otherwise similar to the pale layer. Biotite is less abundant and some granular pyrite is present. Minor carbonate occurs parallel to the dominant schistosity within the pale layer, within 2mm of the contact with one of the dark layers. Minor filamentous pyrite occurs in this zone, but a cross cutting carbonate-vein has pyrite only within the pale layer away from this zone.

It would appear that during a brief interval within the general period of graphitic clay deposition the oxygen fugacity rose above that at which carbonaceous material could be deposited, resulting in graphite free clays being deposited.

6729 RS 3289

Flow textured phlogopite-apatite porphyritic fine grained minette with abundant carbonate, minor quartz and accessory pyrite.

Field Note : Lamprophyric vein, minor sulphide

Phlogopite	20%
Apatite	5%
Orthoclase	40-45%
Carbonate	20%
Quartz	5%
Opaque oxide + leucoxene	7%
Pyrite	1%

This rock has similarities with both 3258 and 3287. As in 3258, the phlogopite flakes have a strong flow orientation, but as in 3287, these phenocrysts are accompanied by strongly oriented needle like, locally hollow, crystals of apatite. The phenocrysts have a dominant orientation and a second less common orientation at 20°-40° to the dominant orientation. The second orientation is more commonly followed by fine groundmass phlogopite flakes, however.

The apatite crystals appear to be smaller than those in No. 3287 but commonly have their C-axes at a high angle to the plane of the thin section, suggesting that the thin section was cut at a high angle to the direction of flow.

Patches of granular carbonate 0.5 - 2mm in size are common, but the groundmass is mostly fine grained orthoclase with finely dispersed oxidised or leucoxenised oxide grains. Rare pyrite occurs as crystals in the carbonate and minor secondary quartz is present mostly in the carbonate lenses.

Thick veins of carbonate ± quartz are present.

6729 RS 3290

Flow textured carbonate rich minette veined by leucocratic microsyenite.

Field Note: Lamprophyric dyke with a fine grained phase.

This sample has areas of flow textured phlogopite rich minette veined by a fine grained phlogopite-poor syenitic rock dominated by orthoclase. The minette contains abundant carbonate but less apatite than 3287 or 3289, and has irregular flow layers rich in small opaque oxide granules.

Phlogopite phenocrysts in the minette are from 2 to 5mm long and contrast with groundmass phlogopite flakes from 0.2 to 0.6mm long. Both define a somewhat convoluted flow texture and the phenocrysts are commonly kinked. There is 4-5% apatite mostly in the groundmass, rarely as micro phenocrysts. Abundant (20%) carbonate occurs in the groundmass as grains 0.1mm in size, but orthoclase grains to 0.2mm in size are more abundant. Small dendritic to equidimensional opaque oxide crystals comprise about 4-5% of the rock and there is trace pyrite.

The microsyenite phase contains 15% carbonate, 5% oxides, 1-2% phlogopite and accessory apatite but is dominantly composed of orthoclase grains to 0.1mm in size with very minor quartz. It occurs in irregular veins 1-10mm wide, locally enclosing small areas of minette.

Veins of carbonate ± quartz ± pyrite are present.

6729 RS 3291 Siderite vein with quartz, sericite and pyrite.

Field Note : Barite vein, minor sulphide.

The granular mineral in this rock is siderite, not barite, as indicated in your field note. The density of siderite ($FeCO_3$) is 3.9 gcm^{-3} compared with 4.5 for barite and the yellow colour is more typical of siderite. The lamellae in the rock are stylolite-like and contain quartz > sericite ≫ pyrite.

The siderite ranges from granular to almost fibrous with grains to 1mm in length. The quartz is fine grained and granular to prismatic.

6729 RS 3292 Flow textured quartz bearing minette cf. No. 3258.

Field Note : Lamprophyre dyke (surface sample) equivalent to RS 3258 in drill hole

Biotite	25%
Orthoclase	60-65%
Magnetite	3%
Leucoxene	5%
Quartz	2-3%
Clays	~1%
Apatite	~1%

This rock is similar to RS 3258, but is richer in biotite and poorer in quartz. The biotite flakes are 0.2-1mm long with a strong flow texture but the orthoclase is unoriented and granular to prismatic locally in subradiating bundles, with prisms to 1.5mm long. Fine oxidised and leucoxenised oxides are common and there is minor quartz and apatite.

APPENDIX B

Geological Drill Logs and Geophysical Down Hole Logs

DEPARTMENT OF MINES – SOUTH AUSTRALIA

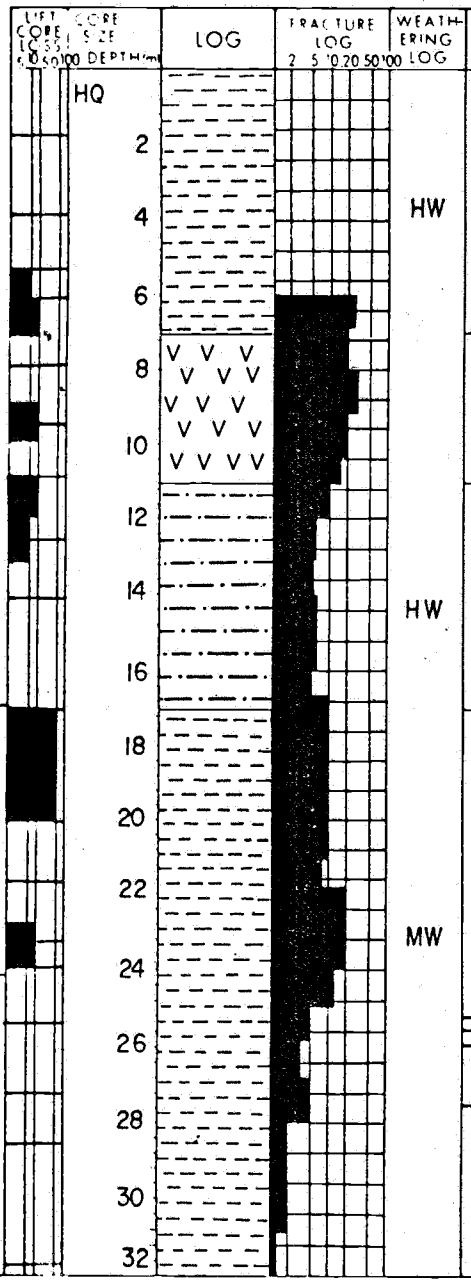
PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

HOLE NO. Frankton No. 1
TYPE OF HOLE Diamond
MACHINE NO Rockdrill Rig 8
BORE SERIAL NO

INCLINATION 060°
AZIMUTH 093° mag
DEPTH OF HOLE 201m
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE Ex– 985
COORDINATES 34°18'N, 139°11·1'E
GROUND ELEV. 255m AHD

DATE COMMENCED 29 April 1990
DATE COMPLETED 4 May 1990
DRILLER R. Pederson
LOGGED BY B.J. Morris



LITHOLOGICAL DESCRIPTION	VISIBLE SULPHIDES
Grey-green-brown weathered shale with reddish lisagang bands	
Lamprophyre (minette, petrology 6729 RS 3258) dyke dips 60° to core, with orthoclase, biotite (·5–5mm), quartz, minor magnetite	
Weathered grey-green siltstone with reddish lisagang bands, thinly laminated dip 45° to core.	
Black Shale with limonite stringers	
Yellow jarosite and FeO and MnO in fractures	
Vuggy quartz-pyrite veins 2cms wide	
Black Shale with pyrite along cleavage planes (40° to core) and as stringers across cleavage every 5cms	abundant pyrite
Quartz vein	

SAMPLE NUMBER	ASSAYS (p.p.m.) Cu	Pb	Zn	As	Au
6729 RS3059	60	5	155	30	0·001
RS3060	30	5	150	22	—
RS3061	75	5	155	18	—
RS3062	105	30	270	11	—
RS3063	305	35	340	14	0·001
RS3064	85	< 5	285	23	—
RS3065	45	< 5	270	16	—
RS3066	15	< 5	160	17	—
RS3067	45	< 5	115	16	—
RS3068	85	5	160	8	—
RS3069	65	15	100	7	—
RS3070	70	50	120	22	—
RS3071	45	95	120	27	—
RS3072	70	115	120	26	—
RS3073	80	85	90	46	—
RS3074	70	60	120	12	—

HOLE NO.
DRG.NO. S21762A

DEPARTMENT OF MINES – SOUTH AUSTRALIA

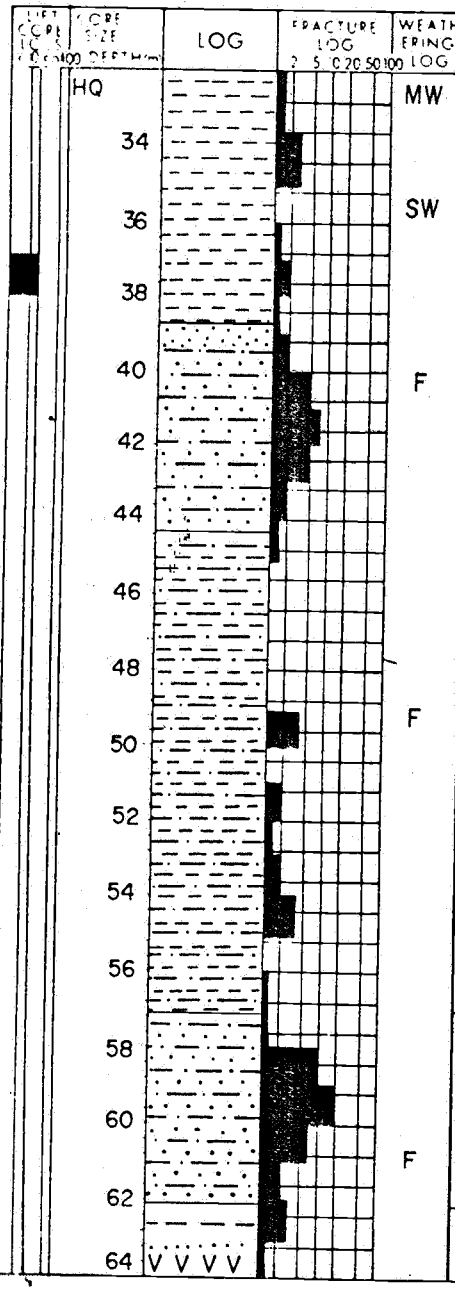
PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

HOLE NO. Frankton No. 1
TYPE OF HOLE
MACHINE NO.
BORE SERIAL NO

INCLINATION
AZIMUTH
DEPTH OF HOLE
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE
COORDINATES
GROUND ELEV.

DATE COMMENCED
DATE COMPLETED
DRILLER
LOGGED BY



LITHOLOGICAL DESCRIPTION	VISIBLE SULPHIDES	SAMPLE NUMBER	ASSAYS p.p.m Cu	Pb	Zn	As	Au
Vein quartz - pyrite (1cm). Black Shale (petrology 6729 RS 3257)	pyrite	RS 3075	80	75	355	9	—
		RS 3076	75	60	300	14	—
		RS 3077	85	85	235	5	—
20cm fine sandstone, layering dips 20°, cleavage 45°		RS 3078	70	10	65	21	—
Light grey sandy siltstone with black shale frags to 40·4m then occasional black shale bands 2mm wide. (Petrology 6729 RS 3256)		RS 3079	30	< 5	135	10	—
		RS 3080	25	< 5	210	11	—
Dark grey siltstone and shale with pyrite on cleavage planes and as stringers.	moderate pyrite	RS 3081	80	< 5	95	10	—
		RS 3082	90	< 5	250	8	—
		RS 3083	45	< 5	165	14	—
		RS 3084	30	< 5	125	16	—
53·8 – 54·6m 1cm wide near vertical vuggy quartz - pyrite vein		RS 3085	25	< 5	105	20	—
2cm quartz - pyrite vein		RS 3086	15	5	100	20	—
Grey fine sandstone/siltstone dips 45° to core	minor pyrite	RS 3087	75	< 5	100	21	—
		RS 3088	50	< 5	90	15	—
		RS 3089	30	5	80	10	0·001
Light grey, phyllite / shale abundant quartz - calcite stringers with pyrite some fine sandstone interbeds. 1cm wide lamprophyre vein cross cutting layering		RS 3090	10	< 5	70	12	—

HOLE NO.

DRG.NO. S21762 B

DEPARTMENT OF MINES – SOUTH AUSTRALIA

PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

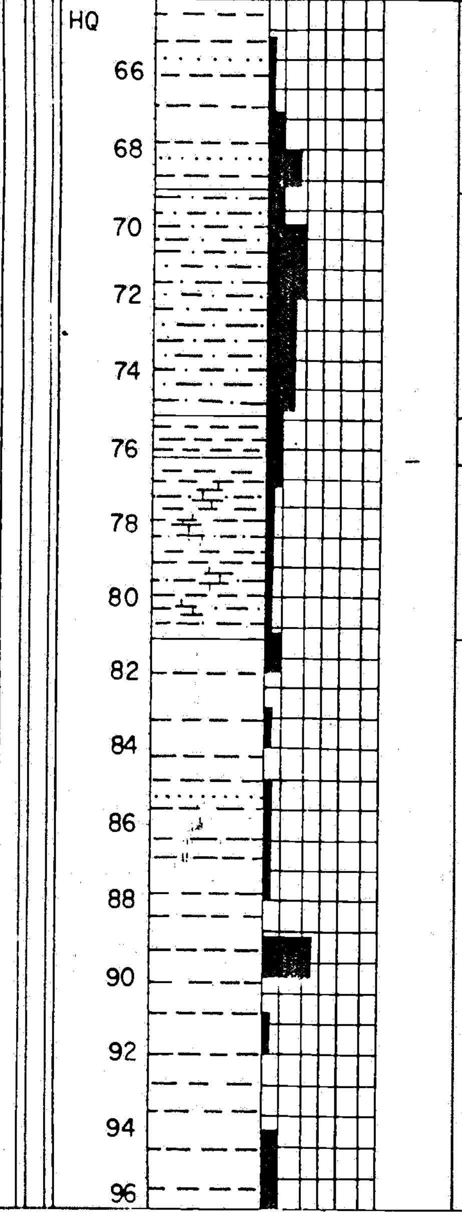
HOLE NO. Frankton No. 1
TYPE OF HOLE
MACHINE NO
BORE SERIAL NO

INCLINATION
AZIMUTH
DEPTH OF HOLE
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE
COORDINATES
GROUND ELEV.

DATE COMMENCED
DATE COMPLETED
DRILLER
LOGGED BY

CORE LOSS | CORE SIZE | DEPTH (m) | LOG | FRACTURE LOG (2 5 10 20 50 100) | WEATHERING LOG



LITHOLOGICAL DESCRIPTION

Light grey phyllite / shale, some fine sandstone layers, abundant quartz – calcite stringers with pyrite.

2cm silty layer showing slumping (Petrology 6729 RS 3255)

Light grey fine sandy siltstone, layer of intraformational breccia with black shale clasts at 70·5 m.

Minor black shale layers and intraformational breccia.

Light grey phyllite / shale

Interlayered (0·5cm) grey shale and light grey calcareouse siltstone

Minor dark grey shale layers

Minor quartz-calcite stringers

Black Shale, pyrite along cleavage planes and quart-pyrite stringers

Pale green non graphitic shale 1cm

Fine sandstone layer 85·2 – 85·4 cm

Quartz veins with feldspar, calcite and pyrite common from 88·5 – 93 m

Pale green non graphitic shale 1cm

Massive quartz – pyrite vein 90·9 – 91·1 m

Massive quartz-pyrite vein 92 – 92·4 m

3cm non graphitic shale layer

Non graphitic shale 95·3 - 95·5 m

VISIBLE SULPHIDES: abundant pyrite (from 82 m to 96 m)

SAMPLE NUMBER	Cu	Pb	Zn	As	Au
	ASSAYS p.p.m.				
RS3091	15	< 5	35	2	0·010
RS3092	25	< 5	70	5	0·007
RS 3093	20	< 5	75	11	0·002
RS3094	15	5	90	13	0·004
RS3095	20	< 5	90	15	—
RS3096	40	5	85	17	0·001
RS3097	30	< 5	75	14	—
RS3098	30	< 5	70	13	—
RS3099	60	< 5	70	8	—
RS 3100	90	10	250	5	—
RS3101	70	45	385	63	—
RS 3102	65	10	130	4	—
RS3103	95	1235	1425	53	—
RS3104	145	95	360	170	—
RS3105	95	115	240	21	—
RS3106	75	130	410	18	—

HOLE NO.

DRG.NO. S21762 C

DEPARTMENT OF MINES – SOUTH AUSTRALIA

PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

HOLE NO. Frankton No. 1
TYPE OF HOLE
MACHINE NO
BORE SERIAL NO

INCLINATION
AZIMUTH
DEPTH OF HOLE
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE
COORDINATES
GROUND ELEV.

DATE COMMENCED
DATE COMPLETED
DRILLER
LOGGED BY

CORE LOSS %	CORE SIZE	DEPTH m	LOG	FRACTURE LOG 2 5 10 20 50 100	WEATHERING LOG	LITHOLOGICAL DESCRIPTION	VISIBLE SULPHIDES
	HQ						abundant pyrite
		98				Blue-grey weakly calcareous shale, pyrite on cleavage, calcite – pyrite stringers	
	NQ					3cm quartz – calcite – pyrite breccia vein.	
		100					
		102				101·3 – 101·5 light grey non calcareous silty layer with black shale clasts 7cm non graphitic shale.	
						102 – 102·5 non calcareous dark grey silty layer.	
		104					
		106					
		108					
		110					
		112				5cm non graphitic shale	
		114				5cm non graphitic shale	
		116					
		118					
		120				Interlayered dark grey shale and light grey calcite – siltstone	
		122				1cm non graphitic shale	
		124					minor pyrite
		126				Light grey calcite – siltstone with medium grey weakly calcareous – silt interbeds, layer with granular texture 126 – 126·4 m	
		128					

SAMPLE NUMBER	ASSAYS ppm Cu	Pb	Zn	As	As
RS3107	45	30	125	67	—
RS3108	60	55	235	26	—
RS3109	60	115	115	6	—
RS3110	65	65	105	4	—
RS3111	55	80	120	6	—
RS3112	50	90	115	12	—
RS3113	45	50	110	10	—
RS3114	40	30	155	22	—
RS3115	35	25	125	12	—
RS3116	35	25	155	48	—
RS3117	35	25	130	18	—
RS3118	25	15	125	22	—
RS3119	35	30	300	8	—
RS3120	30	65	240	3	—
RS3121	25	100	445	2	—
RS3122	15	20	65	4	—

HOLE NO.

DRG. NO. S21762 D

DEPARTMENT OF MINES – SOUTH AUSTRALIA

PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

HOLE NO. Frankton No.1
TYPE OF HOLE
MACHINE NO.
BORE SERIAL NO

INCLINATION
AZIMUTH
DEPTH OF HOLE
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE
COORDINATES
GROUND ELEV.

DATE COMMENCED
DATE COMPLETED
DRILLER
LOGGED BY

HOLE NO. DRG.NO. S21762 E

CORE LOSS %	CORE SIZE DEPTH m	LOG	FRACTURE LOG 5 10 20 50 100	WEATHERING LOG	LITHOLOGICAL DESCRIPTION	VISIBLE SULPHIDES	SAMPLE NUMBER	ASSAYS p.p.m Cu	Pb	Zn	As	Au
	NQ				Medium grey weakly calcareous siltstone pale grey calcareous siltstone interbeds.	minor pyrite	RS3123	15	5	55	2	—
	130						RS3124	15	5	50	5	—
	132						RS3125	15	10	40	4	—
	134						RS3126	15	20	45	2	—
	136				Light grey calcareous siltstone, some layers with granular texture, with medium grey weakly calcareous siltstone interbeds.		RS3127	10	40	50	4	—
	138				Medium grey weakly calcareous siltstone with pale grey calcareous layers.		RS3128	15	20	70	8	—
	140					moderate pyrite	RS3129	20	20	80	8	—
	142						RS3130	20	10	65	7	—
	144						RS3131	20	25	75	3	—
	146						RS3132	20	5	70	6	—
	148						RS3133	20	15	70	7	—
	150						RS3134	15	15	70	6	—
	152						RS3135	20	10	75	6	—
	154				Quartz-calcite veins with pyrrhotite common.		RS3136	20	10	80	5	—
	156					minor pyrite	RS3137	20	20	65	7	—
	158				Light grey calcareous siltstone some with granular texture with interbeds of medium grey weakly calcareous siltstone. Layering 45° to core, cleavage 60° to core.		RS3138	60	25	30	13	—
	160											

DEPARTMENT OF MINES – SOUTH AUSTRALIA

HOLE NO. Frankton No. 1
TYPE OF HOLE
MACHINE NO
BORE SERIAL NO

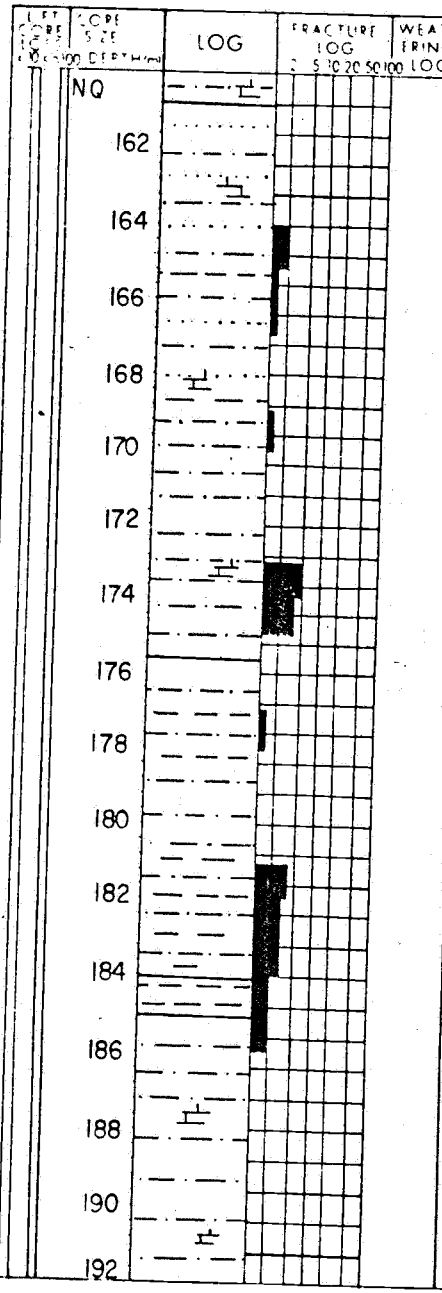
PROJECT
INCLINATION
AZIMUTH
DEPTH OF HOLE
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE
COORDINATES
GROUND ELEV.

DATE COMMENCED
DATE COMPLETED
DR'LLER
LOGGED BY

HOLE NO.

DRG NO. S21762 F



LITHOLOGICAL DESCRIPTION

Quartz-calcite-pyrite vein 2cm
Dark grey fine meta-sandstone/siltstone with occasional light grey calcareous layers

Layering dips 30° and cleavage 60° to core.

Meta-sandstone (petrology 6729 RS3254)

Dark grey siltstone/shale with minor light grey calcareous patches alligned to cleavage

Layering dips 40-45°, cleavage 60° to core

Pale grey shale

Medium grey siltstone with some light grey calcareous-siltstone layers.
Occasional clast of black shale.

VISIBLE SULPHIDES: minor pyrite

SAMPLE NUMBER	ASSAYS p.p.m Cu	Pb	Zn	As	Au
RS3139	65	35	40	8	—
RS3140	<5	10	55	7	—
RS3141	5	5	45	7	—
RS3142	5	5	50	6	—
RS3143	<5	10	55	6	—
RS3144	<5	5	40	2	—
RS3145	<5	5	45	5	—
RS3146	5	10	55	5	—
RS3147	<5	10	65	7	—
RS3148	5	10	70	4	—
RS3149	10	5	100	5	—
RS3150	5	15	75	6	—
RS3151	30	5	175	10	—
RS3152	10	10	80	7	—
RS3153	5	20	70	7	—
RS3154	5	5	75	4	—

DEPARTMENT OF MINES – SOUTH AUSTRALIA

PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

HOLE NO Frankton No. 1
TYPE OF HOLE
MACHINE NO
BORE SERIAL NO

INCLINATION
AZIMUTH
DEPTH OF HOLE
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE
COORDINATES
GROUND ELEV.

DATE COMMENCED
DATE COMPLETED
DRILLER
LOGGED BY

CORE SIZE / DEPTH	LOG	FRACTURE LOG (2 5 10 20 50 100)	WEATHERING LOG	LITHOLOGICAL DESCRIPTION	VISIBLE SULPHIDES	SAMPLE NUMBER	ASSAYS ppm Cu	Pb	Zn	As	Au
NQ					minor pyrite	RS3155	15	10	95	8	—
194						RS3156	10	10	90	6	—
196						RS3157	10	5	70	5	—
198						RS3158	5	<5	35	6	—
200											
201				Light grey siltstone with black shale clasts.		RS3159	5	<5	45	10	—
				EOH 201m							

HOLE NO.

DRG.NO. S21762 G

DEPARTMENT OF MINES – SOUTH AUSTRALIA

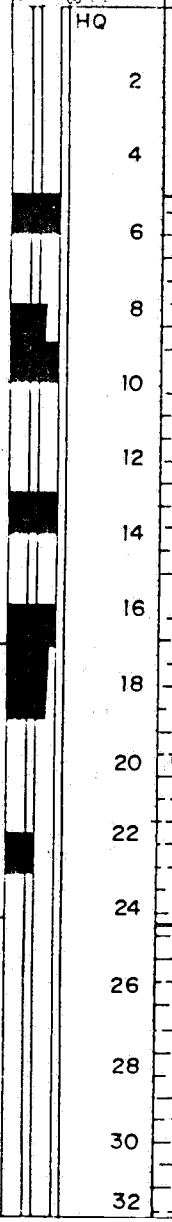
PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

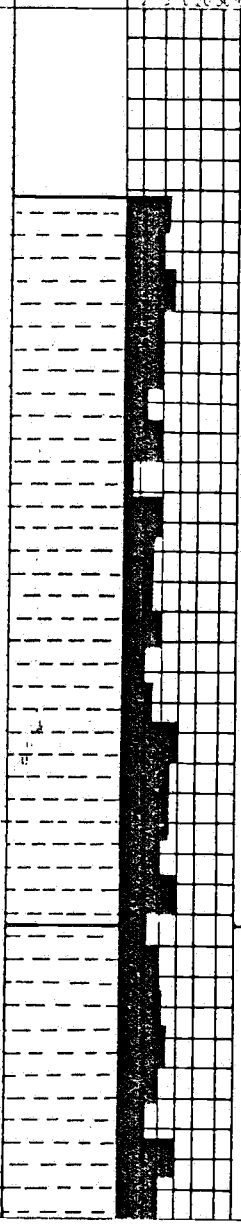
HOLE NO. Frankton No.2
TYPE OF HOLE Diamond
MACHINE NO Rockdrill Rig. 8
BORE SERIAL NO

INCLINATION 058°
AZIMUTH 085 °mag
DEPTH OF HOLE 194.1m
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE Ex-1022
COORDINATES 34°18'N, 139°11·7'E
GROUND ELEV. 245m AHD

DATE COMMENCED May 6, 1990
DATE COMPLETED May 14, 1990
DRILLER R. Pederson
LOGGED BY B.J.Morris





LITHOLOGICAL DESCRIPTION		VISIBLE SULPHIDES	SAMPLE NUMBER	ASSAYS ppm Cu	Pb	Zn	As	Au
Red brown clay soil with siltstone, shale, sandstone and quartz pebbles.								
Bleached shale, pale yellow – cream	HW		6729 RS3160	90	35	80	48	0·002
			RS3161	75	120	150	24	0·001
			RS3162	80	55	125	40	—
			RS3163	50	50	115	22	0·022
Light-grey – off white shale, bleached.			RS3164	60	30	160	28	—
			RS3165	185	85	260	100	0·002
			RS3166	130	80	515	62	0·002
Blue-grey carbonaceous shale with jarosite – FeO on cleavage planes dip 45° to core.	MW		RS3167	85	55	365	93	0·001
			RS3168	40	70	120	38	0·001
			RS3169	85	90	130	110	—
Start of fresh pyrite		abundant pyrite	RS3170	90	80	205	18	—

HOLE NO.

DRG.NO. S21761A

DEPARTMENT OF MINES – SOUTH AUSTRALIA

PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

HOLE NO. Frankton No. 2
TYPE OF HOLE
MACHINE NO
BORE SERIAL NO

INCLINATION
AZIMUTH
DEPTH OF HOLE
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE
COORDINATES
GROUND ELEV.

DATE COMMENCED
DATE COMPLETED
DRILLER
LOGGED BY

HOLE NO. DRG. NO. S21761 B

CORE SIZE & DEPTH (m)	LOG	FRACTURE LOG (2 5 10 20 50 100)	WEATHERING LOG	LITHOLOGICAL DESCRIPTION	VISIBLE SULPHIDES	SAMPLE NUMBER	ASSAYS p.p.m Cu	Pb	Zn	As	Au
HQ			MW	Blue-grey carbonaceous shale, pyrite on cleavage planes and as stringers.	abundant pyrite	RS 3171	90	95	160	27	—
34						RS3172	105	105	150	20	—
36						RS3173	100	80	70	14	—
38						RS 3174	95	70	150	10	—
40			SW			RS3175	85	65	205	21	—
42						RS3176	60	50	95	24	—
44						RS3177	75	60	280	33	—
46						RS3178	65	75	250	47	—
48						RS3179	60	60	160	46	—
50				Non carbonaceous shale 3cm 1cm pale non carbonaceous shale 10cm pale non carbonaceous shale		RS3180	55	45	125	10	—
52						RS 3181	55	35	100	18	—
54						RS3182	60	50	150	14	—
56	V V V V V		F	Black shale carbonaceous 30cm lamprophyre vein (petrology 6729 RS3287) some calcite-pyrite stringers		RS3183	60	45	100	28	—
58				1cm pale non-carbonaceous shale 2cm pale non-carbonaceous (petrology 6729 RS3288)		RS3184	50	20	100	24	—
60						RS3185	55	25	190	34	—
62				Some quartz-pyrite stringers		RS 3186	50	50	110	70	—
64											

DEPARTMENT OF MINES – SOUTH AUSTRALIA

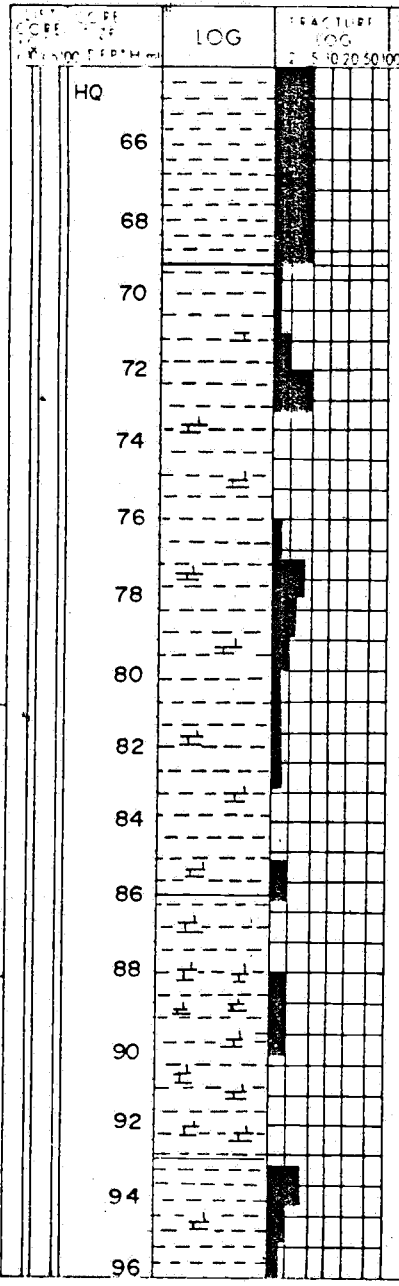
PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

HOLE NO. Frankton No.2
TYPE OF HOLE
MACHINE NO
ROPE SERIAL NO

INCLINATION
AZIMUTH
DEPTH OF HOLE
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE
COORDINATES
GROUND ELEV.

DATE COMMENCED
DATE COMPLETED
DRILLER
LOGGED BY



LITHOLOGICAL DESCRIPTION	VISIBLE SULPHIDES
Black shale carbonaceous, pyrite on cleavage planes and as stringers, some quartz – pyrite veinlets. pale non carbonaceous shale 10cm.	abundant pyrite
Grey–black shale, calcareous, carbonaceous with calcite stringers. 1cm pale non-carbonaceous shale 1cm pale non-carbonaceous shale	
Medium grey calcareous shale with light grey strongly-calcareous layers often with granular texture. Calcite stringers present.	
Dark grey calcareous shale with pyrite on cleavage planes and as stringers.	

SAMPLE NUMBER	ASSAYS p.p.m				
	Cu	Pb	Zn	As	Au
RS3187	65	80	100	18	—
RS3188	55	70	165	18	—
RS3189	50	60	200	35	—
RS3190	60	70	150	36	—
RS3191	50	80	195	17	—
RS3192	40	40	130	14	—
RS3193	40	25	125	31	0·001
RS3194	40	30	160	12	0·001
RS3195	30	35	150	22	0·001
RS3196	35	50	140	20	0·001
RS3197	35	65	505	34	0·001
RS3198	30	20	140	19	0·001
RS3199	30	40	175	12	—
RS3200	25	15	150	31	—
RS3201	50	50	145	29	—
RS3202	55	55	280	26	—

HOLE NO.

DRG. NO. S21761 C

DEPARTMENT OF MINES – SOUTH AUSTRALIA

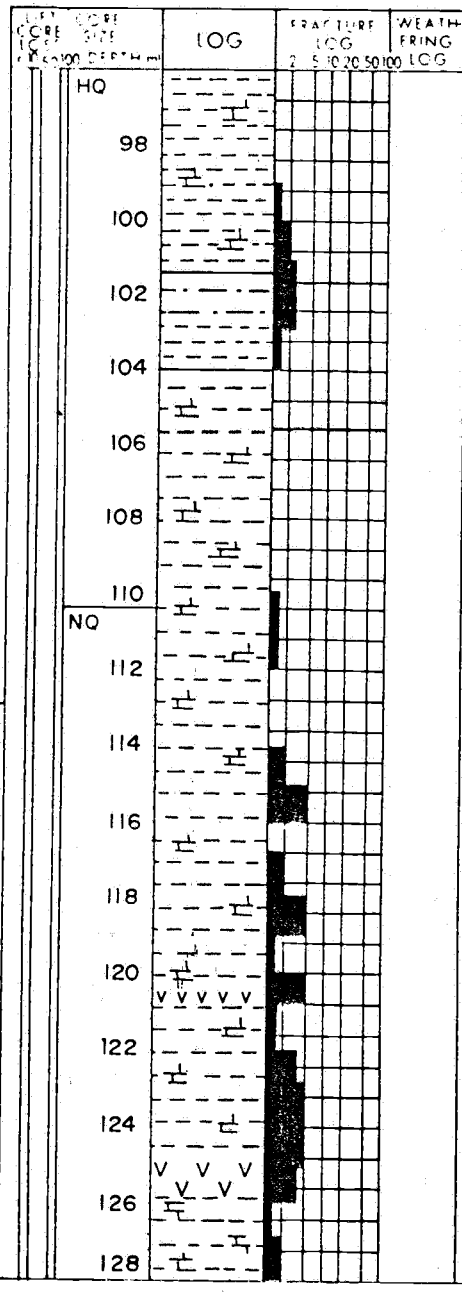
PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

HOLE NO Frankton No.2
TYPE OF HOLE
MACHINE NO.
BORE SERIAL NO

INCLINATION
AZIMUTH
DEPTH OF HOLE
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE
COORDINATES
GROUND ELEV.

DATE COMMENCED
DATE COMPLETED
DRILLER
LOGGED BY



LITHOLOGICAL DESCRIPTION	VISIBLE SULPHIDES	SAMPLE NUMBER	ASSAYS ppm Cu	Pb	Zn	As	Au
3cm calcite vein with pyrite 2cm pale non-carbonaceous shale	abundant pyrite	RS3203	45	50	150	28	—
		RS3204	45	40	340	82	—
Dark grey shale-silt		RS3205	50	35	340	70	—
		RS3206	55	65	235	12	—
Dark grey calcareous shale with light grey strongly calcareous layers. Pyrite cleavage plane and as stringers.		RS3207	55	95	315	10	—
pale non-carbonaceous shale 10cm		RS3208	50	140	645	9	—
		RS3209	65	95	335	24	—
3cm pale non-carbonaceous shale		RS3210	55	95	400	40	—
		RS3211	55	110	335	18	—
		RS3212	55	160	700	6	—
		RS3213	70	215	600	17	—
40cm zone of calcite-quartz-pyrite veinlets		RS3214	60	135	450	12	—
2cm lamprophyre vein (petrology 6729 RS3289)	pyrite common	RS3215	80	320	635	36	—
		RS3216	65	245	810	92	—
90cm lamprophyre dyke (petrology 6729 RS3290)		RS3217	125	415	1050	240	—
		RS3218	55	330	740	31	—

HOLE NO.

DRG NO. S21761 D

DEPARTMENT OF MINES – SOUTH AUSTRALIA

PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATION

HOLE NO Frankton No. 2	INCLINATION	PLAN REFERENCE	DATE COMMENCED
TYPE OF HOLE	AZIMUTH	ASSAY REFERENCE	DATE COMPLETED
MACHINE NO	DEPTH OF HOLE	COORDINATES	DRILLER
CORE SERIAL NO	DEPTH TO WATER	GROUND ELEV.	LOGGED BY

DEPTH (m)	LITHOLOGICAL DESCRIPTION	VISIBLE SULPHIDES	SAMPLE NUMBER	Cu (ppm)	Pb (ppm)	Zn (ppm)	As (ppm)	Au (ppm)
NQ		pyrite common	RS3219	45	180	600	7	—
130	Layering dips 30° to core	abundant pyrite	RS 3220	35	115	345	50	—
132		pyrite common	RS 3221	35	105	500	5	—
134	2cm pale non-carbonaceous shale		RS3222	40	180	955	17	—
136	Medium grey calcareous shale and light grey calcareous layers.		RS3223	35	80	310	4	—
138	layering dips 10°, cleavage 45° to core 10cm pale non-calcareous shale		RS3224	45	315	1040	7	—
140	layering dips 45°, cleavage 45° to core		RS 3225	30	40	195	5	—
142			RS3226	25	30	135	18	—
144			RS3227	25	35	200	16	—
146			RS 3228	25	55	300	18	—
148			RS3229	25	40	220	22	—
150			RS3230	30	120	420	12	—
152		minor pyrite	RS3231	15	45	105	3	—
154	Medium grey weakly calcareous silt/shale and light grey calcareous shale strongly banded.		RS3232	15	50	460	6	—
156	Calcite veinlets common		RS3233	15	5	60	6	—
158	50cm zone of quartz-calcite veins with pyrrhotite common calcite veinlets common		RS3234	10	20	50	12	—
160								

HOLE NO.

DRG NO. S21761 E

DEPARTMENT OF MINES – SOUTH AUSTRALIA

PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

HOLE NO. Frankton No. 2
TYPE OF HOLE
MACHINE NO
BORE SERIAL NO

INCLINATION
AZIMUTH
DEPTH OF HOLE
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE
COORDINATES
GROUND ELEV.

DATE COMMENCED
DATE COMPLETED
DRILLER
LOGGED BY

Core size: NQ

Depth (m)	Lithological description	Visible sulphides	Sample number	Cu	Pb	Zn	As	Au
162		minor pyrite	RS3235	10	10	120	5	—
164			RS3236	10	10	40	6	0·001
166	Calcite veinlets common		RS3237	20	5	65	8	—
168	layering and cleavage dips 45° to core		RS3238	15	5	60	10	—
170			RS3239	40	5	45	48	—
172	6cm lamprophyre vein, dips 60° to core		RS3240	115	15	15	18	0·013
174	Siderite vein with host rock fragments plus disseminated pyrite chalcopyrite Pale grey impure meta-sandstone (Petrology 6729 RS3291)		RS3241	260	5	25	31	0·001
176	0·5-2cm veins of quartz-siderite with pyrite and chalcopyrite at 174·2m and 175·2m. Layering 10°, cleavage 60° to core.		RS3242	645	5	20	22	0·001
178	Light grey meta-quartzite with clasts of black and grey shale		RS3243	100	20	95	30	—
180	Dark grey impure meta-sandstone		RS3244	120	285	230	21	—
182			RS3245	150	310	70	26	—
184	several siderite veinlets with traces of chalcopyrite		RS3246	220	145	80	41	—
186	some clasts of black shale		RS3247	30	120	60	28	—
188			RS3248	95	365	115	23	—
190	White clean quartzite		RS3249	95	200	120	20	—
192	1cm quartz veins at 190·5 and 190·9m (brecciated margins, 2 phase veins) Dark grey impure meta-sandstone	↓	RS3250	70	20	25	14	—

Assays p.p.m.

HOLE NO.

DRG. NO. S21761 F

DEPARTMENT OF MINES – SOUTH AUSTRALIA

PROJECT KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

HOLE NO. Frankton No. 2
TYPE OF HOLE
MACHINE NO
BORE SERIAL NO.

INCLINATION
AZIMUTH
DEPTH OF HOLE
DEPTH TO WATER

PLAN REFERENCE
ASSAY REFERENCE
COORDINATES
GROUND ELEV.

DATE COMMENCED
DATE COMPLETED
DRILLER
LOGGED BY

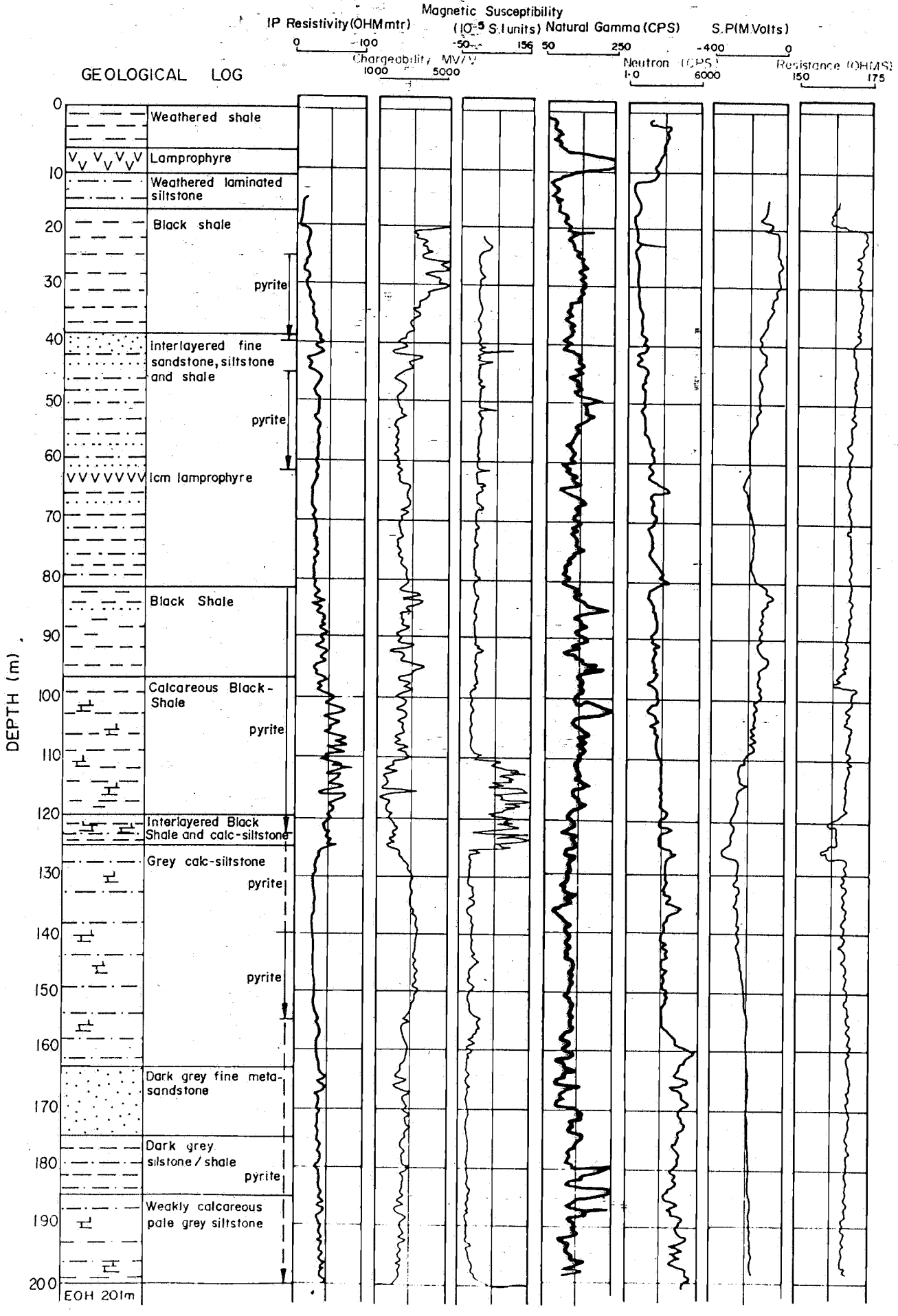
LIFT / CORE LOSS / CORE SIZE / DEPTH (m)	LOG	FRACTURE LOG (2 5 10 20 50 100)	WEATHERING LOG	LITHOLOGICAL DESCRIPTION	VISIBLE SULPHIDES	SAMPLE NUMBER	ASSAYS ppm Cu	Pb	Zn	As	Au
NQ 194				193·1 – 193·4m siderite stringers with some quartz feldspar traces of chalcopyrite. 193·7m 1cm quartz vein.	minor pyrite	RS3251	115	20	45	11	—
				EOH 194·1m							

HOLE NO.

DRG. NO. S21761 G

FRANKTON No.1 DOWN HOLE GEOPHYSICAL LOGS

(LOGGED 5-4-90, N.E. DUNSTAN)

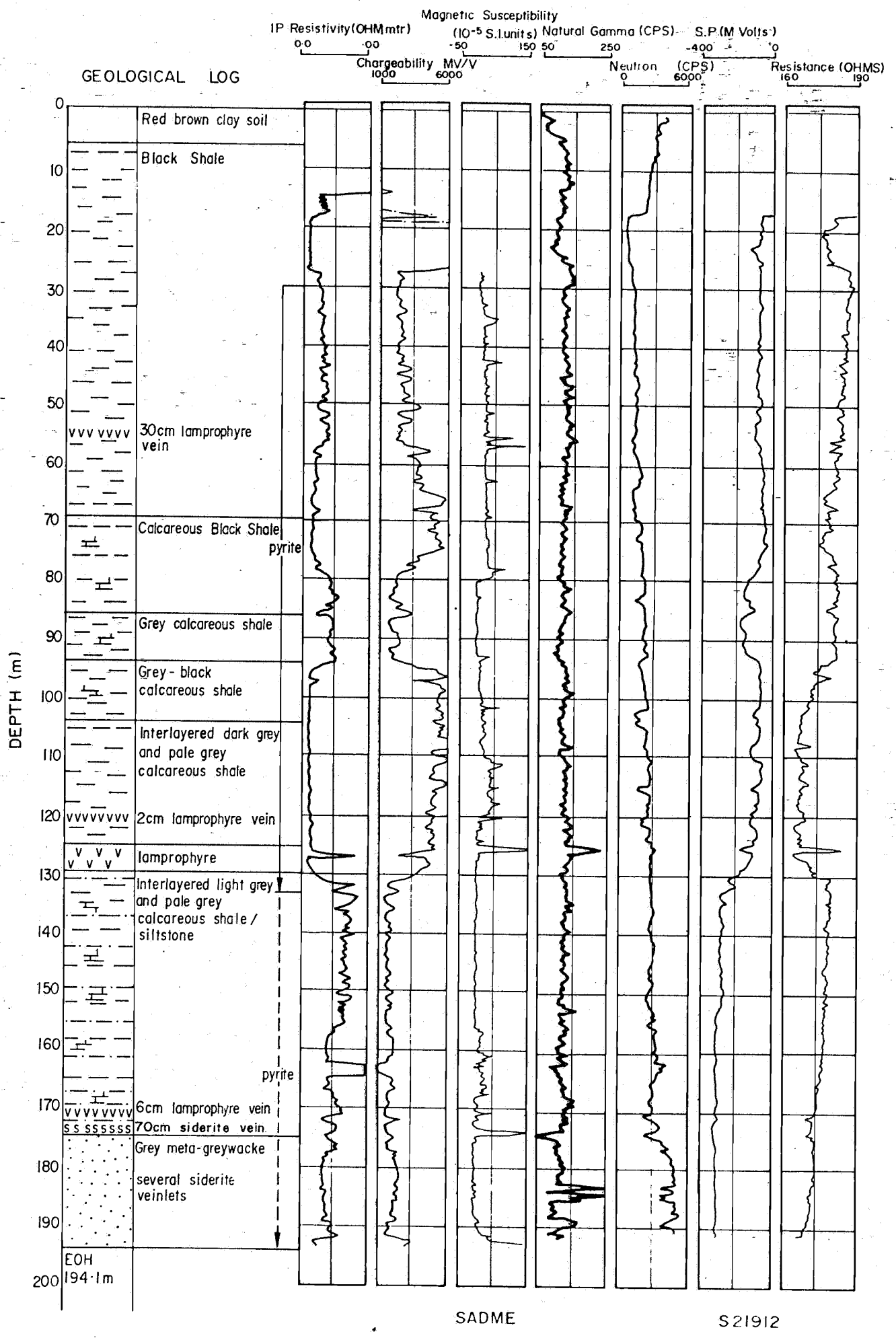


SADME

S21911

FRANKTON No. 2 DOWNHOLE GEOPHYSICAL LOGS

(LOGGED 15-5-90, N.E DUNSTAN)



Hole No:	TG1	Inclination:	50° to 090°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	50m	Date Drilled:	27 August 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Weathered shale, pale grey to black with	RS3343	145	20	70	100	0.002
2-4	fine mica partings, some FeO blebs.	RS3344	95	10	65	-	-
4-6		RS3345	50	5	155	100	-
6-8		RS3346	45	10	30	100	0.002
8-10		RS3347	60	15	2465	300	0.002
10-12		RS3348	90	10	645	100	-
12-14		RS3349	55	10	650	200	-
14-16		RS3350	30	10	320	100	-
16-18	Weathered black shale with vein quartz chips	RS3351	50	30	565	100	-
18-20	Weathered black shale with fine mica partings, some FeO blebs.	RS3352	55	25	475	100	-
20-22		RS3353	55	30	35	-	-
22-24		RS3354	125	30	125	100	-
24-26	Weathered pale brown shale, micaceous, ferruginous	RS3355	90	20	20	-	-
26-28	Weathered black shale, micaceous and some FeO blebs	RS3356	140	20	25	100	-
28-30		RS3357	375	15	10	100	0.001
30-32	- some chips of vein quartz.	RS3358	990	15	10	200	-
32-34		RS3359	1035	15	5	200	-
34-36	Moderately fresh pale grey micaceous shale.	RS3360	665	25	5	100	0.001
36-38		RS3361	200	15	-	-	-
38-40	Pale grey meta-siltstone.	RS3362	200	30	-	-	-
40-42		RS3363	65	20	5	-	0.001
42-44	Grey interlayered meta siltstone and shale.	RS3364	95	30	5	100	0.001
44-46		RS3365	75	135	-	-	-
46-48		RS3366	55	140	-	-	-
48-50		RS3367	45	115	-	-	-
	E.O.H. 50m						

G01914

Hole No:	TG2	Inclination:	50° to 090°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	50m	Date Drilled:	27 August 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Weathered calcareous grey-green meta-siltstone	RS3368	25	925	15	100	0.002
2-4	and shale, with FeO blebs.	RS3369	20	280	10	-	-
4-6	as above with chocolate brown strongly	RS3370	25	820	15	-	-
6-8	ferruginous layers.	RS3371	25	865	30	100	-
8-10	-less ferruginous	RS3372	20	210	10	100	0.001
10-12	Grey-green-pale brown calcareous siltstone	RS3373	25	150	80	-	0.001
12-14	with thin ferruginous layers	RS3374	20	90	40	-	-
14-16		RS3375	20	40	15	-	-
16-18		RS3376	20	355	15	-	-
18-20	- cavities between 18 and 22m.	RS3377	20	155	20	100	-
20-22		RS3378	35	515	35	700	0.001
22-24	Yellow-brown strongly ferruginous calcareous.	RS3379	360	985	1085	100	0.001
24-26	meta-siltstone, thin sandstone bed at 24m.	RS3380	225	210	190	100	0.001
26-28	Fine grained blue-grey-brown dirty sandstone	RS3381	45	240	155	100	-
28-30	with some FeO veinlets and blebs.	RS3382	15	60	15	-	-
30-32		RS3383	5	65	10	100	-
32-34		RS3384	5	85	5	100	-
34-36		RS3385	10	110	15	-	-
36-38		RS3386	10	50	10	-	-
38-40		RS3387	5	45	5	-	-
40-42		RS3388	5	65	5	-	-
42-44		RS3389	5	85	-	-	-
44-46		RS3390	-	45	-	-	0.001
46-48		RS3391	-	45	-	-	0.001
48-50		-					
	E.O.H. 50m						

Hole No:	TG3	Inclination:	50° to 090°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	50m	Date Drilled:	28 August 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Weathered grey-green calcareous meta-siltstone	RS3392	50	1565	20	100	0.004
2-4	Weathered grey-green calcareous meta-siltstone	RS3393	20	830	25	100	0.001
4-6	with grey-brown calcareous shale interbed, some	RS3394	15	170	20	-	-
6-8	FeO blebs.	RS3395	20	80	20	-	-
8-10		RS3396	20	60	15	100	-
10-12		RS3397	20	75	15	100	-
12-14		RS3398	15	100	30	-	-
14-16		RS3399	15	120	35	-	0.001
16-18	Chocolate brown ferruginised calc. siltstone and shale to 18.5m.	RS3400	110	410	40	200	0.001
18-20	Grey-brown, fine, dirty sandstone with hm	RS3401	845	50	100	600	0.001
20-22	specks and minor calcite stringers.	RS3402	80	75	15	100	-
22-24		RS3403	30	60	15	100	-
24-26		RS3404	15	35	15	-	-
26-28	Pale brown calcareous, ferruginous meta-siltstone.	RS3405	20	465	35	-	0.001
28-30		RS3406	45	55	10	-	-
30-32	Pale grey fine meta-sandstone,	RS3407	110	45	15	-	-
32-34		RS3408	45	40	5	-	0.001
34-36		RS3409	15	35	10	-	0.001
36-38		RS3410	5	20	15	-	-
38-40		RS3411	25	50	5	-	-
40-42	- FeO blebs.	RS3412	5	30	5	-	-
42-44		RS3413	5	25	10	-	-
44-46		RS3414	-	30	-	-	-
46-48		RS3415	-	20	5	-	-
48-50	- FeO blebs.	RS3416	5	20	5	-	-
	E.O.H. 50m						

G01914

Hole No:	TG4	Inclination:	48° to 235°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	50m	Date Drilled:	28 August 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Weathered yellow-brown ferruginous fine	RS3417	115	180	95	200	0.001
2-4	meta-sandstone.	RS3418	265	255	30	500	0.001
4-6		RS3419	330	215	20	300	0.001
6-8	Chocolate brown-black ferruginous fine meta-sandstone.	RS3420	3580	2630	9560	1600	0.039
8-10	Grey-brown fine meta-sandstone, ferruginous.	RS3421	145	1870	33200	1300	0.014
10-12		RS3422	20	305	1500	100	0.001
12-14		RS3423	20	115	165	100	0.001
14-16	As above, weakly calcareous with some calc.	RS3424	45	215	30	100	-
16-18	siltstone interbeds.	RS3425	15	95	45	-	-
18-20	Grey-brown fine meta-sandstone, ferruginous.	RS3426	10	80	35	100	-
20-22	- minor quartz stringers.	RS3427	20	90	35	100	-
22-24	- minor quartz stringers.	RS3428	20	85	10	-	-
24-26	- strongly ferruginous.	RS3429	30	110	10	-	0.001
26-28		RS3430	10	65	5	-	0.001
28-30		RS3431	5	50	30	-	-
30-32		RS3432	5	40	50	-	-
32-34		RS3433	20	45	100	-	-
34-36	Pale grey fine meta-sandstone, bit ferruginous	RS3434	20	80	360	100	-
36-38	35-36m.	RS3435	5	40	35	-	-
38-40		RS3436	10	30	5	-	-
40-42	Grey-brown dirty fine meta-sandstone with FeO blebs	RS3437	290	50	5	-	-
42-44		RS3438	525	45	10	-	0.001
44-46	As above with calc-siltstone interbeds.	RS3439	155	65	10	-	0.002
46-48	Grey-brown fine meta-sandstone with FeO blebs.	RS3440	110	35	-	-	-
48-50	and minor quartz veinlets.	RS3441	25	30	-	-	-
	E.O.H. 50m						

Hole No:	TG5	Inclination:	50° to 048°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	60m	Date Drilled:	29 August 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Weathered yellow-brown ferruginous shale.	RS3442	25	95	30	100	0.002
2-4		RS3443	5	60	50	-	0.001
4-6		RS3444	25	85	65	-	0.001
6-8	Weathered dark grey-brown-yellow-red	RS3445	40	160	40	-	-
8-10	ferruginous shale.	RS3446	25	105	30	100	-
10-12		RS3447	30	90	30	-	0.001
12-14		RS3448	60	180	120	160	0.001
14-16		RS3449	70	1205	120	100	0.001
16-18		RS3450	100	1265	60	-	-
18-20		RS3451	110	1235	175	-	-
20-22		RS3452	125	1180	1685	2000	0.001
22-24		RS3453	105	3020	555	300	0.001
24-26	Grey calcareous meta-siltstone, bit ferruginous.	RS3454	75	875	360	100	-
26-28		RS3455	30	180	65	-	-
28-30		RS3456	20	125	55	-	-
30-32		RS3457	20	105	40	-	-
32-34		RS3458	10	70	30	-	-
34-36		RS3459	20	110	15	-	-
36-38	- some ferruginous stringers.	RS3460	20	65	20	-	-
38-40	Brown-grey calc meta-siltstone, with shale	RS3461	15	80	20	-	-
40-42	interbeds	RS3462	20	45	15	-	-
42-44		RS3463	20	55	20	-	0.001
44-46	- bit ferruginous	RS3464	20	40	10	-	-
46-48	- weakly calcareous	RS3465	120	80	20	100	-
48-50	Brown calcareous meta-siltstone, ferruginous	RS3466	15	75	50	100	-
50-52	- ferruginous, hm on joints.	RS3467	25	545	125	100	-
52-54	- some calcite stringer.	RS3468	500	715	2660	100	0.004
54-56		RS3469	115	380	170	200	-
56-58	Grey fine meta-sandstone, some FeO stringers.	RS3470	50	65	90	1700	-
58-60		RS3471	15	55	25	-	-
	E.O.H. 60m						

G01914

Hole No:	TG6	Inclination:	50° to 270°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	18m	Date Drilled:	4 September 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Weathered dark grey-black shale, partly ferruginous particularly between 8 and 9m.	RS3601	55	110	35	100	0.002
2-4		RS3602	40	80	15	-	-
4-6		RS3603	60	85	20	100	-
6-8		RS3604	65	90	20	100	-
8-10		RS3605	50	70	10	100	-
10-12		RS3606	40	85	10	100	-
12-14		RS3607	95	80	20	-	-
14-16		RS3608	85	105	20	100	-
16-18		RS3609	60	80	25	100	-
	EOH 18m						

Hole No:	TG7	Inclination:	50° to 090°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	60m	Date Drilled:	4 September 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Weathered grey-black shale	RS3610	55	105	30	-	0.003
2-4		RS3611	70	140	15	-	-
4-6	- some FeO blebs.	RS3612	50	100	10	100	0.001
6-8		RS3613	50	105	10	-	-
8-10		RS3614	45	90	5	-	-
10-12	- fairly ferruginous.	RS3615	50	155	15	100	0.001
12-14		RS3616	150	180	60	-	0.001
14-16	As above to 15m then brown ferruginous	RS3617	185	90	95	400	0.003
16-18	shale/siltstone.	RS3618	175	385	385	200	0.002
18-20		RS3619	600	215	225	100	0.002
20-22	Yellow-brown ferruginous, fine meta-sandstone.	RS3620	115	45	40	-	0.003
22-24		RS3621	75	20	25	100	0.003
24-26		RS3622	10	5	5	100	0.001
26-28		RS3623	15	5	10	-	0.001
28-30		RS3624	15	15	15	-	0.001
30-32	- very ferruginous.	RS3625	5	55	55	-	-
32-34		RS3626	-	5	5	-	0.001
34-36		RS3627	-	-	5	-	-
36-38	Yellow-brown ferruginous, fine, meta-sandstone	RS3628	-	-	-	-	-
38-40	with grey siltstone interbeds.	RS3629	-	-	5	-	-
40-42	- vein quartz, stringers.	RS3630	-	-	5	-	-
42-44		RS3631	20	5	5	-	-
44-46		RS3632	-	35	-	-	-
46-48		RS3633	15	60	5	-	-
48-50		RS3634	5	40	10	-	-
50-52		RS3635	10	50	15	-	-
52-54		RS3636	5	95	15	100	0.001
54-56	Grey interlayered fine meta-sandstone and	RS3637	20	120	15	100	0.001
56-58	siltstone with some ferruginisation.	RS3638	5	40	-	-	-
58-60		RS3639	-	40	-	100	0.001
	E.O.H. 60m						

Hole No:	TG8	Inclination:	50° to 090°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	60m	Date Drilled:	4 September 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Light grey weakly calc. meta-siltstone, fine sandstone.	RS3640	80	20	50	100	0.012
2-4	Weathered black shale.	RS3641	80	10	55	100	0.003
4-6		RS3642	100	15	50	100	-
6-8	- some light grey siltstone interbed.	RS3643	40	25	30	100	0.002
8-10	- weakly ferruginous.	RS3644	50	20	30	100	0.003
10-12	- FeO blebs.	RS3645	30	15	40	100	0.001
12-14		RS3646	50	10	25	-	-
14-16		RS3647	50	5	25	100	0.001
16-18		RS3648	40	5	15	100	0.001
18-20		RS3649	30	15	10	100	0.001
20-22		RS3650	30	15	5	100	-
22-24		RS3651	25	15	5	100	0.001
24-26		RS3652	20	10	15	100	0.001
26-28		RS3653	50	10	35	100	-
28-30		RS3654	75	10	85	-	0.001
30-32	- FeO blebs and bands 1mm.	RS3655	85	5	115	100	0.001
32-34		RS3656	110	5	130	100	0.001
34-36		RS3657	150	5	100	100	0.001
36-38		RS3658	95	5	75	100	0.001
38-40		RS3659	55	10	75	100	0.001
40-42		RS3660	95	5	30	100	0.001
42-44		RS3661	40	5	10	100	0.001
44-46	Weathered medium to light grey shale.	RS3662	25	10	10	100	-
46-48	Medium grey and black shale.	RS3663	40	10	10	100	-
48-50		RS3664	50	10	10	200	-
50-52	Brown ferruginous shale.	RS3665	100	10	5	100	-
52-54	Weathered black shale, partly ferruginous some	RS3666	100	20	50	100	-
54-56	jarosite on fractures.	RS3667	205	10	150	100	-
56-58		RS3668	170	15	90	100	0.001
58-60		RS3669	110	10	20	-	-
	E.O.H. 60m						

G01914

Hole No:	AH1	Inclination:	50° to 290°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	54m	Date Drilled:	29 August 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Brown ferruginous limestone.	RS3472	5	45	100	-	0.002
2-4		RS3473	15	55	95	-	-
4-6	Pale brown saccharoidal marble.	RS3474	15	45	60	100	-
6-8		RS3475	15	60	45	-	-
8-10	- FeO blebs.	RS3476	25	70	15	-	-
10-12	Brown calcareous meta-siltstone.	RS3477	5	55	10	-	-
12-14		RS3478	10	60	15	-	-
14-16	Grey-brown fine meta-sandstone, ferruginous,	RS3479	15	65	10	-	-
16-18	very micaceous.	RS3480	50	75	10	-	0.001
18-20		RS3481	30	60	10	-	0.001
20-22		RS3482	35	70	10	-	0.005
22-24		RS3483	-	55	5	-	0.001
24-26		RS3484	5	60	10	-	0.002
26-28		RS3485	30	75	10	-	0.002
28-30		RS3486	35	75	10	-	0.006
30-32		RS3487	5	60	15	-	-
32-34	Grey-green meta siltstone.	RS3488	10	60	5	-	0.002
34-36		RS3489	15	55	15	-	0.002
36-38	Pale brown fine meta-sandstone, FeO blebs with	RS3490	25	55	15	-	0.002
38-40	some meta-siltstone interbeds.	RS3491	20	60	20	-	0.001
40-42		RS3492	50	50	30	-	0.001
42-44		RS3493	20	50	5	-	0.001
44-46		RS3494	15	40	10	-	0.001
46-48		RS3495	15	35	10	-	0.002
48-50		RS3496	5	50	15	-	0.002
50-52		RS3497	30	45	10	-	0.002
52-54		RS3498	10	65	25	-	0.001
	E.O.H. 54m						

Hole No:	AH2	Inclination:	50° to 090°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	50m	Date Drilled:	30 August 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Red-brown ironstone, weakly calcareous.	RS3499	15	205	415	100	0.001
2-4		RS3500	10	80	70	200	0.001
4-6		RS3501	10	90	95	200	-
6-8	As above to 7m then grey-brown-white saccharoidal	RS3502	25	175	360	100	0.013
8-10	marble.	RS3503	5	30	140	-	-
10-12	- 10 to 10.2m ferruginous limestone.	RS3504	5	20	110	-	-
12-14		RS3505	5	25	100	-	-
14-16		RS3506	-	30	175	-	-
16-18	- bit ferruginous.	RS3507	-	25	105	-	-
18-20	- bit ferruginous.	RS3508	5	35	95	-	-
20-22	Grey limestone, minor pyrite cubes 1mm.	RS3509	-	20	135	-	0.001
22-24		RS3510	-	20	70	-	0.001
24-26	Yellow-brown ferruginous limestone, some calc-shale layers	RS3511	25	65	55	100	0.003
26-28	- soft broken ground.	RS3512	35	60	85	100	0.001
28-30	- minor pyrite.	RS3513	10	20	190	-	0.004
30-32	- minor pyrite.	RS3514	10	35	20	-	0.001
32-34	Grey-brown calc shale.	RS3515	20	65	10	-	0.001
34-36	Blue-grey limestone with brown shale layers.	RS3516	25	55	5	-	-
36-38	Grey fine meta-sandstone, with FeO blebs.	RS3517	10	50	5	-	-
38-40		RS3518	5	55	5	-	-
40-42		RS3519	10	50	5	-	-
42-44	As above with grey phyllite layers.	RS3520	15	85	15	-	0.001
44-46	Grey phyllite.	RS3521	20	75	5	-	0.001
46-48	Grey phyllite with fine grey sandstone layers.	RS3522	30	80	5	-	-
48-50		RS3523	35	85	5	-	-
	E.O.H. 50m						

G01914

Hole No:	AH3	Inclination:	50° to 100°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	50m	Date Drilled:	30 August 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Red-brown ferruginous fine sandstone, ironstone.	RS3524	20	80	135	-	0.001
2-4		RS3525	35	70	55	-	0.001
4-6		RS3526	40	115	90	-	-
6-8	Yellow-brown weakly calc. ironstone.	RS3527	85	410	580	100	0.003
8-10	As above to 9.5m then blue-grey limestone.	RS3528	55	235	815	100	0.003
10-12	Yellow-brown ironstone and clay to 10.5m then	RS3529	20	60	245	-	0.001
12-14	blue-grey limestone.	RS3530	15	55	215	-	0.001
14-16	Olive green calc. shale, partly ferruginous.	RS3531	30	75	160	100	0.001
16-18	Grey-yellow-brown calc. shale, partly ferruginous.	RS3532	30	65	30	100	0.001
18-20		RS3533	30	80	40	-	0.001
20-22	Grey-green calc. siltstone and shale with ferruginous	RS3534	15	75	140	100	0.001
22-24	clay bands.	RS3535	20	90	490	-	0.002
24-26	As above to 25m then grey-white saccharoidal marble.	RS3536	10	45	175	-	0.004
26-28		RS3537	10	25	35	-	0.002
28-30	- some calc. shale layer.	RS3538	10	35	25	-	-
30-32	Blue-grey fine calc. sandstone with shale layers.	RS3539	10	50	30	-	0.002
32-34	Grey phyllite and siltstone, weakly calcareous.	RS3540	30	70	10	100	0.002
34-36		RS3541	30	85	20	100	0.001
36-38	Grey-green partly ferruginous shale with fine meta-sandstone	RS3542	15	60	35	-	0.003
38-40	layers.	RS3543	30	75	55	-	0.001

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
40-42	Grey-brown fine meta-sandstone.	RS3544	35	65	35	-	0.001
42-44		RS3545	10	55	30	-	0.001
44-46		RS3546	10	45	15	-	0.001
46-48	Grey shale and fine meta-sandstone, some pyrite.	RS3547	45	75	15	-	0.001
48-50		RS3548	45	65	15	-	0.001
	E.O.H. 50m						

Hole No:	AH4	Inclination:	60° to 090°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	54m	Date Drilled:	3 September 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Grey fine meta-sandstone.	RS3549	35	70	25	100	0.001
2-4		RS3550	20	65	20	-	0.001
4-6		RS3551	60	65	20	-	0.001
6-8	Grey weak calc. fine meta-sandstone and siltstone.	RS3552	25	65	25	-	0.001
8-10		RS3553	20	60	10	-	0.001
10-12		RS3554	30	55	10	-	0.001
12-14	Yellow ferruginous meta-sandstone.	RS3555	70	75	15	100	0.002
14-16	Grey-green calc. meta-siltstone, with some blue-grey	RS3556	105	85	20	-	0.004
16-18	meta-sandstone layers.	RS3557	65	95	10	-	0.002
18-20	Dark grey calc. meta-siltstone with FeO blebs.	RS3558	75	105	10	120	-
20-22		RS3559	85	145	5	-	0.002
22-24	- some pyrite cubes 1mm.	RS3560	70	80	15	-	0.002
24-26	- minor pyrite cubes 1mm.	RS3561	55	80	15	100	0.001
26-28	Light grey calc. meta-siltstone with minor fine pyrite.	RS3562	55	80	10	-	0.003
28-30	Blue-grey calc., fine meta-sandstone, minor fine pyrite.	RS3563	30	60	10	100	0.001
30-32		RS3564	20	40	10	-	0.001
32-34	As above but not calcareous.	RS3565	25	55	10	-	0.001
34-36		RS3566	10	45	10	-	0.001
36-38		RS3567	10	45	15	-	0.001
38-40		RS3568	5	50	10	-	0.001
40-42		RS3569	15	55	5	-	0.001
42-44	- minor fine pyrite	RS3570	15	70	5	-	0.001
44-46		RS3571	45	55	5	-	0.001
46-48	- weakly calcareous.	RS3572	25	50	5	-	0.001
48-50		RS3573	20	55	5	-	0.003
50-52		RS3574	20	50	10	-	0.002
52-54	- minor fine pyrite	RS3575	45	65	15	-	0.003
	E.O.H. 54m						

Hole No:	AH5	Inclination:	50° to 090°
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	50m	Date Drilled:	3 September 1990

Interval (m)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	Grey-green fine meta-sandstone.	RS3576	35	50	10	100	0.002
2-4		RS3577	35	90	5	100	0.001
4-6		RS3578	70	85	5	-	0.001
6-8	As above with meta-siltstone layers.	RS3579	45	90	10	100	0.001
8-10	Grey-green meta-siltstone with fine meta-sandstone	RS3580	30	75	5	100	0.002
10-12	and shale layers.	RS3581	35	95	5	-	-
12-14	Grey-green meta-siltstone and shale, partly ferruginous.	RS3582	20	90	10	-	-
14-16		RS3583	30	85	5	100	0.001
16-18		RS3584	30	85	5	100	0.002
18-20		RS3585	40	95	5	100	0.001
20-22		RS3586	35	110	5	100	0.001
22-24		RS3587	30	115	5	-	0.001
24-26	- some dark brown ferruginous clay layers.	RS3588	25	110	5	-	0.003
26-28		RS3589	40	135	180	-	0.002
28-30	Yellow-orange strongly ferruginous siltstone.	RS3590	25	125	10	-	0.002
30-32		RS3591	25	85	260	100	-
32-34	Grey saccharoidal marble bit ferruginous.	RS3592	5	25	125	-	0.001
34-36		RS3593	10	25	210	-	0.001
36-38	- some ferruginous clay zones.	RS3594	15	25	85	-	0.002
38-40		RS3595	-	10	45	-	0.001
40-42	Grey limestone with orange ferruginous clay.	RS3596	70	75	195	-	0.004
42-44	Grey-brown limestone	RS3597	30	50	145	-	0.008
44-46	- cavities present.	RS3598	15	35	165	-	0.003
46-48	Grey-green calcareous meta-siltstone and shale.	RS3599	30	55	95	100	0.002
48-50		RS 3600	25	70	40	-	0.003
	E.O.H. 50m						

Hole No: MB1
Type: Reverse circulation, hammer
Depth: 138m

Inclination: vertical
Driller: Northbridge Drilling, J Rigney
Date Drilled: 5 September 1990

Interval (m)	Magnetic Sus. (10^{-3} SI units)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	0.25	Grey-green fine meta-sandstone,	RS3670	5	85	5	-	0.002
2-4	0.21	FeO blebs.	RS3671	5	90	-	-	0.002
4-6	0.19	Grey-green meta-siltstone, FeO blebs.	RS3672	-	75	-	-	-
6-8	0.25		RS3673	5	80	10	100	-
8-10	0.24	- some shale layers, ferruginous.	RS3674	-	95	-	-	-
10-12	0.25	- ferruginised siltstone.	RS3675	-	85	-	-	-
12-14	0.31	Grey-green fine meta-sandstone, FeO blebs.	RS3676	-	85	-	100	-
14-16	0.31		RS3677	5	80	-	-	-
16-18	0.35		RS3678	-	85	-	-	-
18-20	0.42	- grey meta-siltstone layers.	RS3679	10	85	-	-	-
20-22	0.44	Grey-green meta-siltstone.	10	10	55	-	-	-
22-24	0.25	Grey-green meta-siltstone and shale.	RS3681	65	85	-	-	0.003
24-26	0.31	Grey meta-siltstone and fine	RS3682	40	85	-	100	0.001
26-28	0.33	meta-sandstone.	RS3683	120	70	-	100	0.002
28-30	0.29		RS3684	90	65	-	100	0.003
30-32	0.35	Grey meta-siltstone and shale.	RS3685	5	70	-	100	0.001
32-34	0.42		RS3686	15	75	-	-	0.001
34-36	0.51		RS3687	5	45	-	100	0.001
36-38	0.44	Grey-brown fine meta-sandstone.	RS3688	-	60	-	100	0.001
38-40	0.76		RS3689	10	55	-	100	0.001
40-42	0.57		RS3690	-	50	-	-	0.001
42-44	0.52	Grey-brown fine sandstone, siltstone	RS3691	-	55	-	-	0.001
44-46	0.57	and shale.	RS3692	5	55	5	-	0.002

Hole No:	MB1	Inclination:	vertical
Type:	Reverse circulation, hammer	Driller:	Northbridge Drilling, J Rigney
Depth:	138m	Date Drilled:	5 September 1990

Interval (m)	Magnetic Sus. (10^{-3} SI units)	Log	Sample No (prefix 6729)	Assays (ppm) Cu	Zn	Pb	As	Au
0-2	0.25	Grey-green fine meta-sandstone,	RS3670	5	85	5	-	0.002
2-4	0.21	FeO blebs.	RS3671	5	90	-	-	0.002
4-6	0.19	Grey-green meta-siltstone, FeO blebs.	RS3672	-	75	-	-	-
6-8	0.25		RS3673	5	80	10	100	-
8-10	0.24	- some shale layers, ferruginous.	RS3674	-	95	-	-	-
10-12	0.25	- ferruginised siltstone.	RS3675	-	85	-	-	-
12-14	0.31	Grey-green fine meta-sandstone, FeO blebs.	RS3676	-	85	-	100	-
14-16	0.31		RS3677	5	80	-	-	-
16-18	0.35		RS3678	-	85	-	-	-
18-20	0.42	- grey meta-siltstone layers.	RS3679	10	85	-	-	-
20-22	0.44	Grey-green meta-siltstone.	10	10	55	-	-	-
22-24	0.25	Grey-green meta-siltstone and shale.	RS3681	65	85	-	-	0.003
24-26	0.31	Grey meta-siltstone and fine	RS3682	40	85	-	100	0.001
26-28	0.33	meta-sandstone.	RS3683	120	70	-	100	0.002
28-30	0.29		RS3684	90	65	-	100	0.003
30-32	0.35	Grey meta-siltstone and shale.	RS3685	5	70	-	100	0.001
32-34	0.42		RS3686	15	75	-	-	0.001
34-36	0.51		RS3687	5	45	-	100	0.001
36-38	0.44	Grey-brown fine meta-sandstone.	RS3688	-	60	-	100	0.001
38-40	0.76		RS3689	10	55	-	100	0.001
40-42	0.57		RS3690	-	50	-	-	0.001
42-44	0.52	Grey-brown fine sandstone, siltstone	RS3691	-	55	-	-	0.001
44-46	0.57	and shale.	RS3692	5	55	5	-	0.002

Interval (m)	Magnetic Sus. (10^{-3} SI units)	Log	Assays (ppm) Sample No (prefix 6729)	Cu	Zn	Pb	As	Au
46-48	0.52	Grey-green meta-siltstone.	RS3693	10	75	-	100	0.002
48-50	0.41		RS3694	-	75	-	100	0.002
50-52	0.30	- some fine sandstone and shale.	RS3695	-	75	-	100	0.001
52-54	0.47		RS3696	25	65	-	-	0.001
54-56	0.51		RS3697	30	50	-	-	0.001
56-58	0.75	Blue-grey fine meta-sandstone, minor	RS3698	5	45	5	-	0.001
58-60	0.76	siltstone layers.	RS3699	5	45	-	-	-
60-62	0.58		RS3700	-	50	-	-	-
62-64	0.84	Blue-grey fine meta-sandstone.	RS3701	-	50	5	-	-
64-66	0.71		RS3702	-	50	5	-	0.001
66-68	0.58		RS3703	-	50	-	-	-
68-70	0.77	Blue-grey-green fine meta-sandstone with	RS3704	-	45	-	-	-
70-72	0.46	weakly calcareous siltstone layers.	RS3705	-	55	5	-	-
72-74	0.71	Grey weakly calc. fine meta-sandstone.	RS3706	-	50	5	-	-
74-76	0.73		RS3707	-	50	-	-	-
76-78	0.57	with meta-siltstone	RS3708	-	60	-	-	-
78-80	0.68	- with meta-siltstone.	RS3709	10	70	5	-	-
80-82	0.50	Grey-green calc. meta-siltstone.	RS3710	15	70	-	-	0.001
82-84	0.32	Dark grey shale and calc. meta-siltstone.	RS3711	30	70	-	-	0.001
84-86	0.43		RS3712	210	90	5	-	0.002
86-88	0.39		RS3713	140	95	5	-	-
88-90	0.42		RS3714	105	90	-	-	-
90-92	0.39		RS3715	75	95	5	-	0.001
92-94	0.52	- some calcite stringers.	RS3716	30	80	-	-	-
94-96	0.59	Grey siltstone and shale.	RS3717	35	65	-	-	-
96-98	0.43	Weakly calc. meta-siltstone and shale	RS3718	30	80	-	-	-
98-100	0.41	* cut water at 99m.	RS3719	50	100	5	-	-
100-102	0.41		RS3720	70	85	-	-	-
102-104	0.28		RS3721	120	80	-	-	-
104-106	0.23		RS3722	180	75	-	-	-
106-108	0.22		RS3723	30	75	-	-	-

Interval (m)	Magnetic Sus. (10^{-3} SI units)	Log	Assays (ppm) Sample No (prefix 6729)	Cu	Zn	Pb	As	Au
108-110	0.44	Dark grey shale and siltstone.	RS3724	15	70	-	-	-
110-112	0.32		RS3725	5	65	-	-	-
112-114	0.52	- minor pyrite	RS3726	5	60	5	-	-
114-116	0.37	Weakly calc. dark grey meta-siltstone.	RS3727	-	45	-	-	-
116-118	0.54	Weakly calc. grey meta-sandstone and	RS3728	-	50	-	-	-
118-120	0.38	siltstone.	RS3729	-	60	5	-	-
120-122	0.54	Grey fine meta-sandstone, quartz stringer.	RS3730	5	50	-	-	-
122-124	0.60		RS3731	5	65	-	-	-
124-126	0.37	Dark grey calc. meta-siltstone, quartz	RS3732	-	65	-	-	-
126-128	0.63	stringer. Grey fine meta-sandstone, quartz stringer.	RS3733	15	50	5	-	0.007
128-130	0.39	Grey meta-siltstone and shale.	RS3734	10	70	-	-	-
130-132	0.38	- pyrite on cleavage.	RS3735	145	80	-	-	0.002
132-134	0.35	- pyrite on cleavage.	RS3736	80	85	-	-	-
134-136	0.34	Grey fine meta-sandstone and	RS3737	15	55	-	100	-
136-138	0.34	meta-siltstone, pyrite on cleavage, quartz, stringer.	RS3738	-	65	-	100	-

E.O.H. 138m

Plate 1. Karinya Shale exposed in road cutting on Sturt Highway, The Gap Prospect. Photo No. 39275

Plate 2. Diamond drilling, Frankton Prospect. Photo No. 39277

Plate 3. Diamond drill core showing pyrite along cleavage plane in Karinya Shale. Photo No. 39278

Plate 4. Diamond drill core showing interlayered black shale and grey calc-siltstone of Karinya Shale with calcite stringers. Photo No. 39279

Plate 5. Reverse circulation-hammer drilling at The Gap Prospect. Photo No. 39280

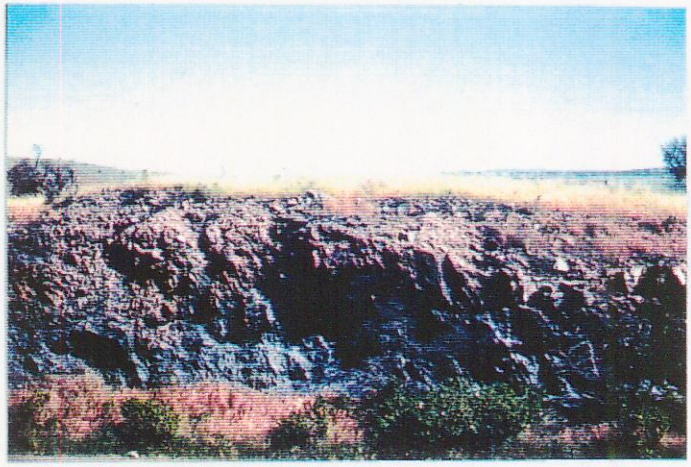


Plate I.

Plate 2.

Plate 3.

Plate 4.

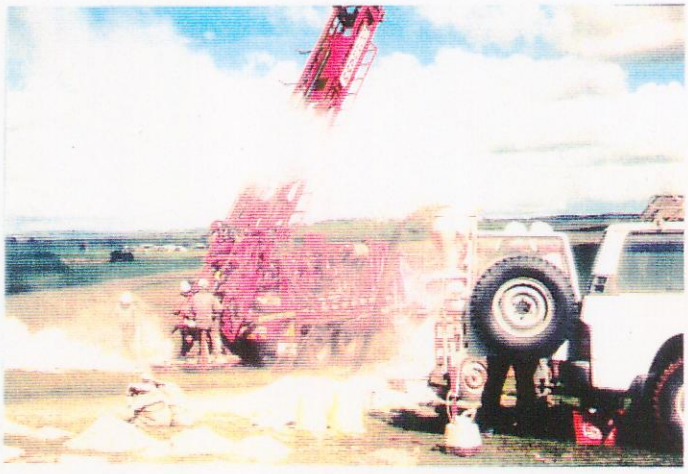


Plate 5.

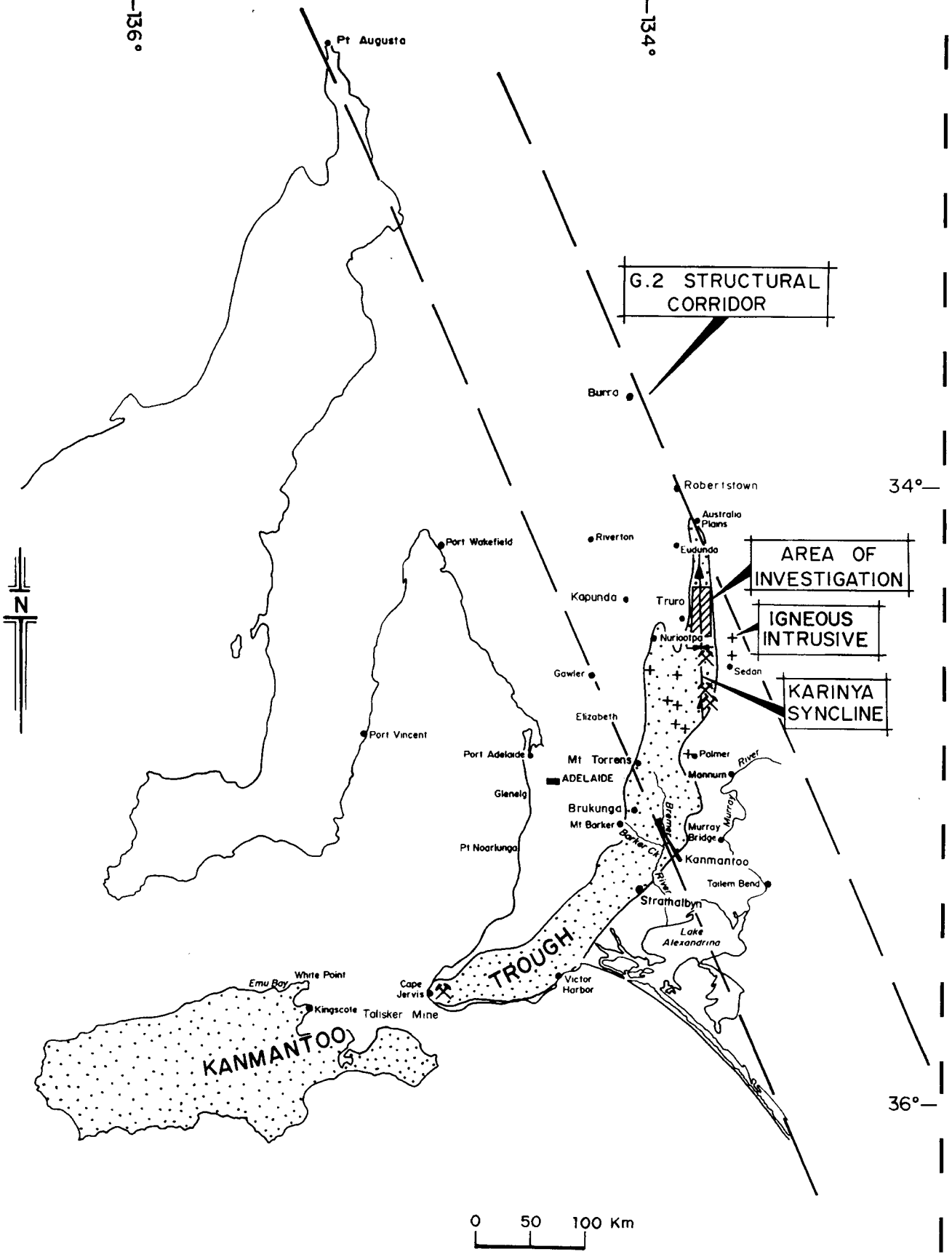


Figure. 1

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED B. Morris	C.D.O. 26·11·90 DATE	
KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS KARINYA SYNCLINE LOCALITY PLAN	DRAWN D. Simpson	SCALE 1:2 000 000	
	DATE Aug 1990	PLAN NUMBER S21671	
	CHECKED		

5080

139° 10'

139° 15'

34° 20'

34° 25'

Landsat Linear Corridor

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17

FRANKTON PROSPECT

Synclin

MALABENA PROSPECT (MB1)

Dutton

THE GAP PROSPECT

Diatreme

Karinya

Ag,Pb

MURRAY

ACCOMODATION HILL PROSPECT

TO BLANCHETOWN

HIGHWAY

STURT

TRURO

Cu

Landsat Linear Corridar

BASIN

N

CAMBRIAN

KANMANTOO GROUP

Tapanappa Formation: grey siltstone and fine meta – sandstone.

Karinya Shale (Talisker Calc-siltstone): carbonaceous shale and grey calcareous meta – siltstone

Backstairs Passage Formation: cross bedded medium to coarse feldspathic meta–sandstone.

Carrickalinga Head Formation: siltstone and sandstone with grey – pink saccharoidal marble (Milendella Limestone Member)

NORMANVILLE GROUP

Blue – black carbonaceous shale, siltstone quartzite and marble.

Truro Volcanics

ADELAIDEAN

Undifferentiated

T1 Regional Soil Sampling Traverses

X Lamprophyre and dolerite intrusives

1 0 1 2 3 4 5

KILOMETRES

Note : Geology after Coats (1959)

Figure. 2

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA

KANMANTOO TROUGH – GEOLOGICAL INVESTIGATIONS
KARINYA SYNCLINE
GEOLOGY & LOCATION OF PROSPECT AREAS

COMPILED	B.J. Morris
DRAWN	D. Simpson
DATE	July 1990
CHECKED	
C.D.O.	26·11·90 DATE
SCALE	1:50 000
PLAN NUMBER	91 – 164

139°12'

139°13'

34°18'

34°19'

Quarry

Frankton

Farm buildings

Farm buildings

Frankton No 1

Frankton No 2

L1 L2 L3 L4 L5 L6 L7 L8 L9 L10 L11 L12 L13

25

0 500

METRES

FRANKTON No 1 — Location of diamond drillhole

High tension power line

Fence

Main road

Track

Creek

L2 — Soil sampling line

CAMBRIAN

KANMANTOO GROUP

Tapanappa Formation: grey metasiltstone and fine metasandstone.

Karinya Shale: black shale and grey calc-siltstone

Backstairs Passage Formation: crossbedded feldspathic metasandstone

Exposed lamprophyre dyke.

Lamprophyre float

70° Strike and dip of bedding

70° Strike and dip of cleavage

25° Direction and strike of fold

KANMANTOO TROUGH
GEOLOGICAL INVESTIGATIONS

KARINYA SYNCLINE — FRANKTON PROSPECT

GEOLOGICAL PLAN AND
LOCATION OF DRILL HOLES

SADME 91-147

FIG. 3

5022

139°12'

139°13'

34°18'

34°19'

L1

L2

L3

L4

L5

L6

L7

L8

L9

L10

L11

L12

L13

Quarry

Frankton

Farm buildings

KARINYA

SHALE

FRANKTON No 2

FRANKTON No 1

Farm buildings

0 500

METRES

FRANKTON No 1 Location of diamond drillhole

Fence

Main road

Track

Creek

SOIL SAMPLE ANOMALIES

Zn (>78ppm)

Pb (>35ppm)

Cu (>43ppm)

KANMANTOO TROUGH

GEOLOGICAL INVESTIGATIONS

KARINYA SYNCLINE — FRANKTON PROSPECT

SOIL SAMPLE ANOMALIES — Cu, Pb, Zn

SADME 91-148

FIG. 4

5022

139°12'

139°13'

34°18'

34°19'

L1

L2

L3

L4

L5

L6

L7

L8

L9

L10

L11

L12

L13

Quarry

Frankton

Farm buildings

KARINYA

SHALE

FRANKTON No 2

FRANKTON No 1

Farm buildings

0 500

METRES

Location of diamond drillhole

Fence

Main road

Track

Creek

SOIL SAMPLE ANOMALIES

Au (>2 ppb)

As (>18ppm)

Fe (>5%)

KANMANTOO TROUGH

GEOLOGICAL INVESTIGATIONS

KARINYA SYNCLINE — FRANKTON PROSPECT

SOIL SAMPLE ANOMALIES — Au, As, Fe

SADME 91-149

FIG. 5

5022

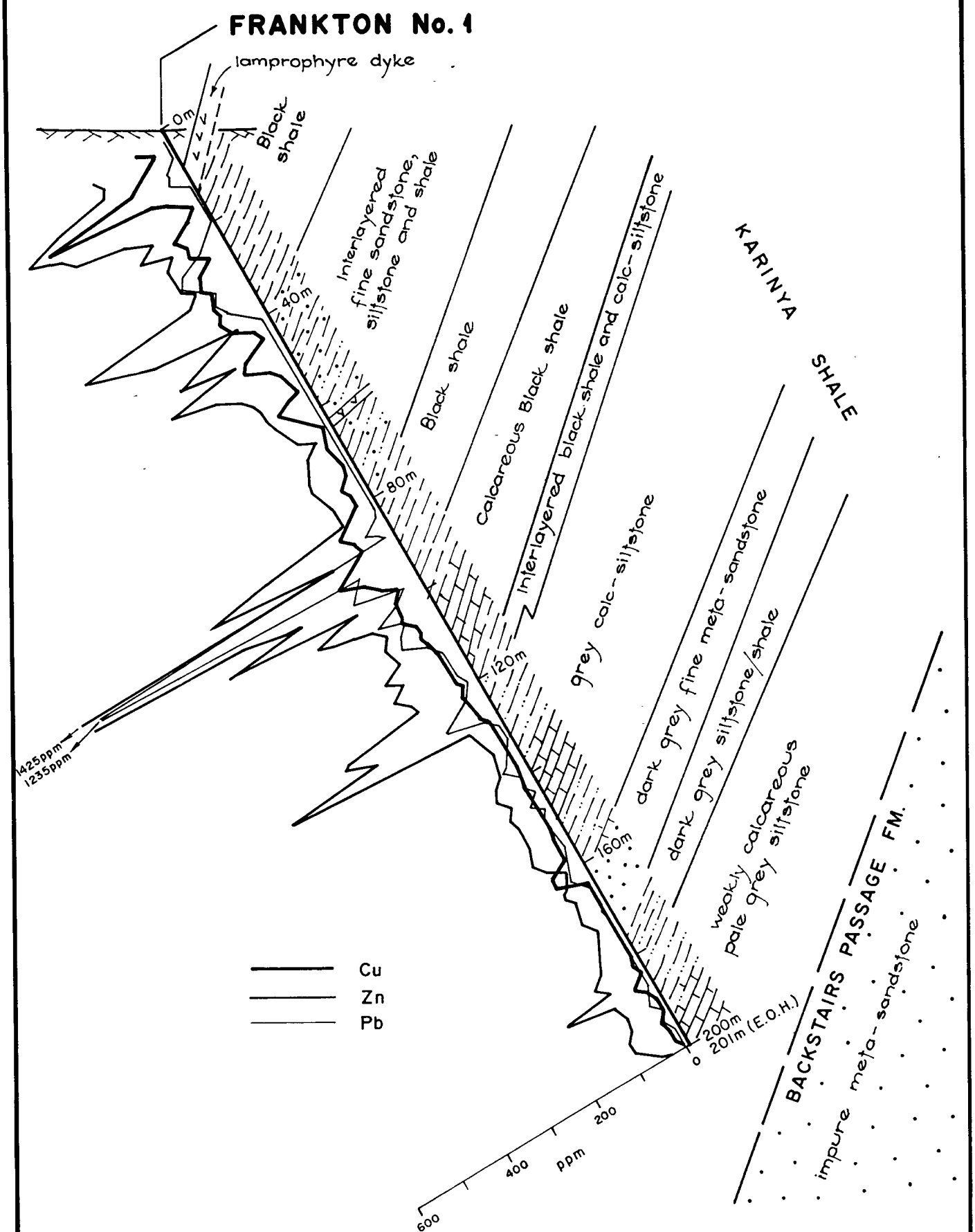


FIG. 6

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED B. Morris	18. 2. 91 C.D.O. DATE
KANMANTOO TROUGH – GEOLOGICAL INVESTIGATIONS	DRAWN E. Calabio	SCALE As shown
DIAMOND DRILL HOLE SECTION – FRANKTON No. 1	DATE Nov. '90	PLAN NUMBER S 21870
KARINYA SYNCLINE – FRANKTON PROSPECT	CHECKED	

5165

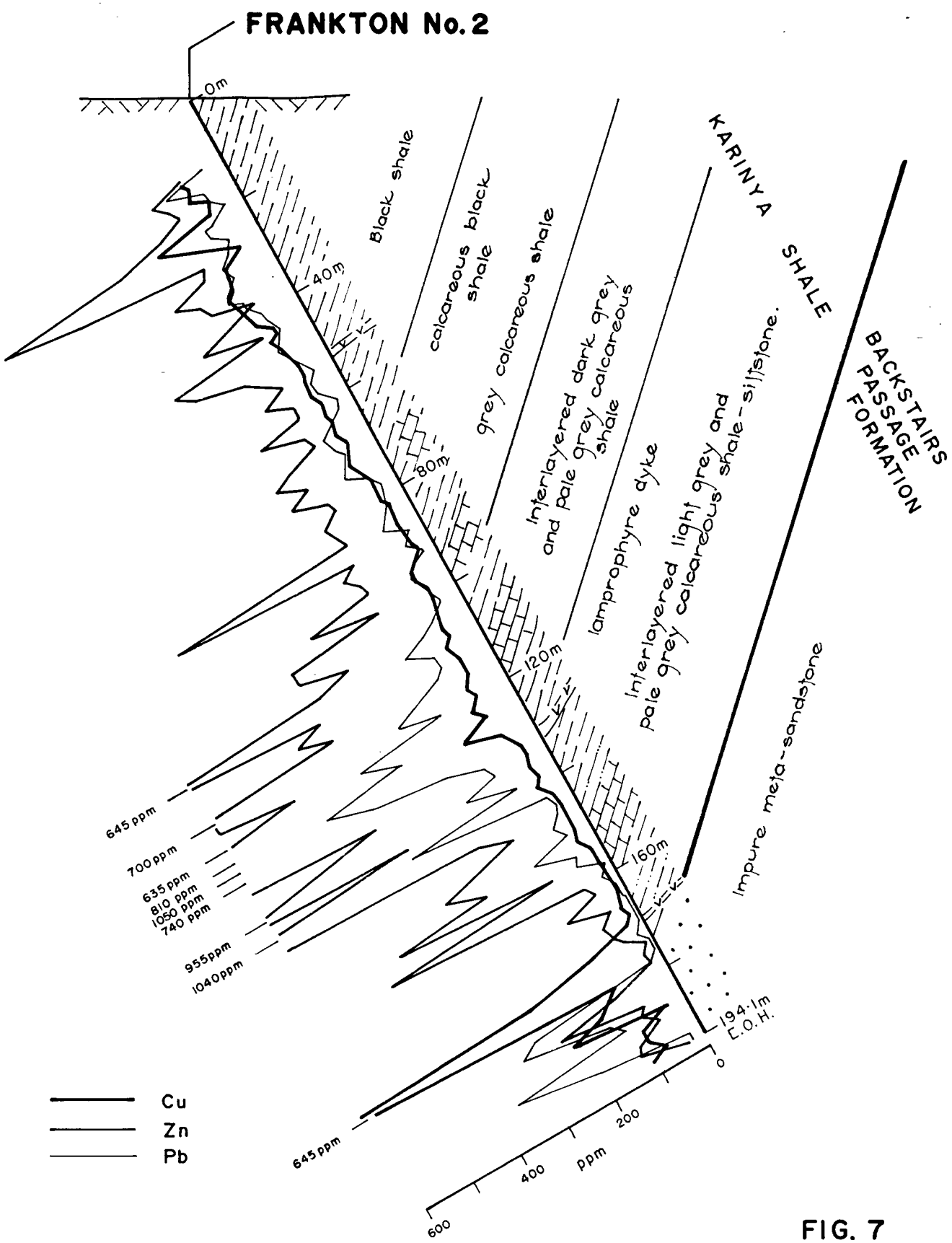


FIG. 7

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

KANMANTOO TROUGH - GEOLOGICAL INVESTIGATIONS
DIAMOND DRILL HOLE SECTION - FRANKTON No.2
KARINYA SYNCLINE - FRANKTON PROSPECT

DRAWN	B. Morris	18.2.91
TRACED	E. Calabio	As shown
DATE	Nov. '90	
		S 21871

5125

KARINYA SHALE

139°11'

139°12'

34° 23'

34° 24'

1000m L13

1000m L12

1000m L6

1000m L5

1000m L4

1000m L11

1000m L10

1000m L9

1000m L8

1000m L7

1000m L3

1000m L2

1000m L1

1000m L14

TG1

TG2

TG3

TG4

TG5

TG6

TG7

TG8

Farm buildings

THE GAP

STURT HIGHWAY

To Truro

Quarry

CAMBRIAN

KANMANTOO GROUP

Tapanappa Formation: grey siltstone and fine meta-sandstone.

Karinya Shale (Talisker Calc-siltstone): carbonaceous shale and grey calcareous meta-siltstone

Backstairs Passage Formation: cross bedded medium to coarse feldspathic meta-sandstone.

Lamprophyre dyke

High tension power line

Fence

Main road

Track

Creek

Location of R.C. drillhole TG9

Soil sample line showing every second sample site 1000m L2

0 1 KILOMETRE

KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

KARINYA SYNCLINE–THE GAP PROSPECT GEOLOGICAL PLAN AND LOCATION OF DRILLHOLES

SADME 91-150

FIG. 8

5022

KARINYA SHALE

139°11'

139°12'

34° 23'

34° 24'

L13

L12

L6

L5

L4

L11

L10

L9

L8

L7

L3

L2

L1

L14

TG1

TG2

TG3

TG4

TG5

TG6

TG7

TG8

Farm buildings

STURT HIGHWAY

To Truro

THE GAP

Quarry

Zinc (>113 ppm)

Lead (>73 ppm)

Copper (>70ppm)

TG2 Location of RC drillhole

Fence

Main road

Track

Creek

0 1 KILOMETRE

KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

KARINYA SYNCLINE – THE GAP PROSPECT

SOIL SAMPLE ANOMALIES – Zn, Pb, Cu

SADME 91-151

FIG. 9

5022

139°11'

139°12'

KARINYA SHALE

L13

L12

L6

TG3

TG1

TG2

L5

TG5

L4

L11

Farm buildings

L10

L9

L8

TG1

L7

L3

L2

THE GAP

34° 24'

L1

STURT

HIGHWAY

To Truro

L14

Quarry

TG8

TG6

TG8

34 23'

Gold (>3 ppb)

Arsenic (>61 ppm)

TG 2 Location of RC drillholes

Fence

Main road

Track

Creek

0 1

KILOMETRE

KANMANTOO TROUGH GEOLOGICAL INVESTIGATIONS

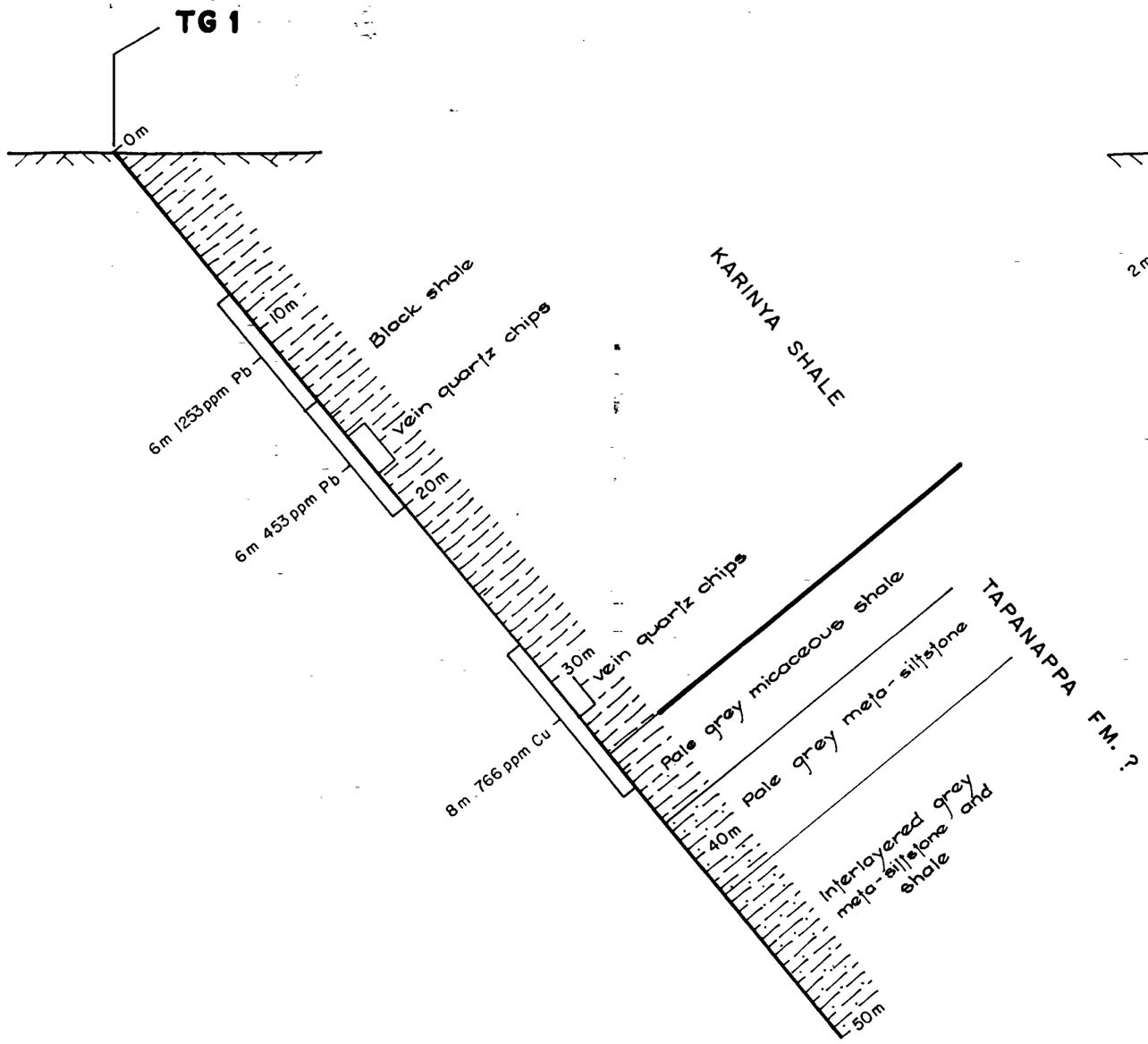
KARINYA SYNCLINE – THE GAP PROSPECT

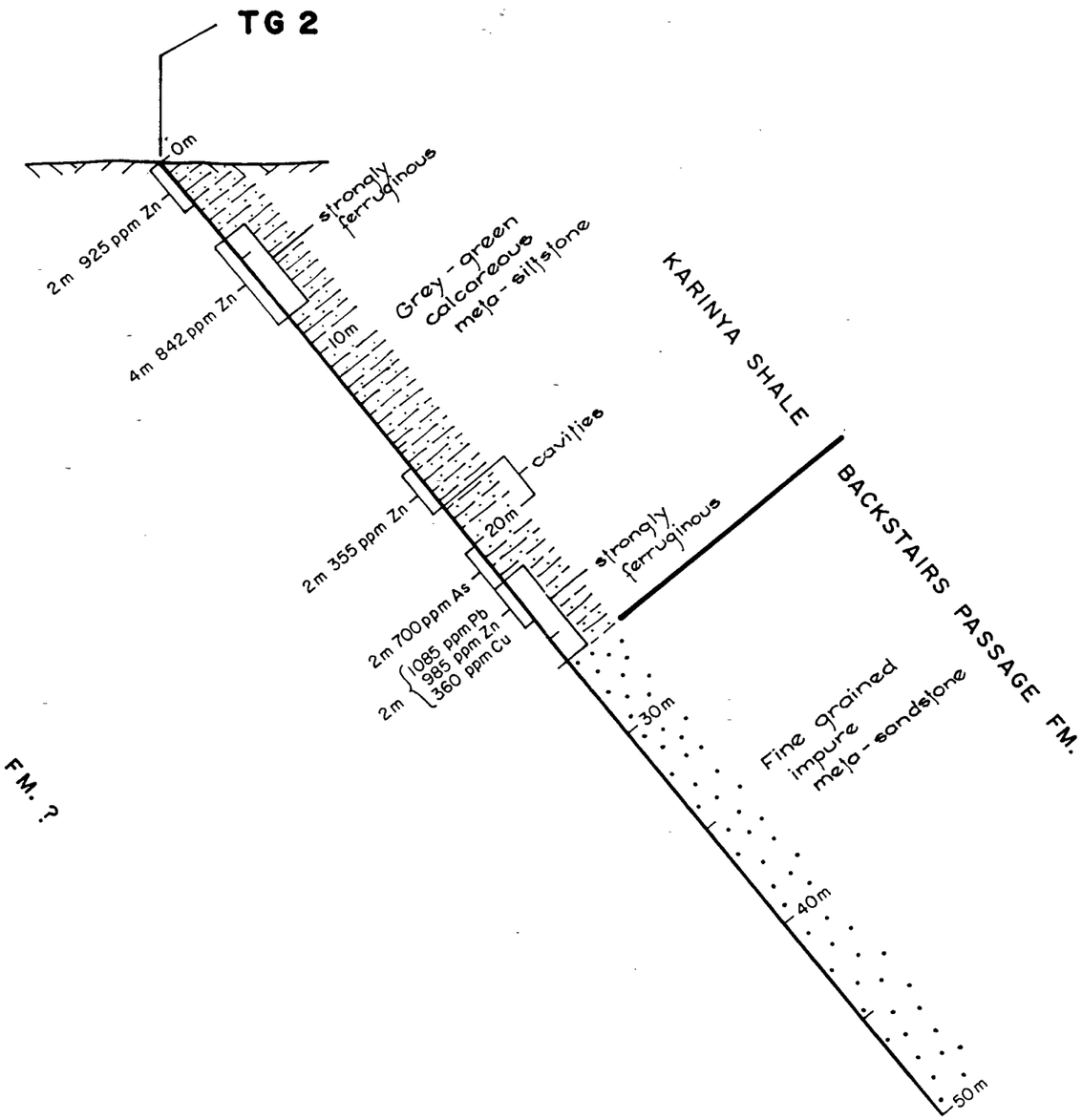
SOIL SAMPLE ANOMALIES – Au, As,

SADME 91 – 152

FIG. 10

5022





SCALE IN METRES

0 10 20

FIG. 11

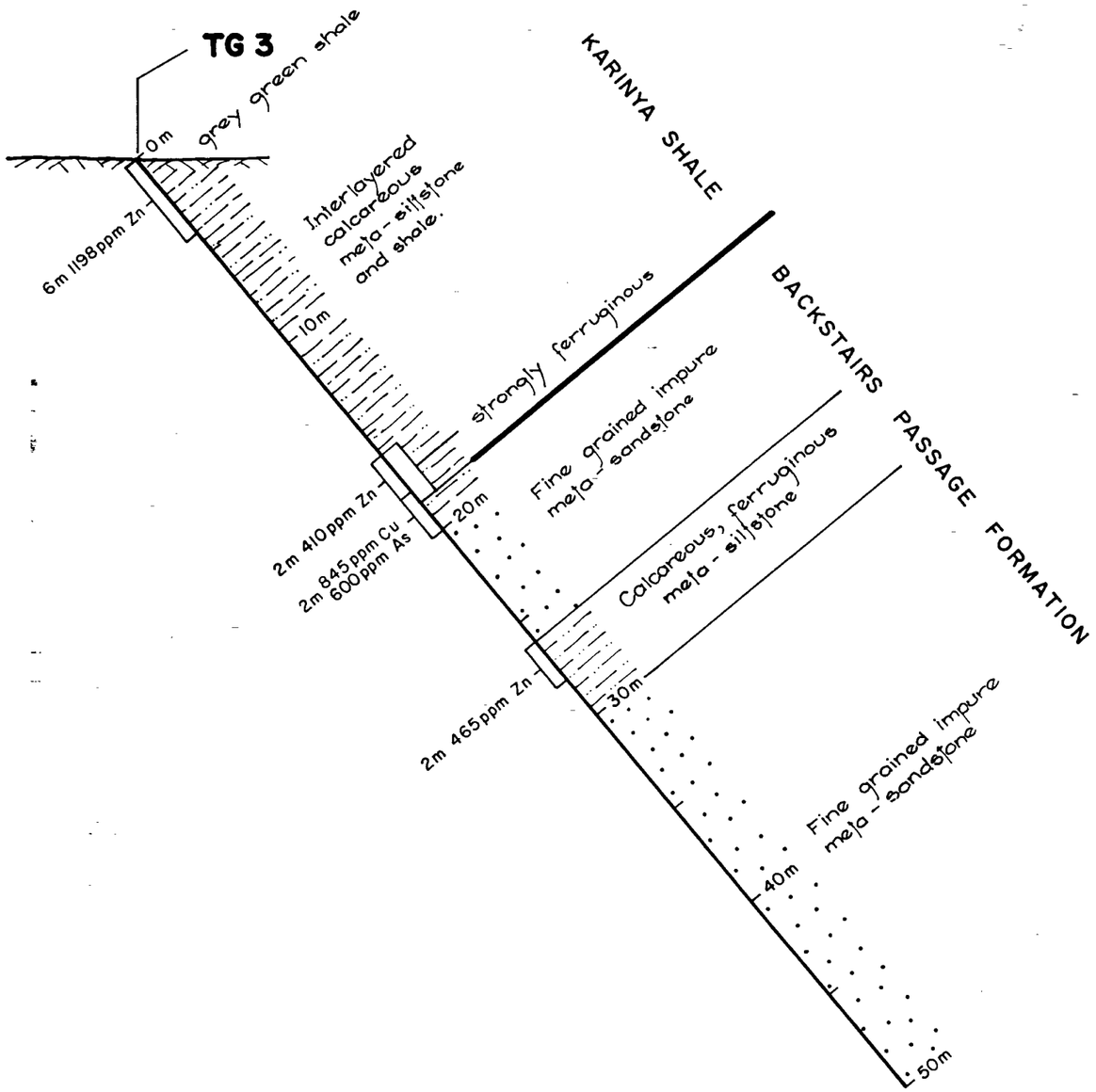
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

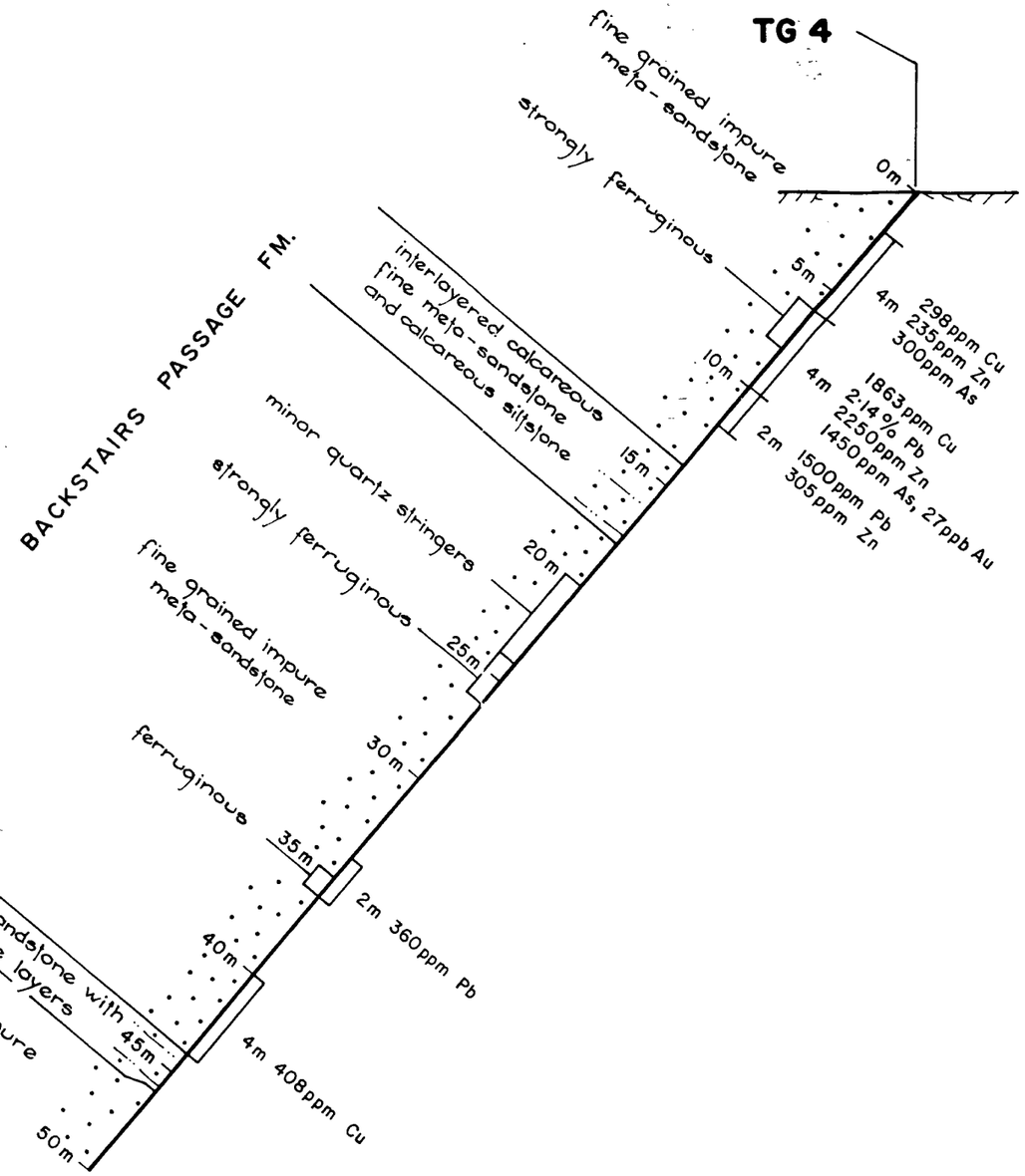
KANMANTOO TROUGH – GEOLOGICAL INVESTIGATIONS

DRILL HOLE SECTIONS TG1 & TG2
KARINYA SYNCLINE – THE GAP PROSPECT

DRAWN: B. Morris	18-1-91 DATE
TRACED: E. Calabio	SCALE: As shown
DATE: Nov. '90	PLAN NUMBER: 90-903
CHECKED	

5135





SCALE IN METRES

0 10 20

FIG. 12

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

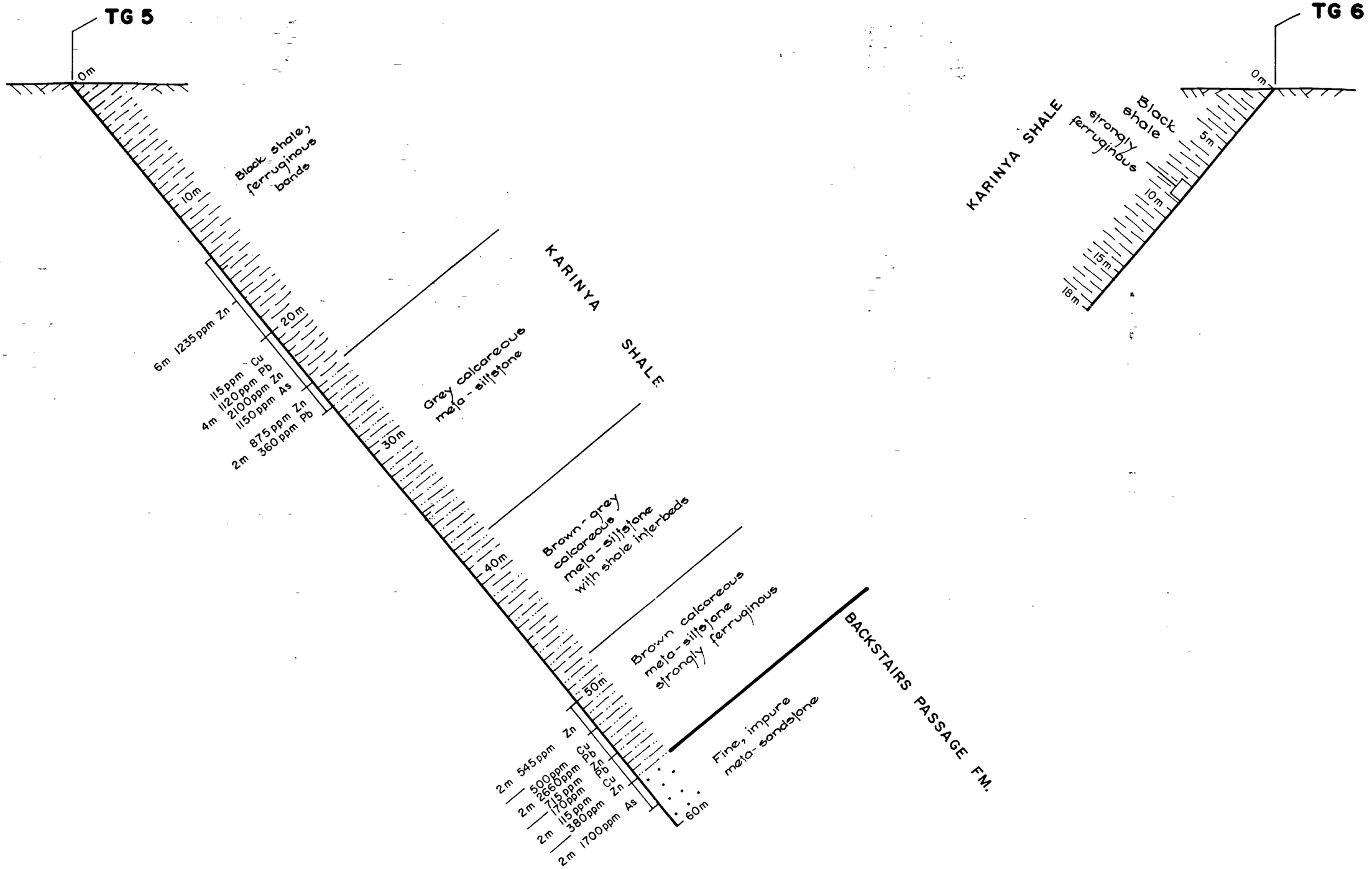
KANMANTOO TROUGH - GEOLOGICAL INVESTIGATIONS

DRILL HOLE SECTIONS TG 3 & TG 4

KARINYA SYNCLINE - THE GAP PROSPECT

PROJECT B. Morris	APPROVED 18.2.91 DATE
DRAWN E. Calabio	SCALE As shown
DATE Nov. '90	PLAN NUMBER 90-904
CHECKED	

FIG5



SCALE IN METRES

0 10 20

FIG. 13

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

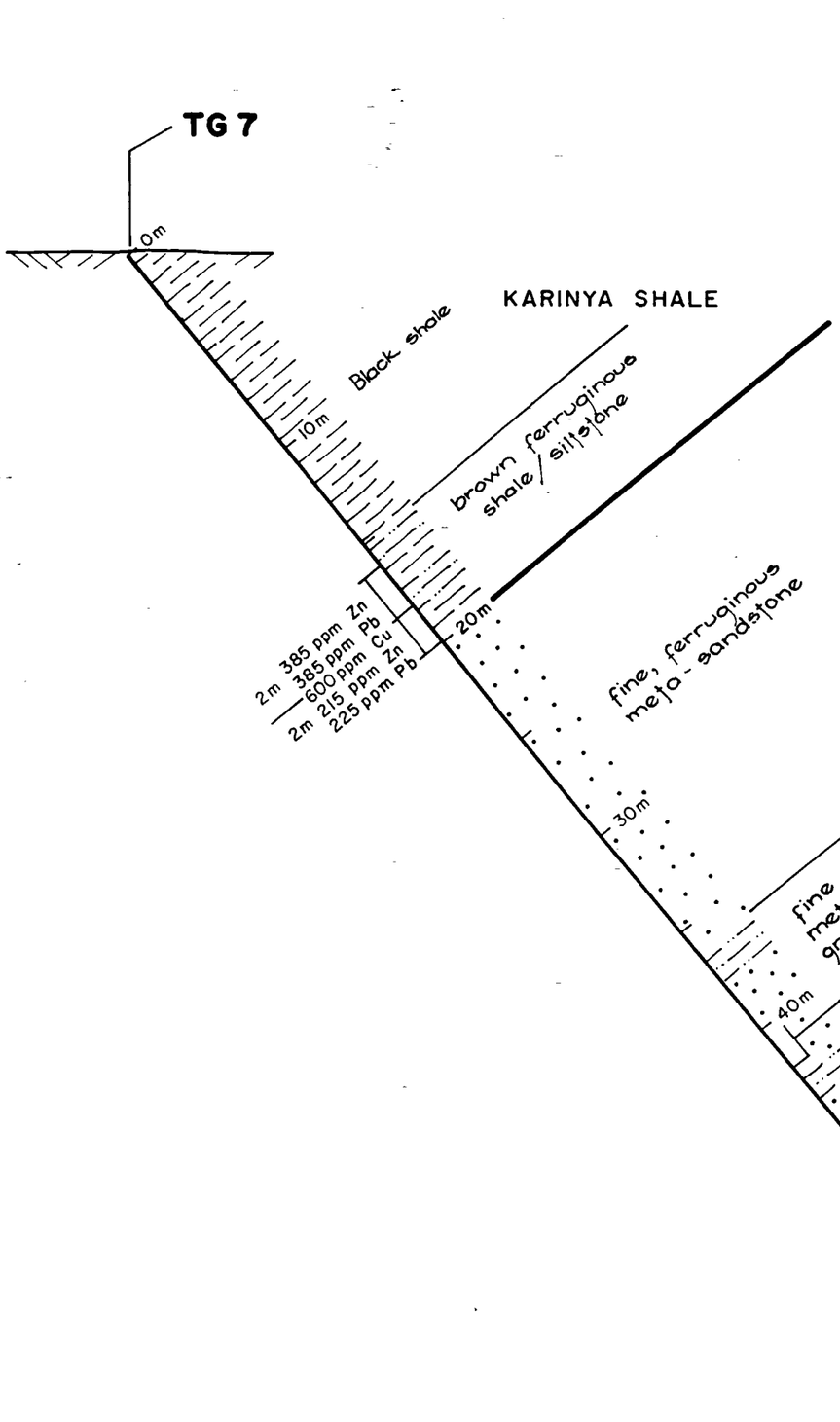
KANMANTOO TROUGH – GEOLOGICAL INVESTIGATIONS

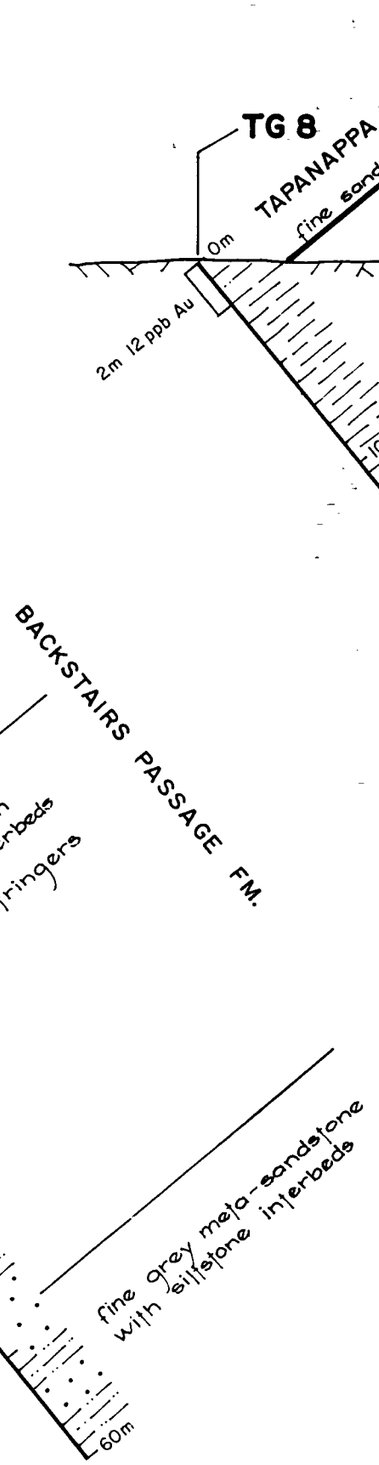
DRILL HOLE SECTIONS TG 5 & TG 6

KARINYA SYNCLINE – THE GAP PROSPECT

COMPILED: B. Morris	CDU 18.2.91 DATE
DRAWN: E. Calabio	SCALE: As shown
DATE: Nov. 90	PLAN NUMBER: 90-905
CHECKED	

5165





SCALE IN METRES

0 10 20

FIG. 14

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED B. Morris	WRC 18.2.91 DATE
KANMANTOO TROUGH – GEOLOGICAL INVESTIGATIONS	DRAWN E. Calabio	SCALE As shown
DRILL HOLE SECTIONS TG 7 & TG 8	DATE Nov. '90	PLAN NUMBER 90-906
KARINYA SYNCLINE – THE GAP PROSPECT	CHECKED	

5163

139°12'

139°13'

34°24'

L5 0m — 1000m

L3 0m — 1000m

L2 0m — 1000m

L1 0m — 1000m

L4 0m — 1000m

AH1

AH2

AH3

AH4

AH5

STURT

THE GAP

ACCOMODATION HILL

HIGHWAY

Soil sampling line showing every second sample site (L2 0m — 1000m)

Fence

Main road

Track

Creek

AH3 — Location of RC drillhole

70° — Dip and strike of bedding

CAMBRIAN

KANMANTOO GROUP

Backstairs Passage Formation: crossbedded medium to coarse feldspathic meta-sandstone

Carrickalinga Head Formation: siltstone and sandstone with grey-pink saccharoidal marble (Milendella Limestone Member)

Lamprophyre dyke

Vein quartz

Ironstone

0 — 1 KILOMETRE

KANMANTOO TROUGH
GEOLOGICAL INVESTIGATIONS
KARINYA SYNCLINE – ACCOMODATION HILL PROPECT

GEOLOGICAL PLAN & LOCATION OF DRILLHOLES

SADME 91–153

FIG. 15

5022

139°12'

139°13'

L5 0m

AH1

1000m

L3 0m

1000m

L2 0m

AH2

1000m

L1 0m

AH4

1000m

AH3

L4 0m

STURT

1000m

THE GAP

34°24'

ACCOMODATION HILL

HIGHWAY

Zinc (>79ppm)

Lead (>61ppm)

Copper (>35ppm)

Fence

Main road

Track

Creek

Milendella Limestone Member

xxxxxxxxx Ironstone

AH2 Location of RC drillhole

0

1

KILOMETRE

KANMANTOO TROUGH
GEOLOGICAL INVESTIGATIONS

KARINYA SYNCLINE – ACCOMODATION HILL PROSPECT
SOIL SAMPLE ANOMALIES – Zn, Pb, Cu

SADME 91-154

FIG. 16

5022

139°12'

139°13'

L5 0m

AH 1

1000m

L3 0m

1000m

L2 0m

AH2

1000m

L1 0m

AH4

1000 m

AH3

L4 0m

1000m

STURT

THE GAP

34°24'

ACCOMODATION HILL

HIGHWAY

Gold (>2ppb)

Arsenic (>22ppm)

Fence

Main road

Track

Creek

Milendella Limestone Member

xxxxxxxx Ironstone

AH2 ●→ Location of RC drillhole

0

1

KILOMETRE

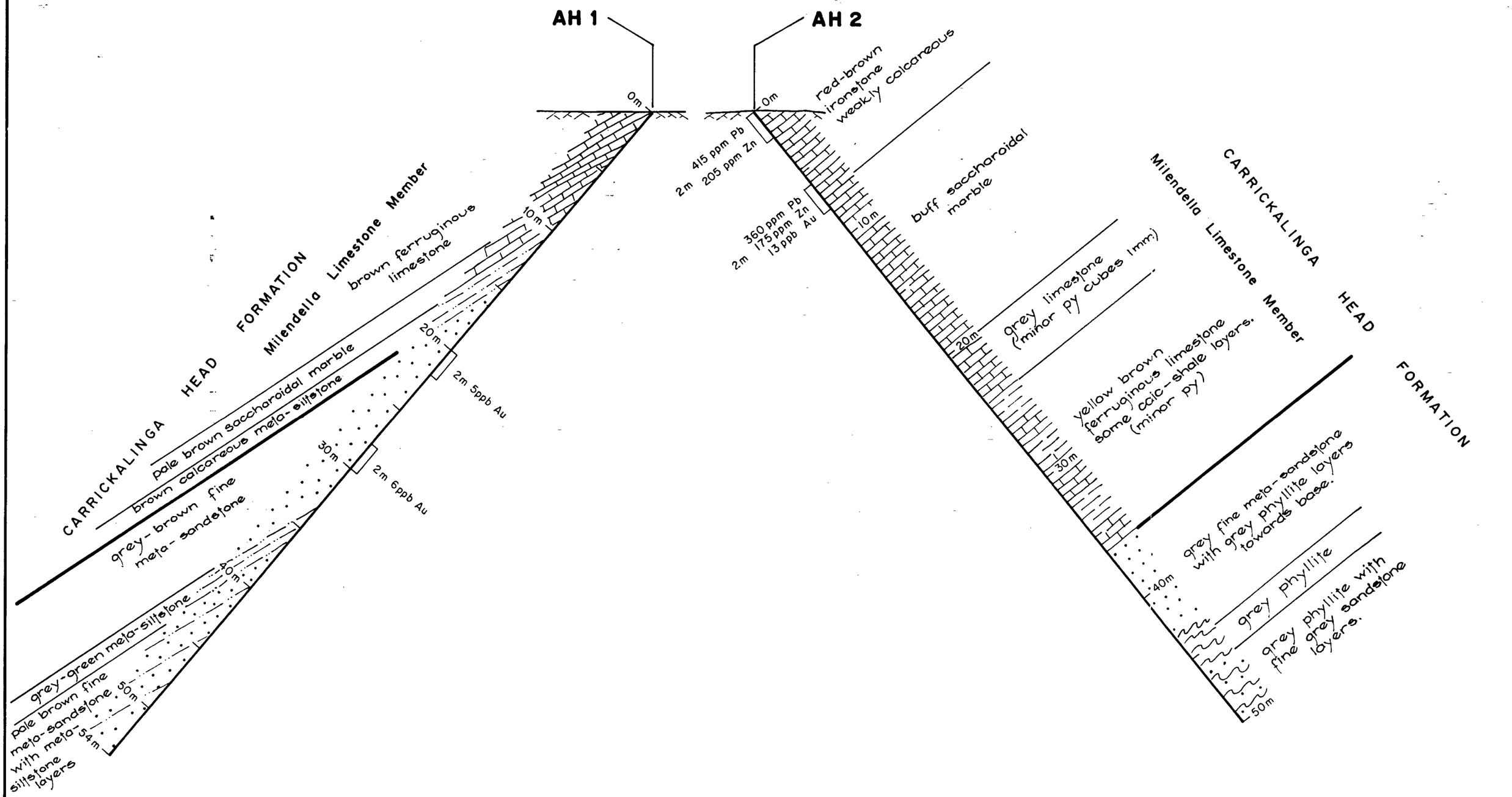
KANMANTOO TROUGH
GEOLOGICAL INVESTIGATIONS

KARINYA SYNCLINE-ACCOMODATION HILL PROSPECT
SOIL SAMPLE ANOMALIES - Au, As

SADME 91-155

FIG. 17

5022



SCALE IN METRES

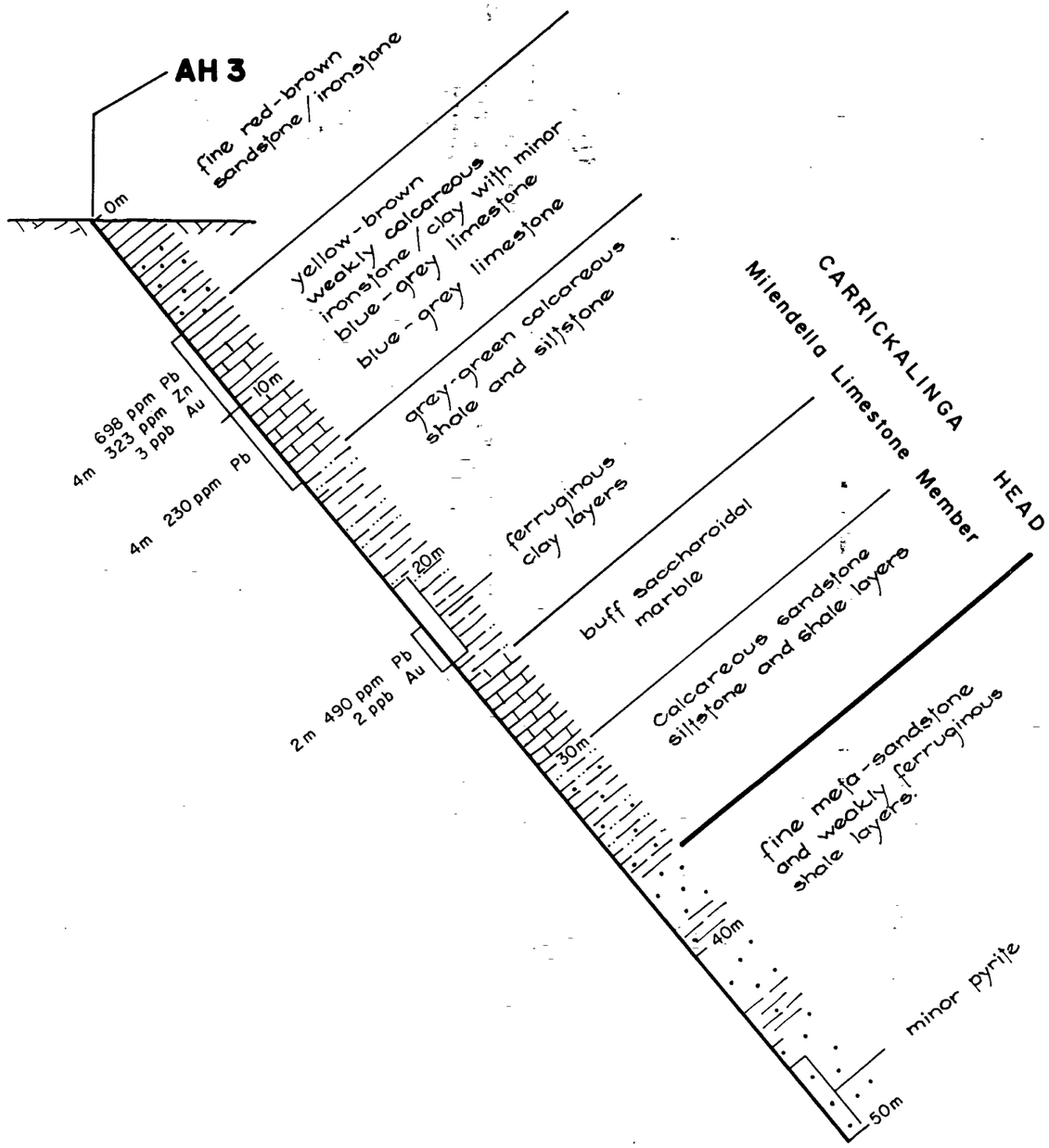
0 10 20

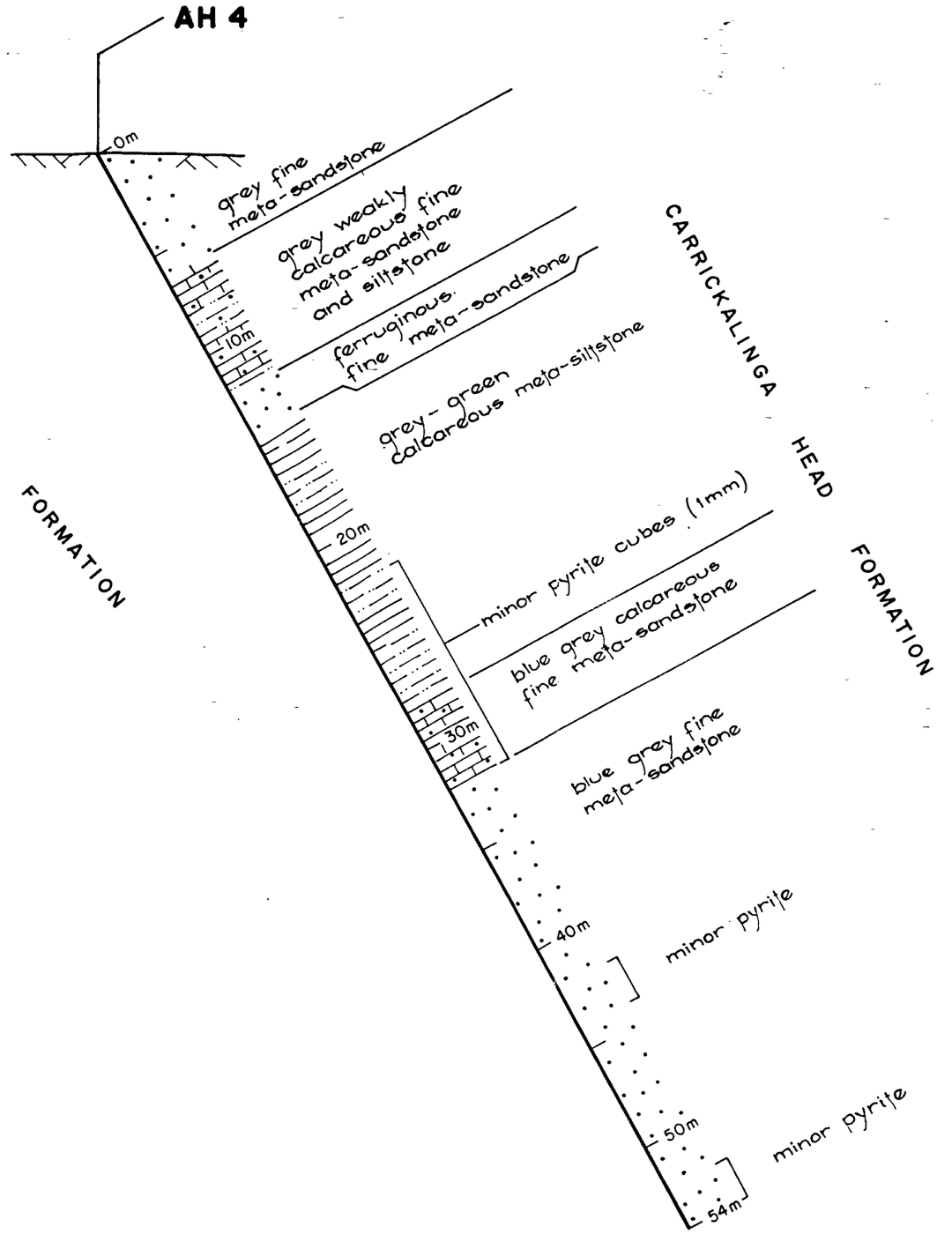
FIG. 18

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

KANMANTOO TROUGH – GEOLOGICAL INVESTIGATIONS	COMPILED B. Morris	CDO 18.2.91 DATE
DRILL HOLE SECTIONS AH1 & AH2	DRAWN E. Calabio	SCALE As shown
KARINYA SYNCLINE – ACCOMODATION HILL PROSPECT	DATE Nov. '90	PLAN NUMBER 90-907
	CHECKED	

5/G5





SCALE IN METRES

0 10 20

FIG. 19

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED B. Morris	CDO	18.2.91 DATE
KANMANTOO TROUGH – GEOLOGICAL INVESTIGATIONS	DRAWN E. Calabio	SCALE As shown	
DRILL HOLE SECTIONS AH3 & AH4	DATE Nov. '90	PLAN NUMBER	
KARINYA SYNCLINE – ACCOMODATION HILL PROSPECT	CHECKED	90-908	

5165

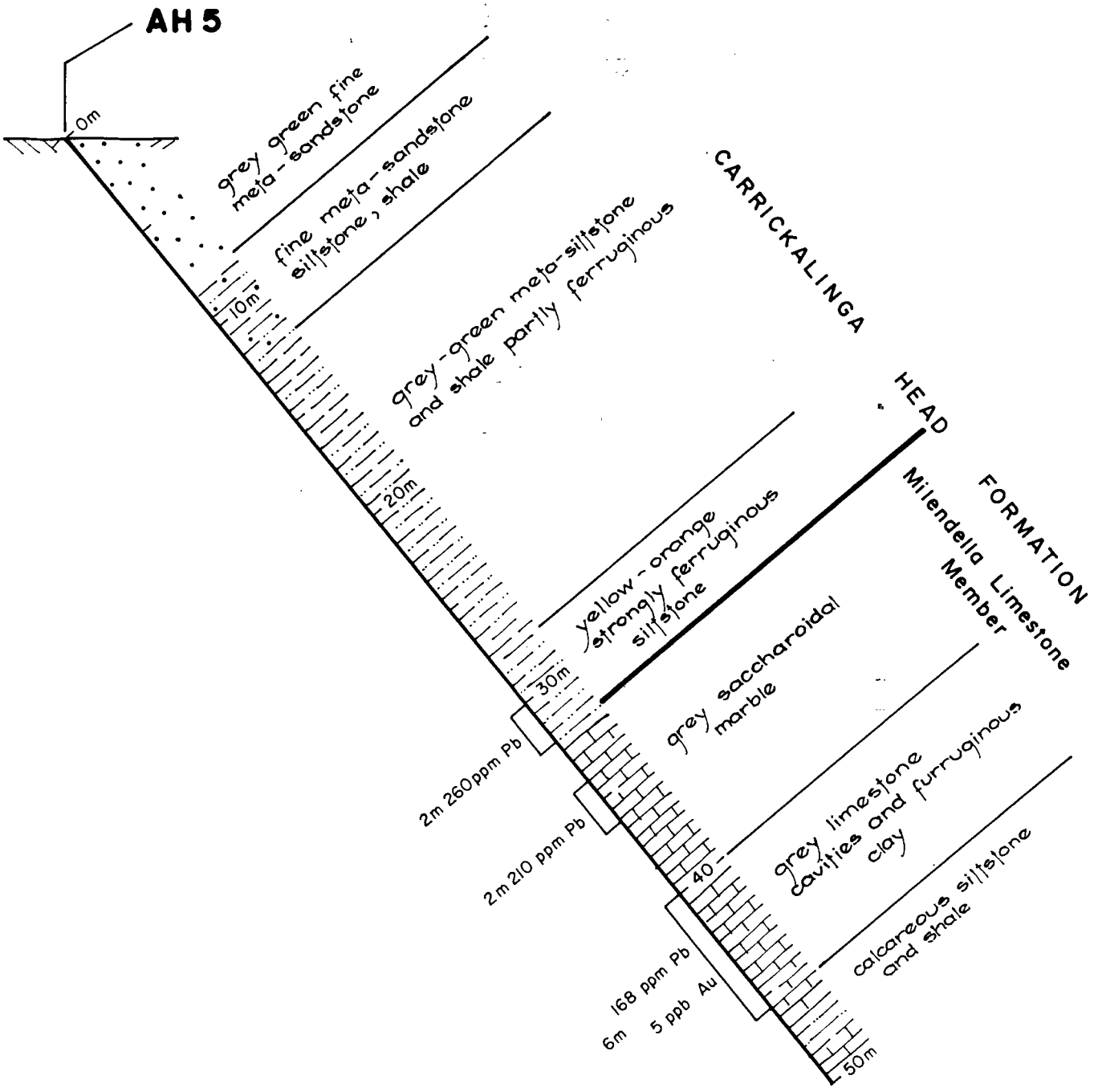


FIG. 20

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED: B. Morris	18. 2. 91 (DATE)
DRAWN: E. Calabio	SCALE: As shown
DATE: Nov. '90	PLAN NUMBER: S 21869
CHECKED:	

KANMANTOO TROUGH – GEOLOGICAL INVESTIGATIONS

DRILL HOLE SECTION – AH5

KARINYA SYNCLINE – ACCOMODATION HILL PROSPECT

5165