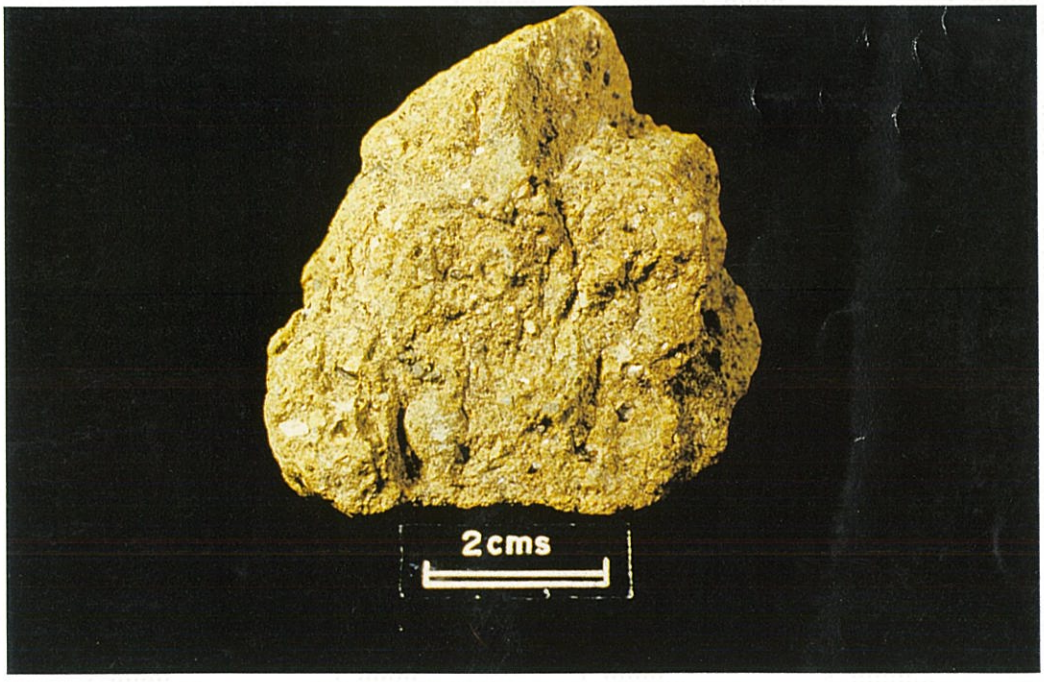
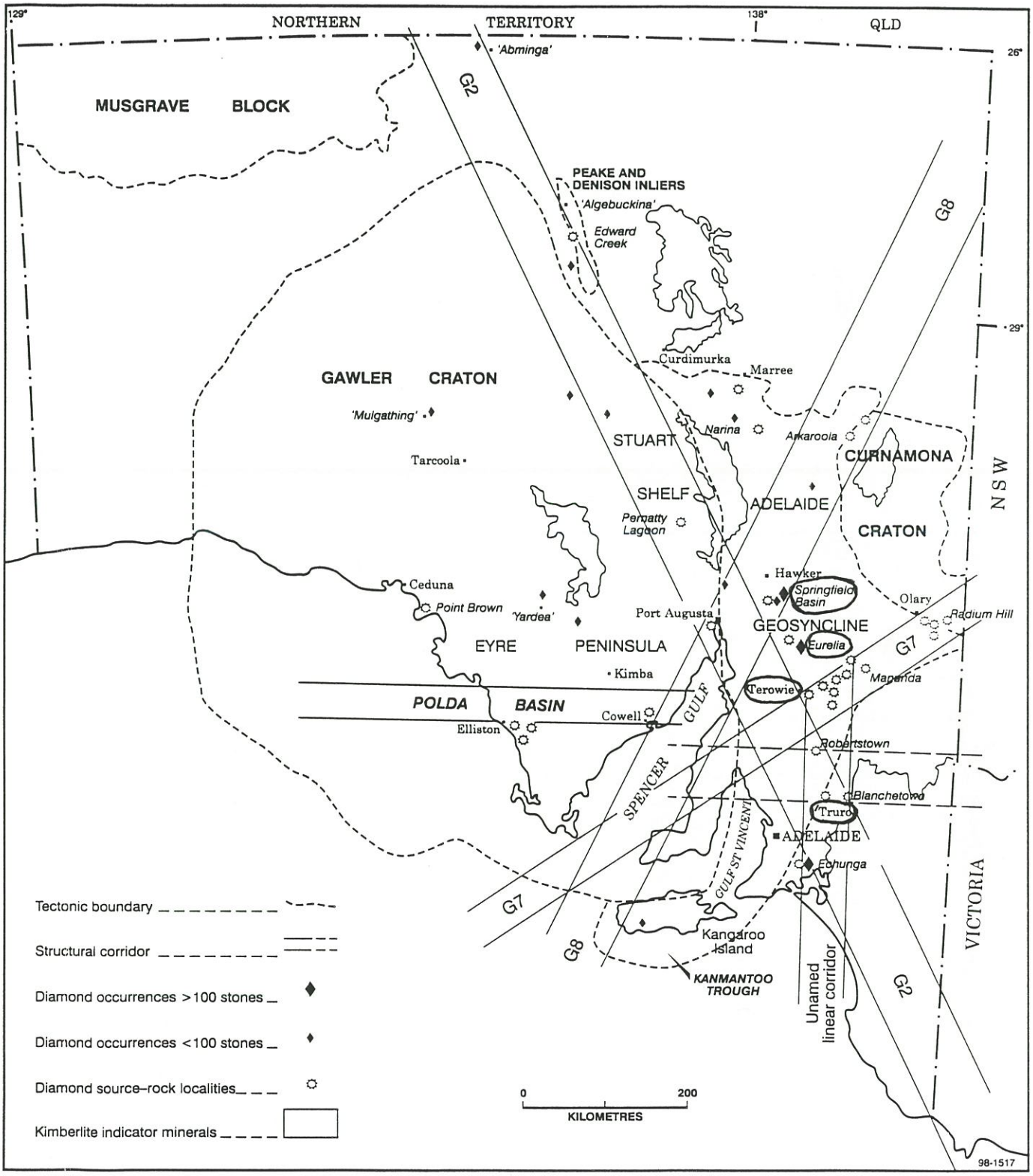
COWLEY

THE 'G2' DIAMOND TRAIL FIELD EXCURSION

15 February `99 to 18 February `99



Terowie kimberlite, phlogopite laths set in groundmass of fine grained phlogopite, clay and serpentine. Note the ovoid autolithic kimberlite xenolith.



Diamond occurrences and tectonic setting in South Australia.

PRIMARY INDUSTRIES and RESOURCES SOUTH AUSTRALIA

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101410

ITINERARY OF G2 KIMBERLITE TRIP, FEBRUARY 1999

Brian Morris, Kevin Wills and Jack Townsend undertook a four day field trip to look at kimberlites and similar rock types througout South Australia in the known kimberlite areas of Truro, Terowie, Eurelia, and Hawker to sample and compare the materials and diamonds or indicators of various ages and localities. It should be noted that most occur on or close to the G2 corridor of O'driscoll. The G2 corridor (see Fig. 1) also includes the kimberlite pipe field of Abminga which has produced a small macro diamond from drillcore during 1997 and many indicator minerals from several different pipes delineated by high resolution aeromagnetics.

The following areas and individual kimberlites have been selected from the large number for a three day field trip to commence on **Monday 15 February** 1999.

- Meet at PIRSA Core Library Connyngham St at 8:30 am 15 February 1999.

- View kimberlite core from selected drillholes and look at some diamonds for 1 hour.

TRURO AREA

- Depart Adelaide for Truro at 9:30 and visit quarry containing two lamprophyre dykes (minettes) composed mainly of phlogopite.

- Visit diatreme in road cutting toward Eudunda. Diatreme shows a variety of kimberlitic compositions mixed with rounded country rock. Some coarse grained gabbroic intrusive, talc and tourmaline are present at the site.

- Brief stop at Truro volcanics on the same road. Some epidote filled amygdules may be found at the site. The ages of lamproite dykes in the Truro area range from 458 to 481 m.y. giving an Ordovician age.

- ***Lunch at Eudunda Hotel or Bakery***.

- Travel to Terowie and see the Mittopitta pipe. This is a sizeable kimberlite pipe containing abundant country rock much of which is rounded from being milled as it moved up the pipe at high speed with the intrusive kimberlite. The outline shown in Figure 3 was mapped using a hand auger.

- Possible visit to Mungibbie dyke and copper show. It should be noted that often kimberlite occurrences are associated with copper and gold deposits such as here and at Ulooloo gold field.

- Visit the nephelinite in the shear zone in Adeladean rocks forming a creek and the first track through the range to the east. Note the patient dry wall road construction to allow Cobb and Co coaches, carts and later vehicular

traffic from the late 1800's until washed away. The dyke extends for more than 50 metres and the shear for much further.

- Lamprophyre dyke cutting across creek. Kimberlitic salt and pepper textured material was followed upstream to this impressive dyke for approximately 0.5 to 1 km by BJM and IJT when looking for the Stockdale lamprophyre.

Terowie Motel: Dinner ; bed ; breakfast

Tuesday 16 February 1999

- Pine Creek kimberlite was found from stream sediment sampling and there is no suggestion of a topographic low associated with it. It is phlogopite rich and bulk sampling did not produce any diamonds.

CALCUTTEROO KIMBERLITES.

- Pipe #1, a kimberlite in backfilled trench which extends on to dyke #2 present in creek and probable cause of creek to the east. Possible fault or shear zone.

- Calcutteroo #3 Pipe (diatreme) kimberlitic material, phlogopite and rare garnet can be found along with many rounded shale pebbles and boulders milled by the rapid upward movement in the pipe. Small but impressive. Other kimberlite dykes exist higher in the hills to the north of #3 pipe and consist of typical green salt and pepper textured weathered kimberlite.

- ***LUNCH ~ ORROROO***

- EURELIA DYKE SWARM

- Dyke # K2 is a 50 m dyke over a saddle to the south of Bel Forest and also produced diamonds. A careful search will expose kimberlite pieces from the backfilled trench which may show pink pyrope garnet complete with a dark kelephytic rind(rim). Individual dykes in the Eurelia dyke swarm all trend approximately northwest . Zircon dating gave an age of 170 my or Jurassic age.

- Bel Forest Dyke/Pipe (K7). A hypabyssal calcite phlogopite kimberlite is exposed in a reasonable sized creek near Bel Forest Homestead. This pipe contained the most microdiamonds in the swarm of several in the area to contain diamonds. Up to 140 microdiamonds were recovered from several dykes and K7 pipe in the Eurelia area.(Dykes K1, K2, K3, K4, K7, K12, K13) (K5, K6 and K8 were all barren)

- Boolcunda Basin

- Boolcunda Copper Mine is passed en route and as it is typical of several in the area is worth a brief stop.

- Boolcunda Creek, where two small diamonds and one pyrope were recovered from two 50 tonne bulk samples collected by Freeport in October 1984.

- At the Boolcunda Basin A short traverse across the Southeastern edge of the basin illustrates the nature of of the basal Boolcunda Basin sediments for comparison basal Springfield Basin sediments on February 17. An exposure of probable lapilli tuff of possible kimberlitic composition will also be examined

Cradock Hotel : Dinner, Bed and Breakfast

Wednesday 17 February 1999

SPRINGFIELD BASIN (Tiger International / Allender, Le Brun and Youles)

- At the **Northern Springfield Basin Margin** Tiger has dug three trenches in 1998. Conglomerates in these trenches (not basal) give an assemblage of chrome diopside, picro ilmenite, pyrope and chromite. Paleo current directions are thought to suggest a source area to the North. Sediments with plant fossils underlie the conglomerates and are thought to be in faulted contact with Adelaidean lithologies immediately to the North.

- The next location is **Diamond Ridge** where Freeport located 120 diamonds (to 0.05 mm) totaling 1.06 carats from bulk sampling of 1,100 tonnes of conglomerate in 1983. In 1998, Tiger repeated this work and recovered 56 diamonds (to 1.0 mm) totaling 1.63 carats from 1,000 tonnes of conglomerate. A 3.5 mm 0.34 carat stone was recovered. This is thought to be the largest diamond recovered in the area to date. The Diamond Ridge conglomerates also contain significant quantities of the indicator minerals pyrope and chromite. Garnets from trench 26 contain about 10% dark green knorringitic chrome pyrope Mg3 Cr2(SiO4)2 described as G11 garnets and highly indicative of diamonds.
- We will then visit the **Mount Dick** area where Tiger has located its most interesting kimberlitic indicator mineral results to date with several samples containing kimberlitic chromites described as "on source".
- Returning to the **Heavy Media Plant** site we will tour the plant that recently recovered the diamonds from Diamond Ridge conglomerates.
- In **Slaty Cliffs Creek** we will see an exposed contact of the margin of the Springfield Basin, and the rapid change in dip of the sediments as one passes across the basin margin.

Cut lunch from Cradock Hotel : eaten at Slaty Cliffs Creek

- After lunch we will visit the **Wirreanda Indicator Field** and particularly the site of hole SF 50 where interesting kimberlitic indicators have been located with a similar assemblage to those in the trenches from the Northern Springfield Basin.

CALABRINDA CREEK AREA (Tiger International / Amity International)

Travel from the Springfield area to the Kanyaka-Calabrinda Area

- At the **Hut Hill Prospect** there are numerous picro ilmenite indicators which are thought to be located very close to a kimberlitic source. Results of recent drilling will be presented.
- At the **Calabrinda Prospect** another sedimentary basin containing one microdiamond and near source abundant picro ilmenite, chromite, phlogopite and kimberlitic rutile has been located. This area was initially thought to be a one hectare kimberlitic sandy tuff breccia pipe. However, the recent digging of a trench, and drilling of several holes, have shown it to be a secondary source. Further exploration in the area is warranted.
- **Pine Flat Swamp** is a circular topographic depression at the Northern end of the Wilson Valley. There is a possibility that this is the surface expression of a kimberlite as the area is very poorly drained with poor sample sites containing some kimberlitic indicator minerals. However the area is a significant site to local Aborigines and further negotiations would be necessary before any work could be considered.

- ***Return to Cradock for a debriefing. Dinner, bed, breakfast and head home on Thur 18.***

TRURO LAMPROPHYRE PROVINCE

A lamprophyre province has been identified between Truro and Frankton within Cambrian meta-sediments of the Karinya Syncline and within the regional northwest trending G2 structural corridor.

The lamprophyre dykes, 0.1 to 1.5m wide, are generally classed as minettes. They are greyish in colour with distinctive bronze phlogopite or black biotite phenocrysts either with random orientation or aligned to a flow foliation and set in a groundmass of fine mica and orthoclase with minor apatite, quartz and magnetite. K-Ar dating of phenocrysts indicates an age of around 480 Ma.

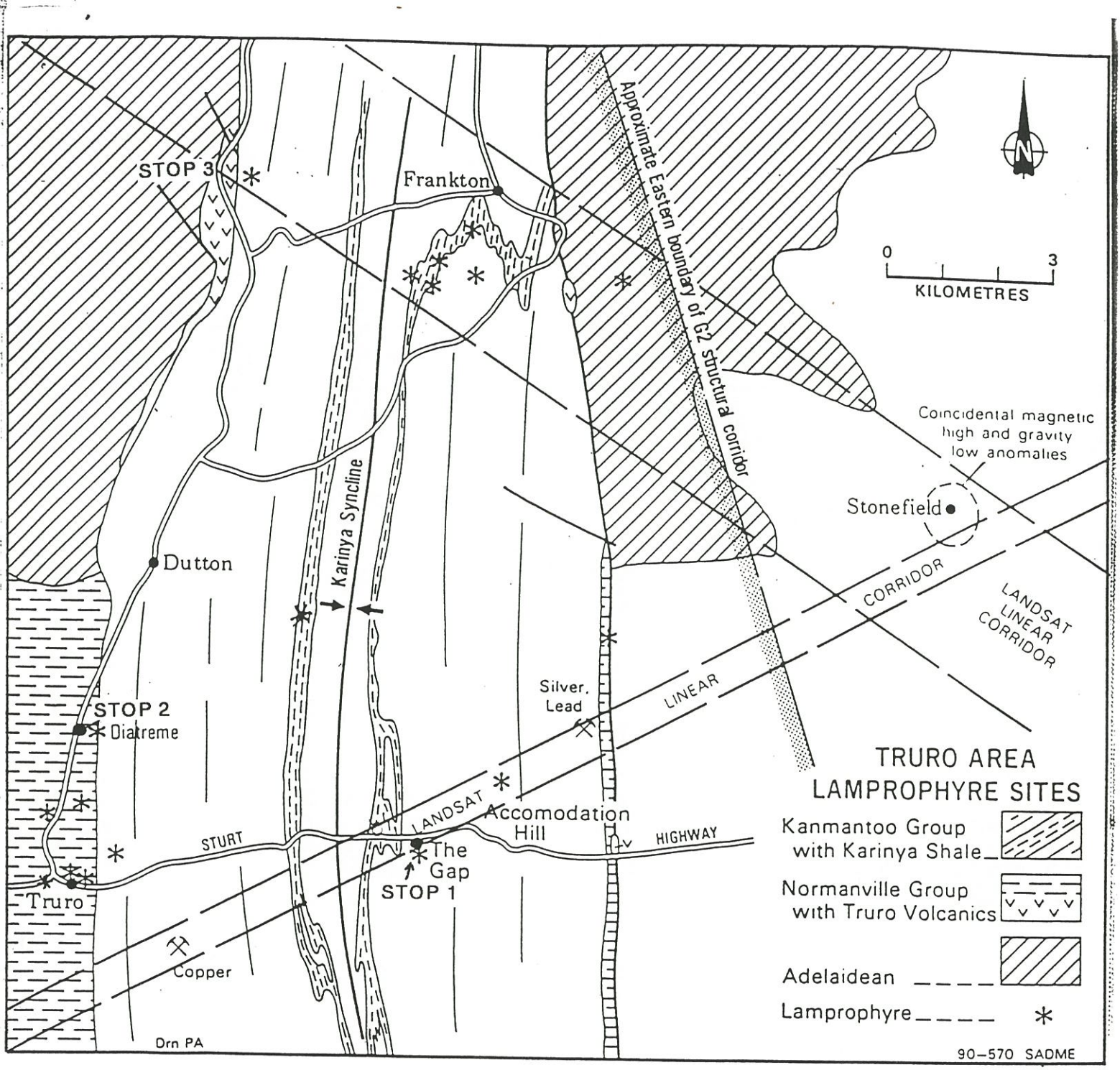
A possible diatreme (Dutton Diatreme), approximately 50m by 100m, composed of multi-phase intrusions of lamprophyre, dolerite and gabbro is exposed in a road cutting. The margin is characterised by pebble breccia containing angular and rounded autolithic and heterolithic xenoliths and alteration of calcareous country rock to talc schist with crocidolite and tourmaline veining.

A kimberlite diatreme, 300m by 50m, was located 11.5 km south of Truro by CRAE in 1992, and has been dated at around 163 Ma. The kimberlite was located by an aeromagnetic anomaly, drainage gravel sampling, ground magnetics and subsequent drilling.

Stop 1. The Gap Quarry, where fine meta-sandstone and meta-siltstone of Cambrian Backstairs Passage Fm. was quarried for road making. Several lamprophyre dykes are well exposed on the eastern quarry face where they intrude along joint planes. The dykes have sharp contacts, chilled margins and flow foliation. The meta-sediments show sedimentary features such as ripple marks, lode casts, channel fill conglomerate and trilobite tracks.

Stop 2. Dutton Diatreme is exposed in a road cutting. Rocks are weathered but features include pebble breccia margins, altered country rock and multi-phase lamprophyre, dolerite and gabbro intrusions.

Stop 3. Truro Volcanics exposure. The volcanics thought to be extrusive and interbedded with the Heatherdale Shale at the base of the Cambrian Kanmantoo Group. The volcanics are fine grained, greenish-grey, amygdaloidal metabasalt with actinolite, epidote and plagioclase.



TRURO LAMPROPHYRE PROVINCE

N

RS2601

Height of batter approx. 3m

RS3297

Tourmaline and talc

RS2599

RS3342

RS2600

RS2603, 2604

RS2602

Tourmaline and iron oxide cubes

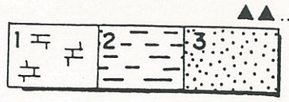
Tourmaline and iron oxide cubes

Height of batter approx. 5m

vvvv..... Undifferentiated dolerite and lamprophyre

+..... Gabbro

▲▲..... Pebble breccia



Angaston marble
1. Marble 2. Calc-shale 3. Calc-sandstone

TT..... Talc and talc schist

..... Amorphous tourmaline

xx..... Asbestos (crocidolite)

..... Calcareous soil and scree

..... Grass and soil

RS 3297 ..... Rock sample location and number

NOTE: All RS numbers prefixed by 6729

TYPE OF SAMPLE	
PETROLOGY	GEOCHEMISTRY
RS 2599	RS 2604
RS 2600	RS 3342
RS 2601	
RS 2602	
RS 2603	
RS 3297	
RS 3342	

0 5 10m

SCALE

KANMANTOO TROUGH
GEOLOGICAL INVESTIGATIONS

KARINYA SYNCLINE
PLAN VIEW OF DUTTON DIATREME

TEROWIE KIMBERLITE PROVINCE

Around 1970 Stockdale Exploration located numerous kimberlite pipes and dykes in the Terowie area. The kimberlites, dated at middle Jurassic (164-174 Ma), occur in groups intruding Burra and Umberatana Group rocks within hinge zones of laterally compressed and faulted anticlines.

Pipes vary in size (up to 6.35 ha) have an irregular surface expression and brecciated wall rock up to 1.5m from poorly defined contacts. Typically they comprise highly weathered breccias with autolithic xenoliths of kimberlite, rare eclogite and lower crustal granulites plus heterolithic xenoliths of country rock, set in a kimberlitic matrix containing serpentine and phlogopite plus chrome pyrope, picroilmenite and chrome diopside accessories.

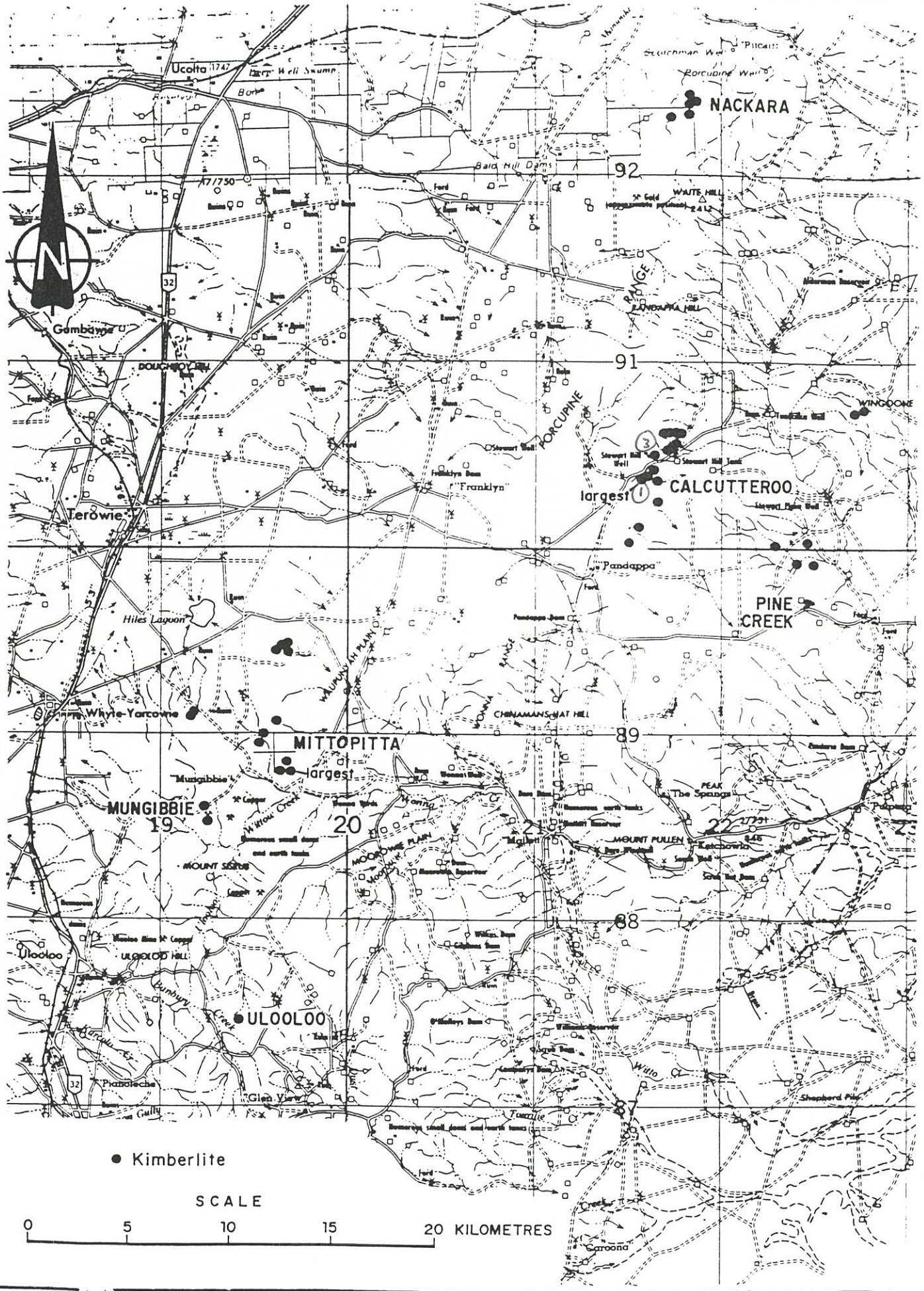
Dykes are generally 20cm – 2m wide, strike NE and NW, have sub-vertical dips and can be traced for up to 400m. Contacts are sharp, often slickensided, with wall rock showing a brown discolouration for up to 10cm. They are massive and comprise micaceous kimberlite with phenocrystal phlogopite and altered olivine set in a groundmass of phlogopite, magnesite and opaques. Xenoliths and brecciation are absent reflecting their passive intrusion.

Mittopitta Pipe

The pipe is 192m by 165m (1.54 ha) with a brecciated texture and abundant autolithic and heterolithic xenoliths set in an olive green, carbonate rich, phlogopite poor matrix with yellowish serpentinised pseudomorphs after olivine. Accessories include chrome pyrope, picroilmenite and chrome diopside. The xenoliths are ovoid, smooth surfaced with an onion skin structure resulting from milling during a fluidised emplacement. A ground magnetometer survey shows a 1300 nT anomaly.

Nephelinite Dyke

A near vertical dyke, up to 3m wide and striking southeasterly, can be traced for about 1km along a fault zone. It is composed of anhadral olivine (now altered) in a fine grained matrix of clinopyroxene and biotite with interstitial nepheline.



DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED B.M.	CDO 23·10·84 DATE
DRAWN M. B.	SCALE 1:250 000
DATE Sept '84	PLAN NUMBER S17506
CHECKED	

KIMBERLITIC ROCKS – SOUTH AUSTRALIA

TEROWIE - WHYTE YARCOWIE

3620

N.W. Corner post
M.L. 4835

NORTHERN BOUNDARY OF M.L. 4835

N E CORNER POST
M.L. 4835

9950 E
10 000
10 050
10 100
10 150
10 200
10 250
9950 N
9900
9850
9800
9750

Orth - quartzite outcrop

Stream incised 3-5 m into country rock

Steep 6m high banks cut into alluvium

APPROXIMATE LIMIT OF ROCK OUTCROP

Small scattered outcrop of quartzite

M.C. 6 (140 tonnes)

APPROXIMATE BOUNDARY OF CHANGE IN SLOPE (442m A.S.L.)

M.C. 3 (140 tonnes)

Small scattered outcrops of quartzite

M.C. 5 (140 tonnes)

MC 2 (140 tonnes)

M.C. 1 (140 tonnes)

M.C. 4 (140 tonnes)

Old prospecting pit in kimberlite

APPROXIMATE LIMIT OF ROCK OUTCROP

High standing quartzite ridge

LEGEND

BOUNDARY OF PROTEROZOIC COUNTRY ROCK

INFERRED BOUNDARY OF KIMBERLITE (FROM STOCKDALE DRILLING / COSTEANING PRO)

PROPOSED COSTEAN LOCATION AND TONNAGES

ACCESS TRACK

CREEK

MN

MITTOPITTA PIPE

Pine Creek Pipe

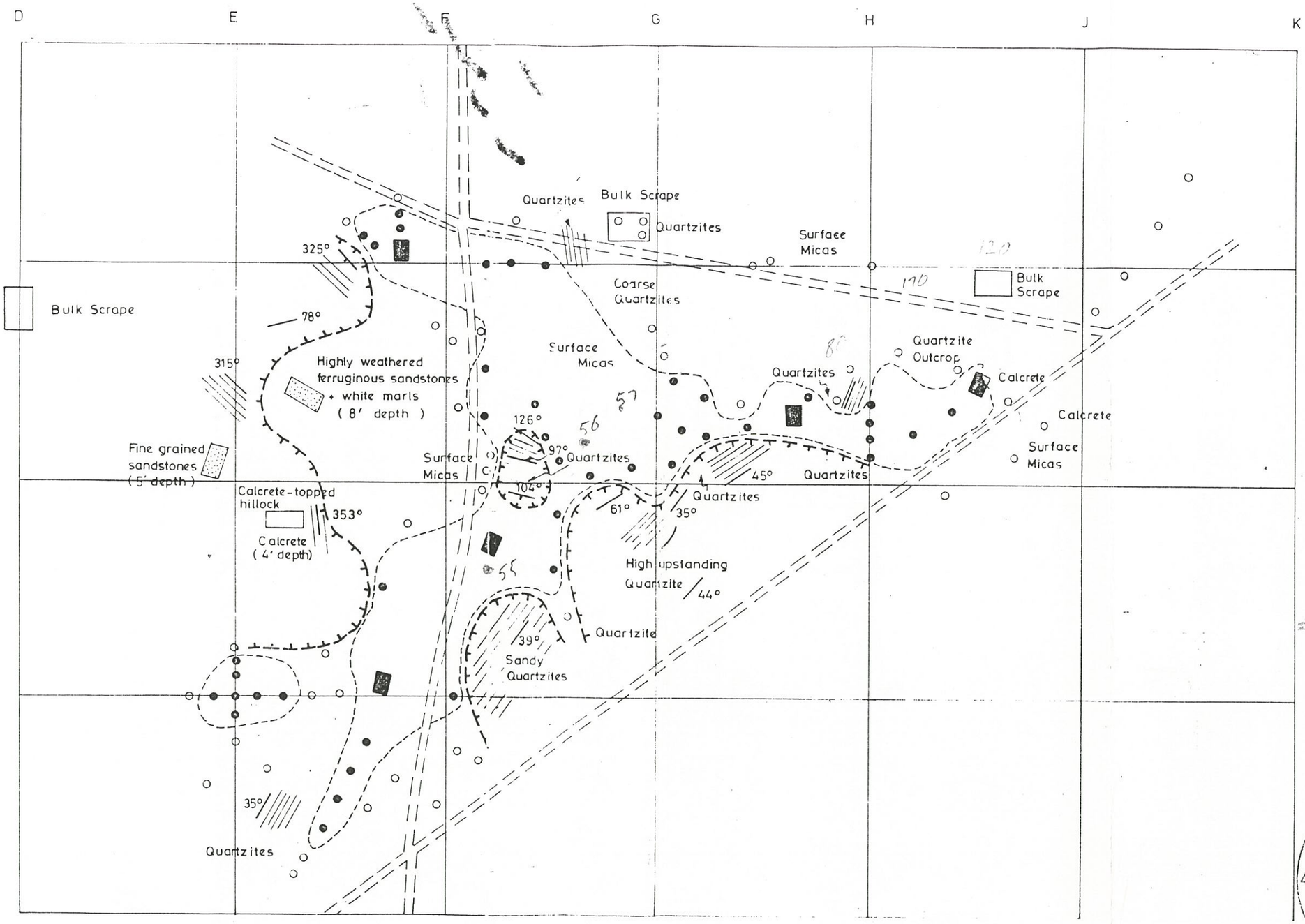
The pipe is a T - shaped body, 350m by 400m (6.35 ha) and possibly formed as a diatreme at the intersection of two dykes. It is classed as a micaceous kimberlite with abundant phlogopite. Accessories include picroilmenite, pyrope garnet, chrome diopside and chromite, xenoliths of eclogite and hartzbergite may be present. A ground magnetometer survey shows a 550nT anomaly.

Calcutteroo Pipe 1 3

Described as a T- shaped pipe, 66m by 44m, of olive green micaceous kimberlite containing autoxenoliths plus heteroxenoliths of garnet granulite and eclogite. Ground magnetics show a 1500nT anomaly.

Calcutteroo Pipe 3 1

The pipe is a basic igneous intrusion about 10m across and contains abundant rounded xenoliths of charnokite comprising quartz, orthopyroxene, garnet, feldspar and biotite. Xenoliths of kyanite eclogite are also present but weathered and fragile. Embedded in the clay matrix are mud balls up to 2cm that surround small mineral and rock freagments. It has been suggested they resemble `chalazoidites` which form in volcanic ash clouds.



M N.

Bulldozed costeans :- Kimberlitic

Non Kimberlitic

Post hole :- Kimberlitic

Non Kimberlitic

Strike direction of country rock (dip direction shown where proven)

Country rock outcrop

Possible outcrop of kimberlitic body

SCALE

0 Miles 1/10

80m 160m

100m

Refer 1-54-5 Map 3

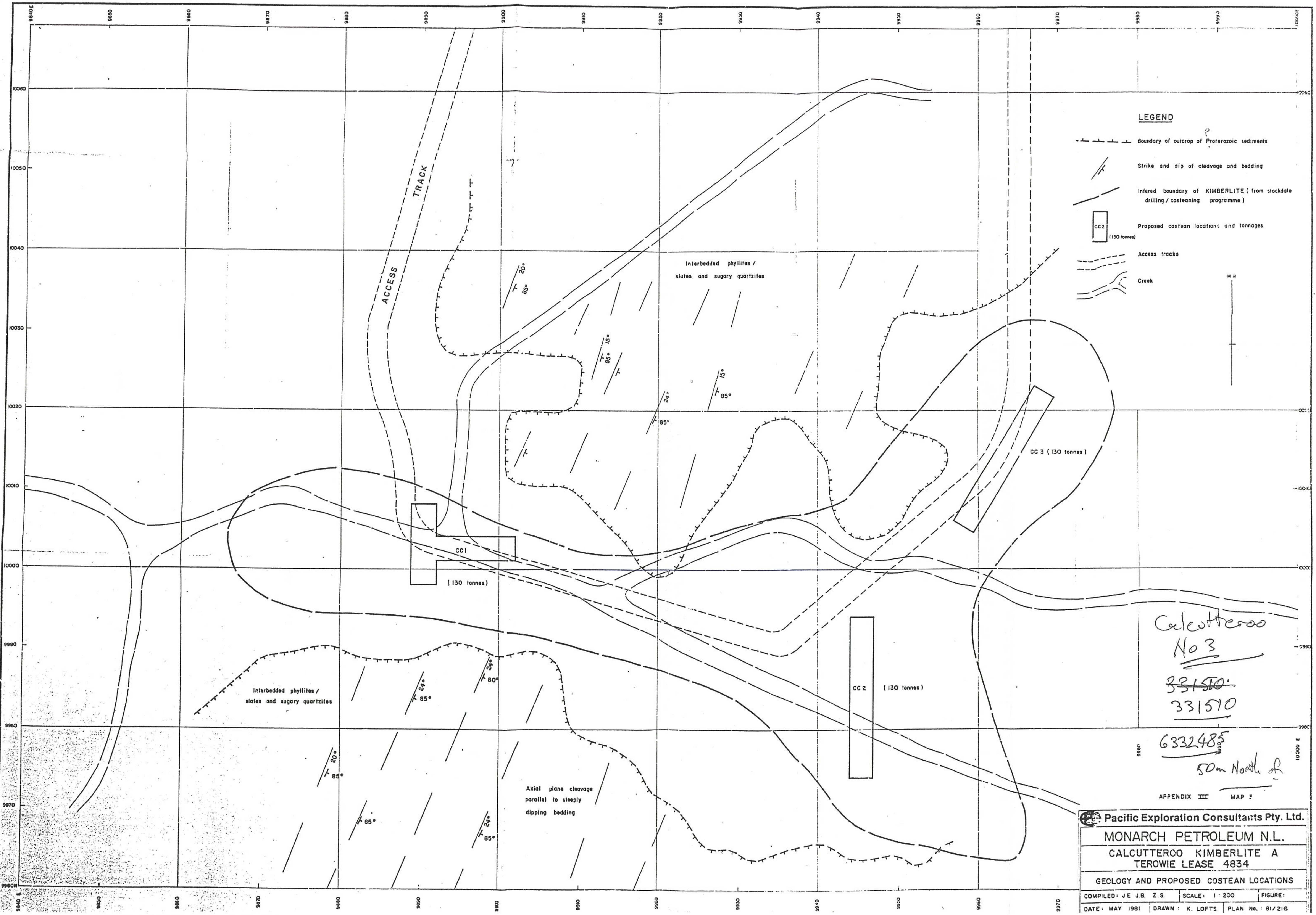
STOCKDALE EXPLORATION LIMITED

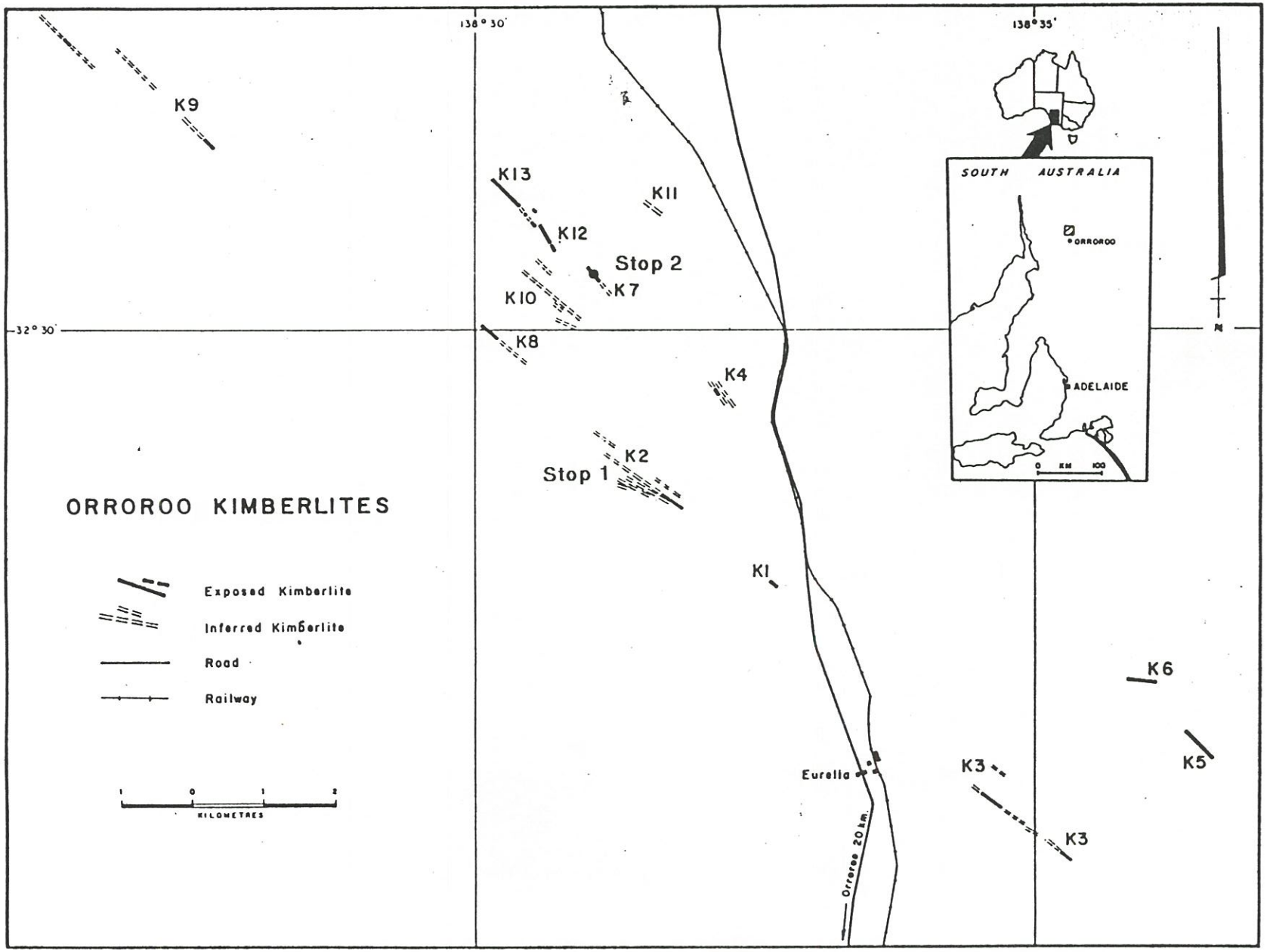
PART BURRA CONCESSION

PINE CREEK AREA

GEOLOGY

DRAWN	COMPILED	SCALE	
	D.M.C.	1"=4 Chains	SEL - 263

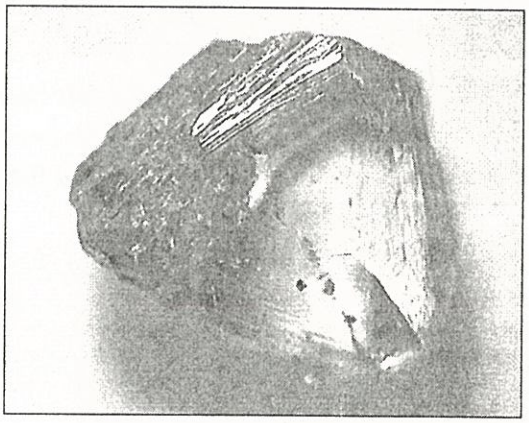

LEGEND
Boundary of outcrop of Proterozoic sediments
Strike and dip of cleavage and bedding
Infered boundary of KIMBERLITE (from stockdale drilling / costeaning programme)
Proposed costean location; and tonnages
CC2 (130 tonnes)
Access tracks
Creek
M.N.
ACCESS TRACK
Interbedded phyllites / slates and sugary quartzites
CC1 (130 tonnes)
CC 3 (130 tonnes)
CC2 (130 tonnes)
Interbedded phyllites / slates and sugary quartzites
Axial plane cleavage parallel to steeply dipping bedding
Calcutteroo No 3
331510
6332485
50m North of
APPENDIX III
MAP 3
Pacific Exploration Consultants Pty. Ltd.
MONARCH PETROLEUM N.L.
CALCUTTEROO KIMBERLITE A
TEROWIE LEASE 4834
GEOLOGY AND PROPOSED COSTEAN LOCATIONS
COMPILED: J.E. J.B. Z.S.
SCALE: 1 : 200
FIGURE:
DATE: MAY 1981
DRAWN: K. LOFTS
PLAN No.: 81/216


138°30'
138°35'
32°30'
K9
K13
K11
K12
Stop 2
K7
K10
K8
K4
K2
Stop 1
K1
K6
K5
K3
K3
Eurella
Orroroo 20 km.
SOUTH AUSTRALIA
ORROROO
ADELAIDE
0 KM 100
N
ORRORROO KIMBERLITES
Exposed Kimberlite
Inferred Kimberlite
Road
Railway
1 0 1 2
KILOMETRES

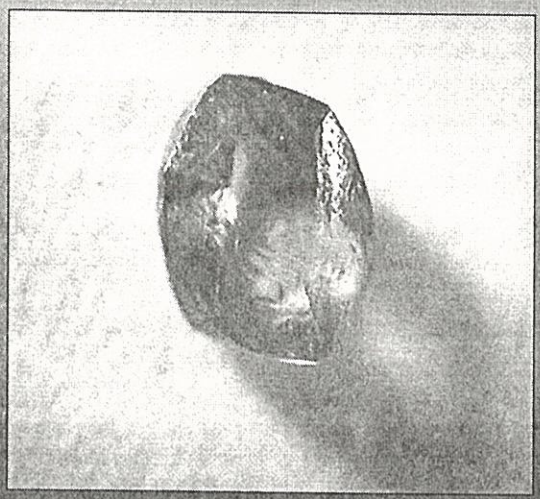
COUSLEY

Tiger International
Resources Inc

TGR•VSE



south flinders ranges diamond project



Dr K.J.A. Wills
February 1999
PIRSA – Tiger Field Trip

February 1999
PIRSA – Tiger Field Trip

This information has been extracted from a December 1998 report. Most Plates and Figures have been excluded. Selected Figures relevant to the February 1999 field trip have been appended.

CONTENTS

south flinders ranges diamond project
— summary —

In February 1998, Tiger International Resources Inc (Tiger) began a diamond exploration program in the Flinders Ranges of South Australia. The Southern Flinders Ranges Project lies in a highly prospective geological setting on the continent-wide G2 gravity lineament. This hosts five of South Australia's diamondiferous diamond prospects. From south to north they are; Echunga, Eurelia, Springfield, Edward Creek and Abminga.

The Southern Flinders Ranges Project contains of two farm-in agreements, one on the Springfield Project with the Springfield Syndicate, and another on the Kanyaka Project with Amity International Pty Ltd. Tiger itself applied for and now holds title to two granted EL's and one EL application. These three tenements can become part of the Springfield Project. The overall project consists of seven EL's totalling 5,435 km^2 (Figure 1), with a cumulative expenditure commitment over a full year of $805,000. Approximately $600,000 will have been spent during 1998 which is about $150,000 above the pro-rata cumulative expenditure commitment. Most of the land under tenure is either Perpetual Crown Lease or Freehold Land. In both cases, Native title is likely to have been extinguished.

Various previous diamond exploration programs have located 32 indicator mineral anomalies either in or very near the project area (Figure 2). There are also seven prospects containing a total of 344 diamonds, which lie along the G2 gravity lineament. The Eurelia Prospect contains the most diamondiferous kimberlites yet found in South Australia, and is located in the southeast corner of the project area. There has only been one phase of serious diamond exploration on the Springfield Project area by Freeport and partners between 1979 and 1991. This work has since been found to be seriously defective by missing numerous indicator mineral anomalies that have been located during Tiger's recent exploration.

At Springfield in 1998, a program of reprocessing airborne magnetic data, bulk sampling (Figure 3) and undercover drilling (Figure 4) was planned and executed. As the program developed, other activities included regolith mapping (Figure 2), trenching (Figure 5), new drainage sampling (Figure 6) and indicator mineral geochemistry (Figures7 & 8). This work has led to a completely new understanding of the diamond potential of the area, and has opened up a large number of new anomalous avenues (Figure 13), which are expected to lead to the discovery of a new province of diamondiferous kimberlites.

On the Kanyaka Project with Amity International, results at the Calabrinda and Hut Hill prospects suggest that undiscovered primary diamondiferous source rocks lie within about one kilometre. Other anomalies at CC50, CC53, the Wilson Valley and Hawker Lagoon are also considered close to source, and worthy of follow up exploration in 1999.

Exploration of the Southern Flinders Ranges Project has reached the stage where a small amount of additional work should lead to the identification of several new diamondiferous kimberlites. A program consisting of ground magnetics and indicator trace element auger soil sampling is recommended. This program will take about three months and cost about $200,000. A comprehensive report on the first year's exploration would also be produced as part of this program.

Once several diamondiferous kimberlites have been located, attention can turn to a three component program of exploration and evaluation. This would include: an ongoing regional drainage program to locate the sources of regional anomalies, a detailed follow up program to locate new kimberlites, and bulk sampling to estimate kimberlite diamond grades. This program would take between one and two years and cost up to two million dollars.

INTRODUCTION

On 4 February 1998, after several months of negotiations, Tiger International Resources Inc. commenced diamond exploration of the Southern Flinders Ranges Project. It entered an agreement with the Springfield Syndicate to earn a major equity by funding an exploration program on the Springfield tenements. The objectives of the program are to locate commercial diamond deposits and to develop them as profitable operations.

Tiger International Resources Inc. (Tiger) is a public company which participates in mineral exploration in Australia. It is incorporated under the Canadian Province of British Columbia Company Act, with its shares traded on the Vancouver Stock Exchange.

The Springfield Diamond Project is located in the Southern Flinders Ranges of South Australia between the towns of Hawker and Port Augusta. The project area is located 300 kilometres due north of Adelaide from where it can be reached by main road, either through the Clare Valley or on the coastal highway, in about four hours.

This document has been designed to give a synthesised and up to date overview of recent activities at the Project. More detailed information is available in the reports listed in the references.

Regional Setting

The main tectonic host unit is the Adelaide Geosyncline. This is a pile of mostly sediments which accumulated between about 800 and 500 million years ago and was then deformed and metamorphosed during the Delamarian Orogeny about 480 million years ago. The Adelaide Geosyncline overlies basement of thick Archean crust known as the Gawler Craton. Archean crustal blocks are known worldwide as the most prospective areas for diamond mines.

The Southern Flinders Ranges project area is also located near the intersection of the continent-wide G2 and G8 gravity lineaments as described by O'Driscoll (1990). These lineaments probably represent deep zones of weakness in the earth's crust along which primary diamond source rocks can be emplaced during periods of local crustal tension.

Of the three diamond prospects in South Australia containing over 100 diamonds, two lie within the Springfield Project area. These are the Eurelia kimberlite dykes and the Springfield Basin diamondiferous conglomerates. The other prospect with over 100 diamonds is at Echunga in the Adelaide Hills, also along the G2 gravity trend.

The Southern Flinders Ranges area is also well known as a field of kimberlites and kimberlitic indicator minerals (Townsend et al, 1994), but lacks primary macrodiamond host rocks to date. The Peake and Denison Inlier diamond prospects and the Abminga diamond prospects also lie along the G2 gravity lineament.

Tenements

Through agreements (see below), and applications in its own right, Tiger now has management control of the seven exploration licences whose details are listed below. Location is illustrated on Figure 1.

Number	Name	Granted Date	Area Km²	Exp Comm $	Ann Rent $	Due in
EL 2405	Springfield	08.08.97	340	130,000	1,037	Aug 99
EL 2464	Glen Oak	03.12.97	592	90,000	1,806	Dec 98
EL 2535	Willochra	18.08.98	1,466	170,000	4,410	Aug 99
EL 2536	Gilbert Hill	18.08 98	2,345	255,000	7,152	Aug 99
ELA 153/98	Kallioota	Exp Dec 98	383	70,000	1,168	Dec 98
EL 1948	Kanyaka	14.07.94	297	60,000	906	Jul 99
EL 2050	Partacoona	15.01.95	12	30,000	37	Jan 99
Totals	**7 EL's**		**5,435**	**805,000**	**16,516**	

By the end of 1998, Tiger will have expended about $600,000, including administrative costs, on the Southern Flinders Ranges Diamond Project. This will be some $150,000 above the pro rata cumulative expenditure commitment for the tenements. A total expenditure of some $800,000 in 1999 will be necessary to meet statutory expenditure commitments.

Agreements

Tiger has entered agreements with two parties—the Springfield Syndicate and Amity International. Brief summaries of terms are given below but the reader should examine the actual documents if a detailed understanding is required.

The Springfield Syndicate (informal name) consists of three private individuals—Mr Jim Allender, Mr Tony Le Brun and Mr Ian Youles. They originally applied for title to the Springfield area in 1991. An agreement relating to EL's 2405 and 2464 was executed on 4 February 1998. The agreement consists of an initial option phase whereby Tiger can earn, in stages, a total equity of 75% for the exploration expenditure of $1.25 million. After this Tiger has an option to purchase an additional 10% equity for the sum of $1 million. Whether Tiger has a 75% or 85% interest, a joint venture is then formed with the Syndicate holding the remaining equity. Thereafter equity is determined on a normal contribute or dilute basis. An area of interest of 30 minutes of longitude or latitude around EL's 2405 and 2464 applies to this agreement.

The other agreement is with Amity International Pty Ltd, a private Perth-based company whose principals are Jeffrey Moore and Linda Frewer. This agreement allows Tiger to earn an 85% interest in EL's 1948 and 2050 (Kanyaka Project) for the exploration expenditure of $1 million. Tiger has issued a warrant to Amity for the purchase of 100,000 Tiger shares at a price of C$1.25 per share. Tiger has a right to purchase the remaining 15% interest after an independent commercial valuation. There is no area of interest in this agreement.

Land Tenure

The type of land tenure over the majority of the project area is Perpetual Crown Lease. There is also a gradually increasing area of Freehold land as one travels south. There are some small areas of Pastoral Lease in the northwest part of the project and also small areas of Crown Land under roadside and nature reserves.

As far as Tiger has been able to ascertain, Perpetual Crown Lease has extinguished Native Title. Tiger intends to initially limit activities to Freehold and Perpetual Lease land. It is however prudent, though not mandatory, to carry out site inspections related to the Aboriginal Heritage Act 1988, prior to carrying out any activities which would disturb the surface of the land.

Tiger has carried out two successful Aboriginal Heritage Act (1988) clearance trips with representative of the Flinders Ranges Aboriginal Heritage Consultative Committee (FRAHCC). There are also environmental restrictions on significant exploration activities and Tiger has obtained approved Declarations of Environmental Factors (DEF's) from the Department of Primary Industries prior to carrying out any trenching, drilling or bulk sampling.

PREVIOUS EXPLORATION

There have been many previous diamond exploration programs in the Southern Flinders Ranges Project area over the last forty years. The work by Stockdale in the 1960's established the Southern Flinders Ranges as the first known kimberlite province in Australia. The main results of these projects are illustrated by the 32 indicator mineral anomalies shown on Figure 2. This also shows that the project area currently contains seven diamondiferous prospects. It is known that when the Kalumburu Joint Venture (the forerunners to the Ashton JV which discovered the Argyle deposit) were deciding which area to explore, they considered that the South Flinders Ranges and the Northeast of Western Australia had the best diamond potential in Australia.

There has only been one phase of serious previous diamond exploration on the Springfield Project area by Swan, Freeport and Poseidon between 1979 and 1991. Previous exploration for base metals is not considered relevant. Swan Minerals, and its successors, held a similar area to that currently controlled by Tiger and proceeded from

first-pass reconnaissance indicator mineral drainage sampling to location of Diamond bearing conglomerates on Diamond Ridge between 1979 and 1982. In 1983 they carried out bulk sampling of the diamondiferous conglomerates and recovered 120 diamonds totalling 1.06 carats from 1000 tonnes of conglomerate processed.

As these results were clearly uneconomic, Freeport turned to the area they thought contained the source of the diamonds to the west and southwest of Diamond Ridge. Exploration of the western area, mainly via loam sampling and geochemistry, proved negative for Kimberlites. Freeport also drilled five diamond drill holes to Adelaidean basement under Diamond Ridge. This also failed to intersect any kimberlite. A large area around the Springfield Basin was drainage sampled, with generally negative results and a few positive results thought to have been derived from the Diamond Ridge area. In late 1990, Poseidon took over Freeport and decided to concentrate its diamond activities on the Bow River alluvial diamond mine.

The area was not vacant of tenure for long before it was applied for by the current Springfield Syndicate titleholders. They carried out gravity and airborne magnetic surveys which defined several new targets at Springfield and Boolcunda. In 1994, the writer was commissioned to carry out an in depth review of previous exploration, which resulted in a series of recommendations for future work (Wills, 1995). The Springfield Syndicate made several attempts to find a joint venture partner between 1994 and 1997 and in early 1998, reached the agreement described above with Tiger International Resources Inc.

SPRINGFIELD 1998 EXPLORATION

Given the objective of locating a primary diamond source as soon as possible, an exploration program was set up in March and April with three types of work planned:

- Bulk sampling to check Freeport's work, to locate larger diamonds and to provide additional information through paleocurrent studies and indicator mineral analysis on primary source location.
- Enhancement of airborne magnetic processing, to produce better quality images for interpretation of possible kimberlite targets.
- Completion of an undercover drilling program to search for kimberlites.

Each of these segments was carried out and the program modified as results became available. For instance the need for more trenching and for another look at drainage sampling for kimberlitic indicators near the Springfield Basin were also included in the forward program. A regional review of previous indicator mineral results was also carried out.

Regional Regolith Mapping

In mid November consultant Dr Richard Russell commenced regional reconnaissance regolith mapping with an emphasis on our understanding of landscape evolution over the project area. To aid this work, Tiger purchased a recent Landsat Thematic Mapper scene, and Jim Allender produced various images designed to enhance regolith features. This work has improved our understanding of stream and gravel transport directions over time, hence aiding location of indicator and diamond primary sources.

A simplified view of the results is shown on Figure 2. The terrain has been classified into erosional and depositional regolith units. This will enable our efforts to be focussed on the erosional regolith units where it will be easier to track anomalous indicator mineral results to their primary sources. A number of structures have also been identified, a deeper understanding of which may also aid in kimberlite location.

Another benefit of the landscape evolution studies has been the implications of our new model. We previously thought that the current landscape had been eroded from a high-level pre-Permian peneplain, which existed at the time of kimberlite emplacement. A consequence of this was that some part of any kimberlite's diatreem facies would have been eroded. Now that we see the landscape as the product of uplift of a low (near sea) level pre-Permian peneplain, it is likely that only a small proportion of any kimberlite diatreem would have been eroded.

Regional Indicator Mineral Review

A review of previous drainage indicator sampling in the project area has been carried out by John Howard. The results of this are also illustrated on Figure 2. A total of 32 drainage indicator anomalies have been recognised.

A total of seven prospects containing diamonds have also been recognised by this review as follows:

Prospect Name	Number of diamonds located to date
Warrakimbo Woolshed	1
Partacoona	1
Calabrinda	1
Drainage Site M31	3
Springfield	196 (Freeport and Tiger sampling)
Boolcunda	2
Eurelia	140 (Stockdale sampling)
Total	**344**

The trend of distribution of these stones is parallel to the G2 lineament and it defines a zone of major prospectivity on the project area. All work to date has been focussed on the follow up of only three of the 32 known indicator anomalies. Each one of these anomalies will generate the need for a significant amount of additional drainage indicator mineral sampling if their sources are to be located. Initial work will consist of resampling anomalous sites to check their validity and to obtain minerals to probe in order to assess each anomaly's diamond potential.

Geophysics

The five existing airborne geophysical surveys that are relevant to the exploration program were reprocessed using Intrepid, Petrosys and ER Mapper software by geophysics consultant Mr Jim Allender (Allender and Koch, 1998). The resulting images were the best yet produced on the Springfield area. A detailed image at 1:25,000 scale of the project's core area has been produced.

This image has been interpreted, and currently over 65 magnetic anomalies have been recognised which could be caused by kimberlites. To date, only two of these have been drill tested directly (Figure 4). This has been a deliberate policy, as it was known that new detailed drainage sampling was planned, and that this would be the best way to evaluate many of the magnetic targets.

Although we have the best data available, only the Springfield Syndicate's 1994 survey was at 50 metre line spacing, which would be the preferable spacing to detect bodies of 100 to 200 metres diameter. Most of the other surveys are at 300-metre line spacing or greater, so are not ideal for current purposes. Several areas need to be re-flown to obtain better data before magnetics can achieve its full potential at Springfield.

We were recently contacted by AGSO, who are about to fly new airborne magnetics over the Northern to Southern Flinders Ranges, to see if we wish to carry out any infill lines during their new surveys. As there as several limitations of the planned AGSO survey, particularly the flying height, it will probably be best to refly a well defined area as part of the ongoing program.

Bulk Sampling

The first major activity in 1998 was the bulk sampling of 1000 tonnes of diamond-bearing conglomerate from Diamond Ridge. April work consisted mainly of planning and organisation, including an Aboriginal Heritage clearance trip and the preparation and approval of the DEF. In May the Heavy Media Separation (HMS) plant was relocated from Derby in Western Australia and set up at Springfield. Two weeks were spent on set up and collection of sufficient water supplies to commence regular production. After mapping of the basal gravel horizons, ten 100 tonne Preliminary Bulk Samples (PBS) were collected and treated between 28 May and 25 June.

A total of 56 diamonds were recovered from the preliminary bulk samples totaling 1.63 carats. Diamonds were only recovered to 1 mm minimum size which is why we obtained less diamonds than Freeport who recovered diamonds to 0.5 mm size. Despite the smaller size range, Tiger recovered a higher weight and larger stones than Freeport. A further seven small diamonds were recovered from the indicator mineral samples. The largest stone was a clear white macle-dodecahedron with a diameter of 3.5 mm and a weight of 0.34 carats. This is the largest known diamond to be recovered from the Southern Flinders Ranges to date. Together with the indicator mineral results and the paleocurrent mapping possible locations for primary sources were suggested (Figure 5).

Details of the location of bulk samples and results are shown on Figure 3. A report describing all aspects of the program has recently been completed by Barbara Anderson (Anderson, 1998).

Local Regolith Mapping

During the previous exploration review it became apparent that we could gain much useful exploration information by a better understanding of the regolith geology of the Springfield project area. Accordingly, consultant geomorphologist Dr Richard Russell was brought in to help. Richard has considerable previous experience as both a geomorphologist and a diamond explorer. During April and May Richard carried out new regolith mapping based on photointerpretation of 1:40,000 scale colour air photographs and new fieldwork. The resulting map showed where there could be hidden kimberlites that could be located by an undercover drilling program (Russell, 1998a).

Undercover Drilling

A program of undercover drilling was undertaken during May and June to test the idea that undiscovered kimberlites could be present under shallow regolith cover in the Springfield area. The work was supervised by John Howard and is described in his recent report (Howard, 1998). A total of 436 metres were drilled in 64 holes. The results of the work are illustrated on Figure 4.

The results downslope of Diamond Ridge showed that a sizeable area of anomalous undercover minerals was present and that the technique could work effectively. A new field of kimberlitic indicator minerals was discovered north and east of the old Springfield Homestead and has been called the Wirreanda Indicator Field. The result for Hole SF 50 in particular is suggestive of a very close kimberlitic source. This has recently been emphasised by incompatible trace element anomalies of 290 ppm niobium, 750 ppm zirconium and 330 ppm cerium from 4-5 metres depth in hole SF 50. This correlates with a yellow-grey clay of possible kimberlitic derivation. Further drilling to follow up the results near SF 50 and north of Wirreanda Creek was necessary.

This drilling was undertaken between 8 and 18 December, 1998. A further 50 holes were drilled on the Wirreanda Indicator Field to bring the hole spacing down to approximately 400 metres. Also a further 30 holes were drilled over an area about 400 metres square centred on the previously anomalous SF 50. At the time of writing results are awaited.

Trenching

In his second mapping project carried out in August, Richard Russell worked on a project to determine the likely source directions for the conglomerate units that are widely present at the base of the Springfield Basin. To this end a further series of trenches were cut across basal conglomerates at approximately one-kilometre intervals around the Springfield Basin. To our surprise, most of the basal conglomerate units sampled contained kimberlitic indicator minerals as shown on Figure 5. Most of the paleocurrent directions suggested sources outside, but not far from, the margins of the basin (Figure 5 and Russell, 1998b).

The results from trench 26 were the most encouraging yet returned. Sample T26-1 contained over 100 very fresh chromites and 169 very fresh pyropes, including about 10% green knorringitic, high chromium and magnesium, pyrope. Knorringitic pyropes are a strong indicator of high diamond contents in their primary source rock. Probe results on indicator grains to date suggest that the three main sources indicated on Figure 5 are all likely to be diamondiferous.

Drainage Sampling

It has gradually become clear that there are many more positive indicator mineral results around the Springfield Basin, than had been previously discovered by Freeport. This is thought to be due to three factors. Freeport's sampling was of generally smaller samples which were concentrated in the field, and only observed to 0.4 mm. Tiger's recent sampling has been of larger samples (20-40 kg), concentrated in the laboratory (IDL) and observed to 0.3 or 0.2 mm.

It therefore became necessary to consider re-sampling the most-prospective areas with an expectation of locating previously unrecognised anomalies. This work is also expected to lead more cheaply and directly to new primary diamond sources in areas of shallow cover. Accordingly in August, Barbara Anderson carried out an 80 sample detailed drainage survey at a nominal spacing of two-kilometres along creeks, over an area within about six kilometres of the margin of the Springfield Basin.

Results of recent Springfield drainage sampling are shown on Figure 6. A further sixteen results from Diamin Resources NL's 1996 sampling during their brief option period are also included. These samples were collected by John Towie using the same system as Tiger and have been processed in the same way at the same laboratory.

A total of about one third of samples collected gave positive results, including many in locations where Freeport had previously returned negative results. Some of the positive results with low numbers of worn indicator grains are probably from secondary sources, such as the Springfield Basin. They are regarded as a type of "haze" that we need to see through to locate targets of interest. However, it is most encouraging that several of the new anomalies are draining areas not connected to the Springfield Basin and contain numerous fresh or very fresh indicator grains suggestive of local primary sources.

Six situations have been chosen as the most prospective and have been followed up with further infill sampling in early November. These samples are KA 2,12, 48, 54, 58 and 72. They are illustrated on Figure 6 and shown as prospective drainage anomalies on the target summary map—Figure 9.

At the time of writing most of these anomalies have been followed up and results returned. The length of anomalous upstream of the most anomalous results was 500 to 1000 metres in early December. Accordingly, another series of infill samples at a nominal 200 metre interval have been collected in December. Results are expected in January.

KANYAKA PROJECT 1998 EXPLORATION

In September 1998, a deal was completed with Amity International who have been exploring an adjacent EL to Springfield for the last four years. Amity's work has focussed on detailed drainage indicator mineral sampling and has led to the discovery of several high quality, near-source indicator mineral anomalies, including a possible primary diamond source rock.

The possible primary source is at the Calabrinda Prospect, which consists of abundant very fresh picroilmenites, chromite, pyrope, phlogopite and, to date, one microdiamond. John Howard recently mapped the prospect prior to digging a trench and drilling four RAB holes. The trench and drillholes suggested that the diamond and indicator minerals are located in a shallow recent sedimentary basin and that the primary source cannot be far away, probably within one kilometre. Other targets identified by Amity's work are shown on Figure 9.

Also recently, John Howard carried out infill drainage indicator sampling at the CC 50, 53 and Hut Hill Prospects and part of the Wilson Valley anomalies. Further anomalies were returned and follow up exploration is necessary.

Activities and available results of recent exploration (December 1999) of the Hut Hill and Calabrinda Prospects are shown by the draft figures 10 and 11 respectively.

INDICATOR GEOCHEMISTRY

Work has commenced on electron microprobing of indicator minerals from the Springfield and Amity properties. Results are shown on Figures 7 and 8. The high chromium nature of some of the chromites and the high chrome-low calcium nature of some of the pyrope garnets attests to a high diamond potential in the source kimberlites, once they are located. At the time of writing about a further 450 indicator grains are being microprobed. These results will help considerably in determining those anomalies with kimberlitic primary sources and with the best diamond potential.

TARGET SUMMARY

A map summarising the most interesting targets located to date is shown as Figure 9. Many of these Targets are currently being followed up and they consist of a variety of situations such as:

- Large areas of anomalous indicators (eg Wilson Valley and CC 050 anomalies)
- Positive drainage anomalies (eg KA 58)
- Positive undercover drilling anomalies (eg SF 50)
- Positive trench anomalies (Diamond Ridge and T26)
- Conceptual Targets (Hawker Lagoon)

With so many targets it is thought that there is a high chance of locating several new primary diamond source rocks in the area. Although it may be difficult to locate the first new primary source, once one is located, we will begin to understand which exploration techniques are most effective, and this should lead to further discoveries.

CONCLUSIONS

Recent diamond exploration of the Southern Flinders Ranges Project has been very sucessful in opening up new avenues of positive results that have the potential to lead to a number of new diamondiferous kimberlite discoveries in the near future.

The prospectivity of the 5,435 square kilometre project area is demonstrated by its location near the G2-G8 structural corridor intersection and the location of seven diamond bearing prospects containing 344 diamonds to date. The limited number of indicator mineral geochemical results so far available suggests that many of the indicators are from kimberlites, and that some of these kimberlites will be diamondiferous.

Twenty of the most interesting targets located to date are shown on Figure 9 and include:

- At least nine positive drainage indicator anomalies which are thought to be near-source.
- Four large area indicator anomalies.
- Three positive undercover drilling anomalies.
- Three prospective corridors (derived from trench anomalies) from the margins of the Springfield Basin.
- One conceptual target.

It is likely that further primary diamond source rocks will be located by follow up exploration of these and additional targets. Bulk sampling will be necessary to determine the diamond contents of any primary sources located. The heavy media separation plant remains located at Springfield ready to conduct this work.

RECOMMENDATIONS

Exploration of the Southern Flinders Ranges Project has reached the stage where a small amount of additional work should lead to the identification of several new diamondiferous kimberlites. Recommended work in the short term should consist of:

- Processing and observation of outstanding indicator mineral samples
- Follow up in anomalous catchments of about 200 by 200 metres size by ground magnetics and indicator element soil sampling
- Trenching of resultant anomalies
- Use of trace elements and indicator minerals to confirm kimberlite has been located
- Treatment of rock samples of the kimberlites for microdiamonds

This work, and completion of a report summarising all work to date, is estimated to take about three months and cost about $200,000.

Once several diamondiferous kimberlites are located attention can turn to a three component program to evaluate the kimberlites located. The three components consist of:

- An ongoing regional drainage sampling program to locate the source of regional indicator anomalies illustrated on Figure 2.
- An ongoing detailed follow up program to locate new kimberlites
- A preliminary bulk sampling program to decide which kimberlites are worthy of further evaluation.

It is estimated that in a full year a budget of at least $800,000 would be necessary to sustain this program.

Following the identification of kimberlites worthy of serious evaluation it is proposed that a bulk sample of about 1000 tonnes be treated of each diamondiferous kimberlite. The cost of this is difficult to estimate, but if five kimberlites were treated at an average cost of $200,000 each, a total expenditure of at least $1,000,000 would be necessary.

A level of exploration expenditure over the next one to two years of up to two million dollars can therefore be anticipated.

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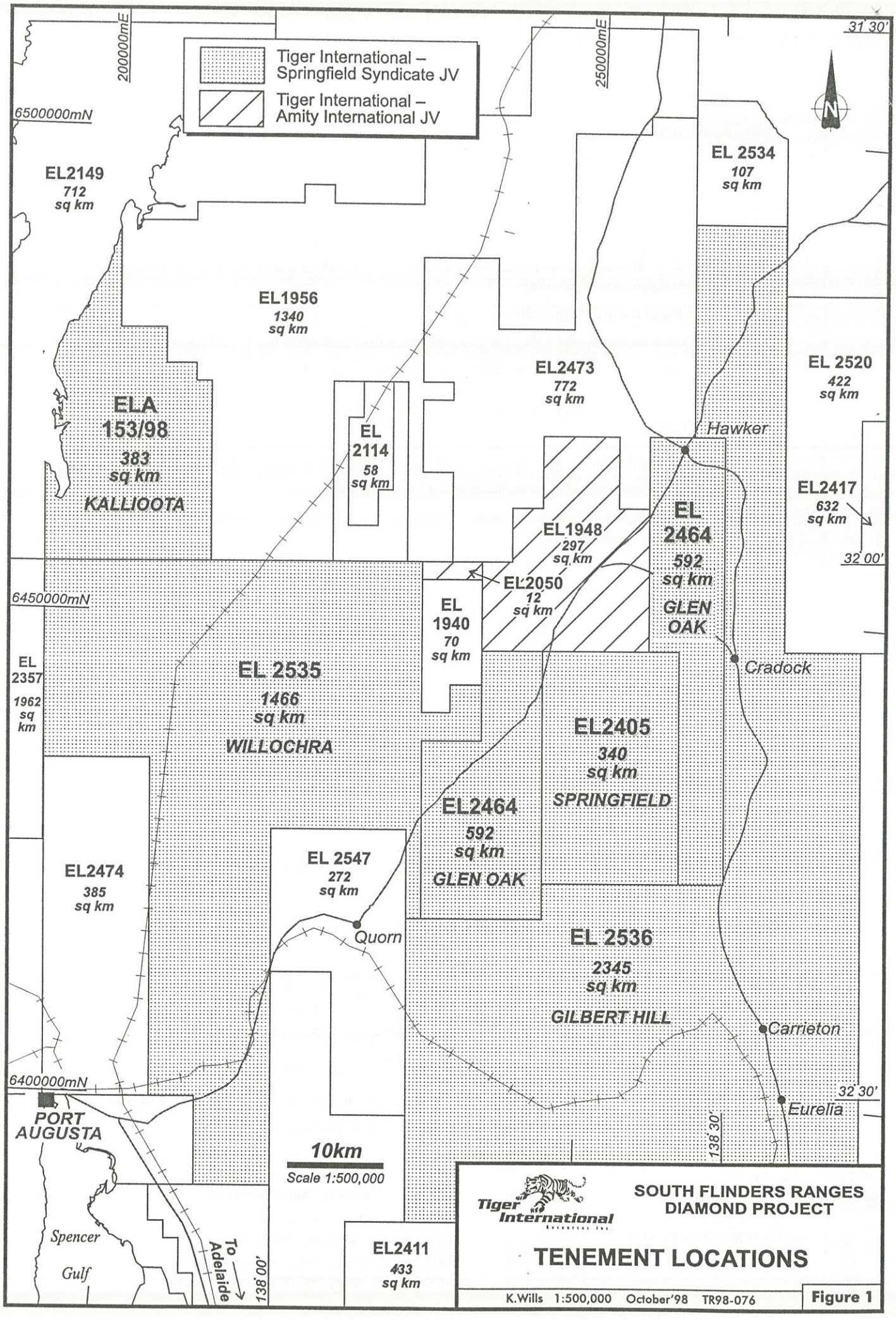
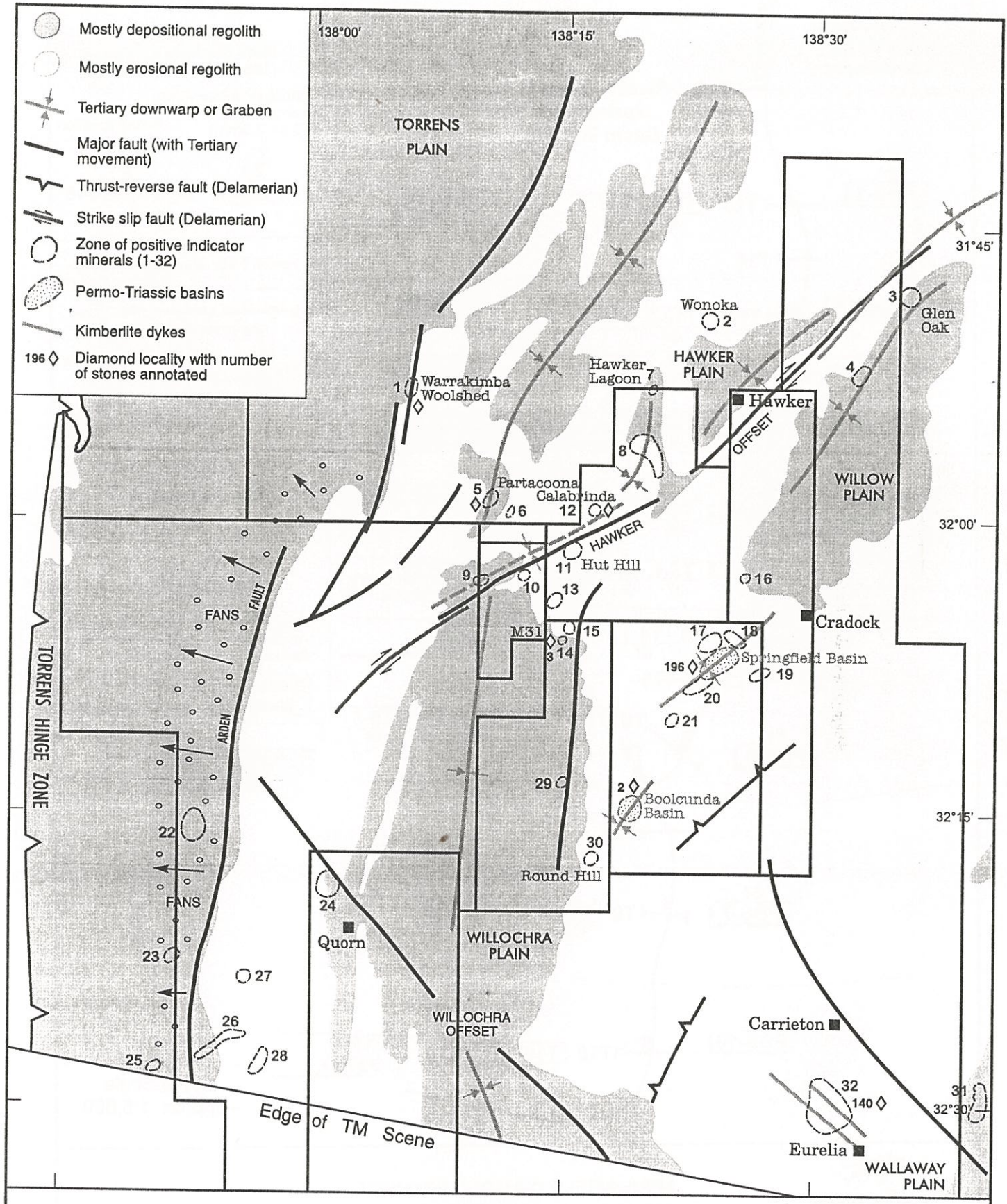

Tiger International – Springfield Syndicate JV
Tiger International – Amity International JV
200000mE
250000mE
31 30'
6500000mN
EL2149
712
sq km
EL1956
1340
sq km
EL2473
772
sq km
EL 2534
107
sq km
EL 2520
422
sq km
ELA
153/98
383
sq km
KALLIOOTA
EL
2114
58
sq km
Hawker
EL2417
632
sq km
32 00'
EL1948
297
sq km
EL2050
12
sq km
EL
2464
592
sq km
GLEN
OAK
6450000mN
EL
1940
70
sq km
Cradock
EL
2357
1962
sq
km
EL 2535
1466
sq km
WILLOCHRA
EL2405
340
sq km
SPRINGFIELD
EL2464
592
sq km
GLEN OAK
EL2474
385
sq km
EL 2547
272
sq km
Quorn
EL 2536
2345
sq km
GILBERT HILL
Carrieton
6400000mN
32 30'
Eurelia
PORT
AUGUSTA
138 30'
10km
Scale 1:500,000
Spencer
Gulf
To
Adelaide
138 00'
EL2411
433
sq km
Tiger International
SOUTH FLINDERS RANGES
DIAMOND PROJECT
TENEMENT LOCATIONS
K.Wills 1:500,000 October'98 TR98-076
Figure 1



SOUTH FLINDERS RANGES DIAMOND PROJECT

REGIONAL REGOLITH, STRUCTURES AND INDICATOR ANOMALIES

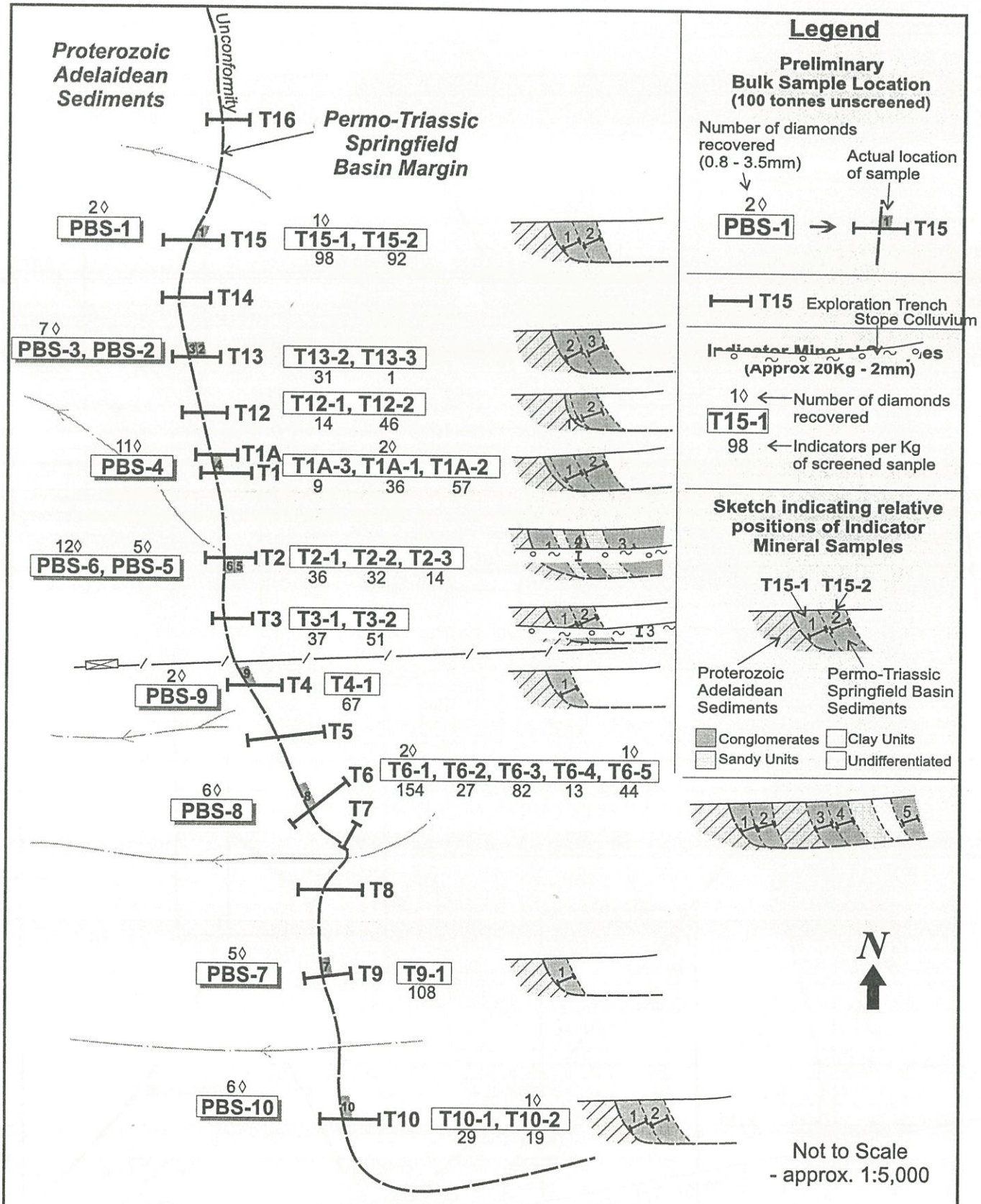
Tiger International

Scale 1:500,000

10 kilometres

R. Russell and K. Wills 1:500,000 December'98 TR98-076

Figure 2

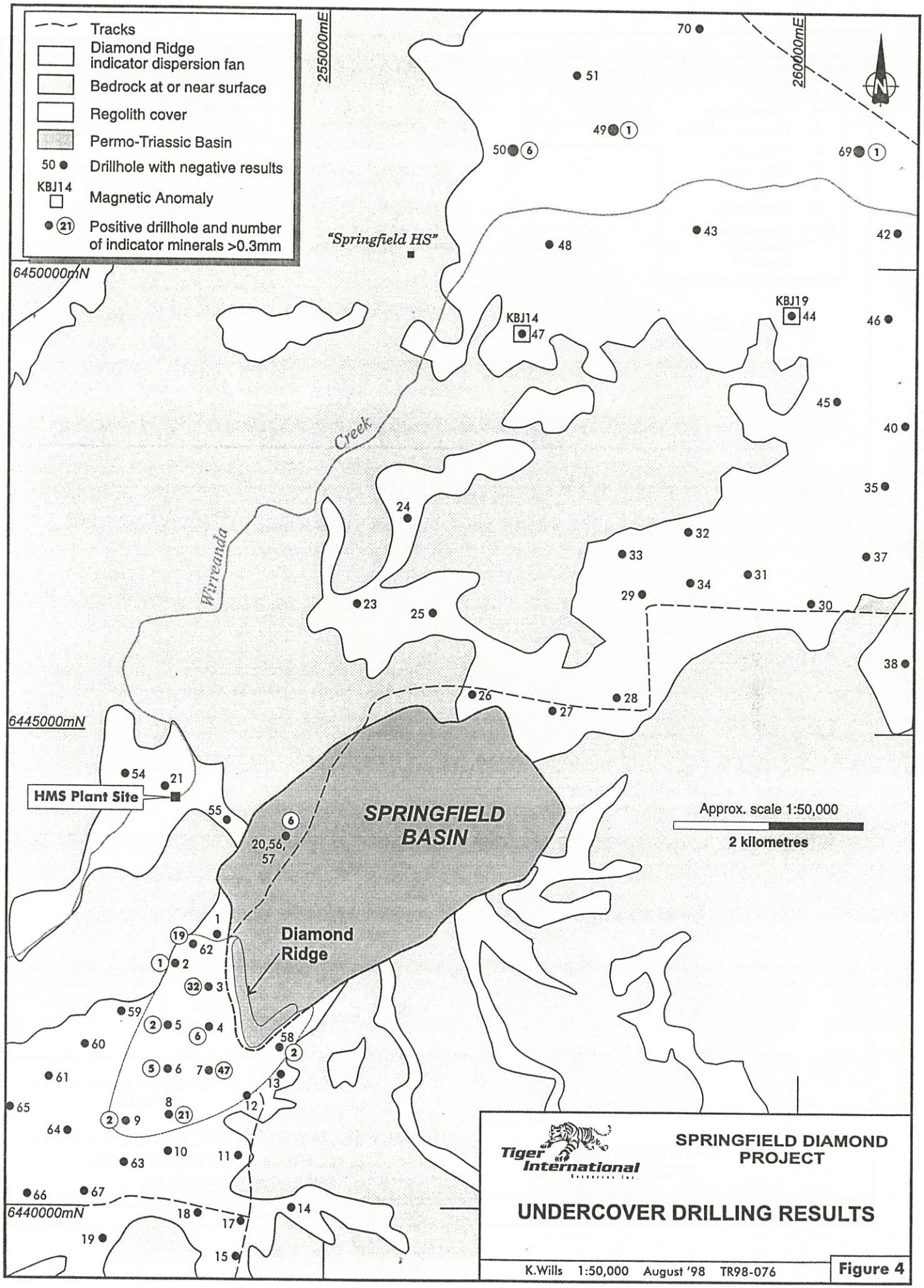


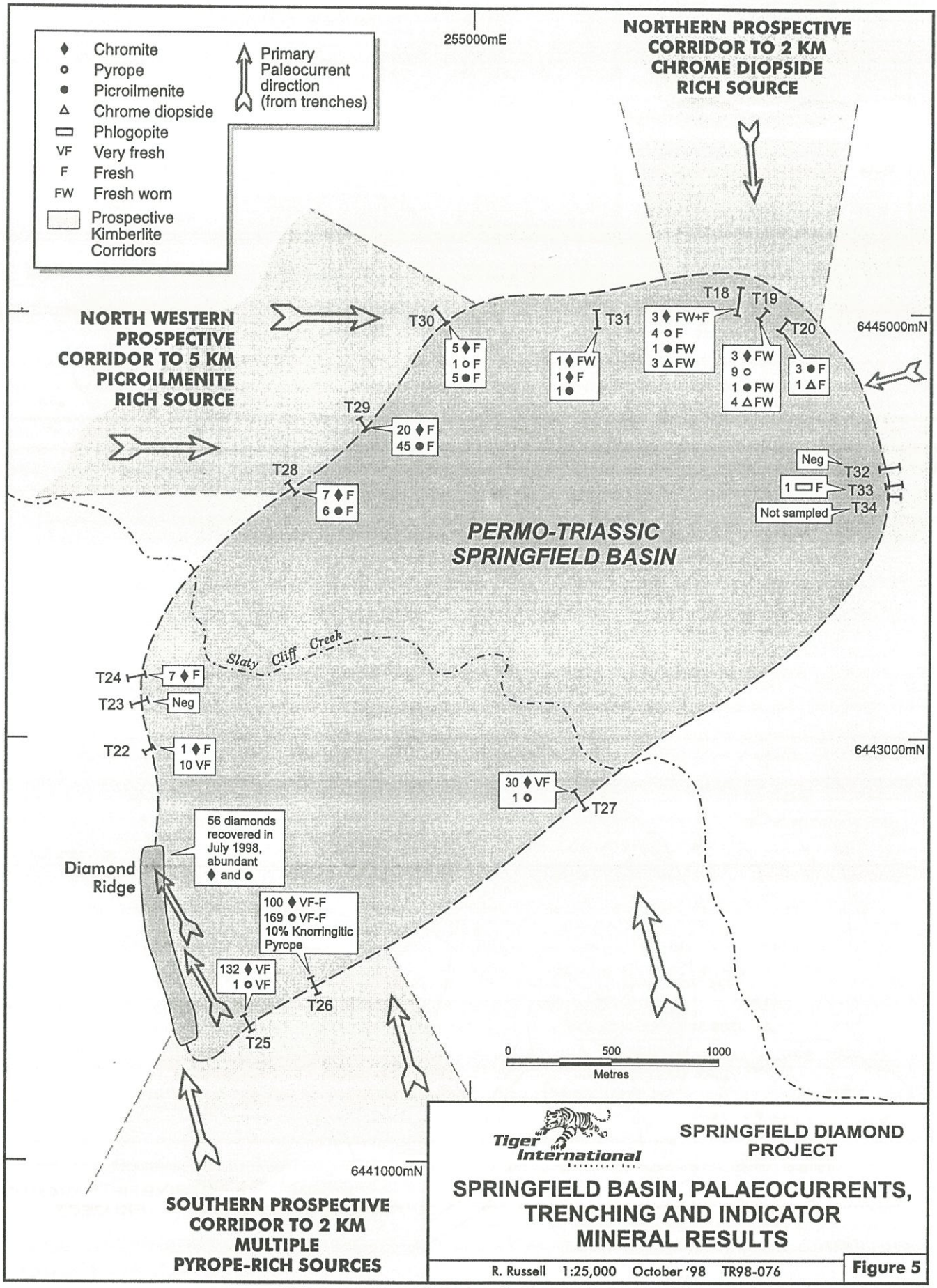
Tiger International

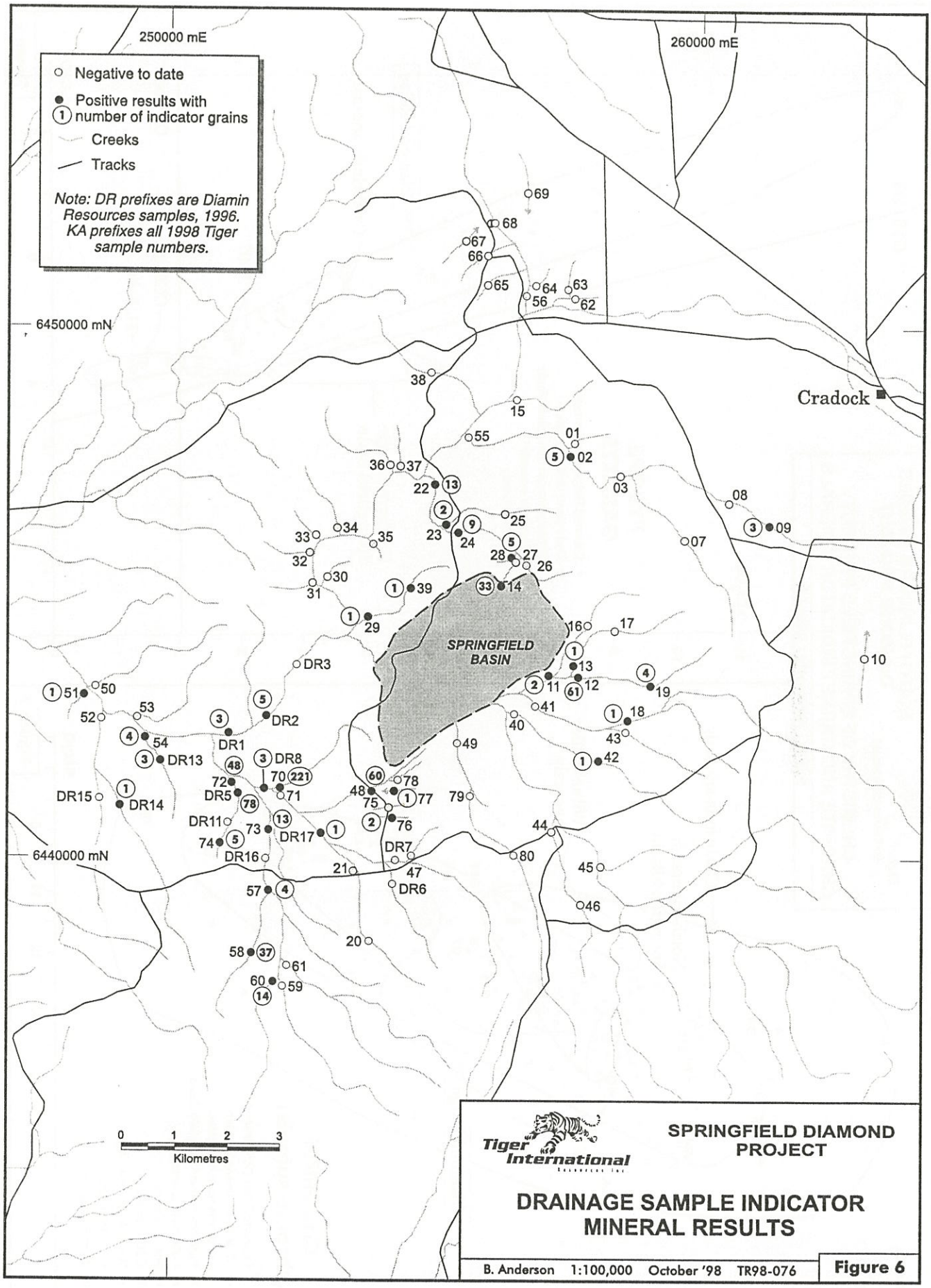
SPRINGFIELD DIAMOND PROJECT

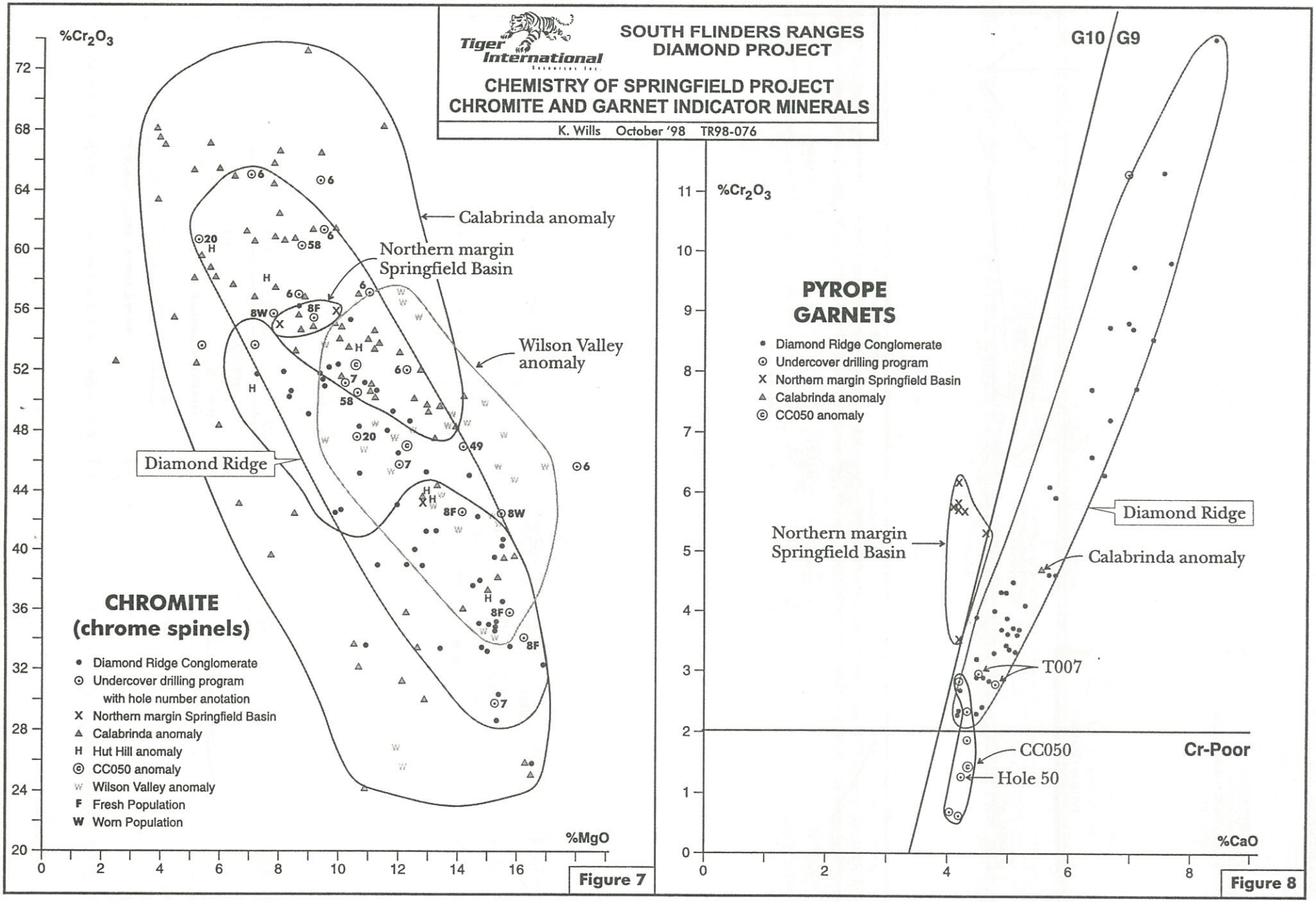
JUNE 1998 BULK SAMPLING AND INDICATOR MINERAL RESULTS

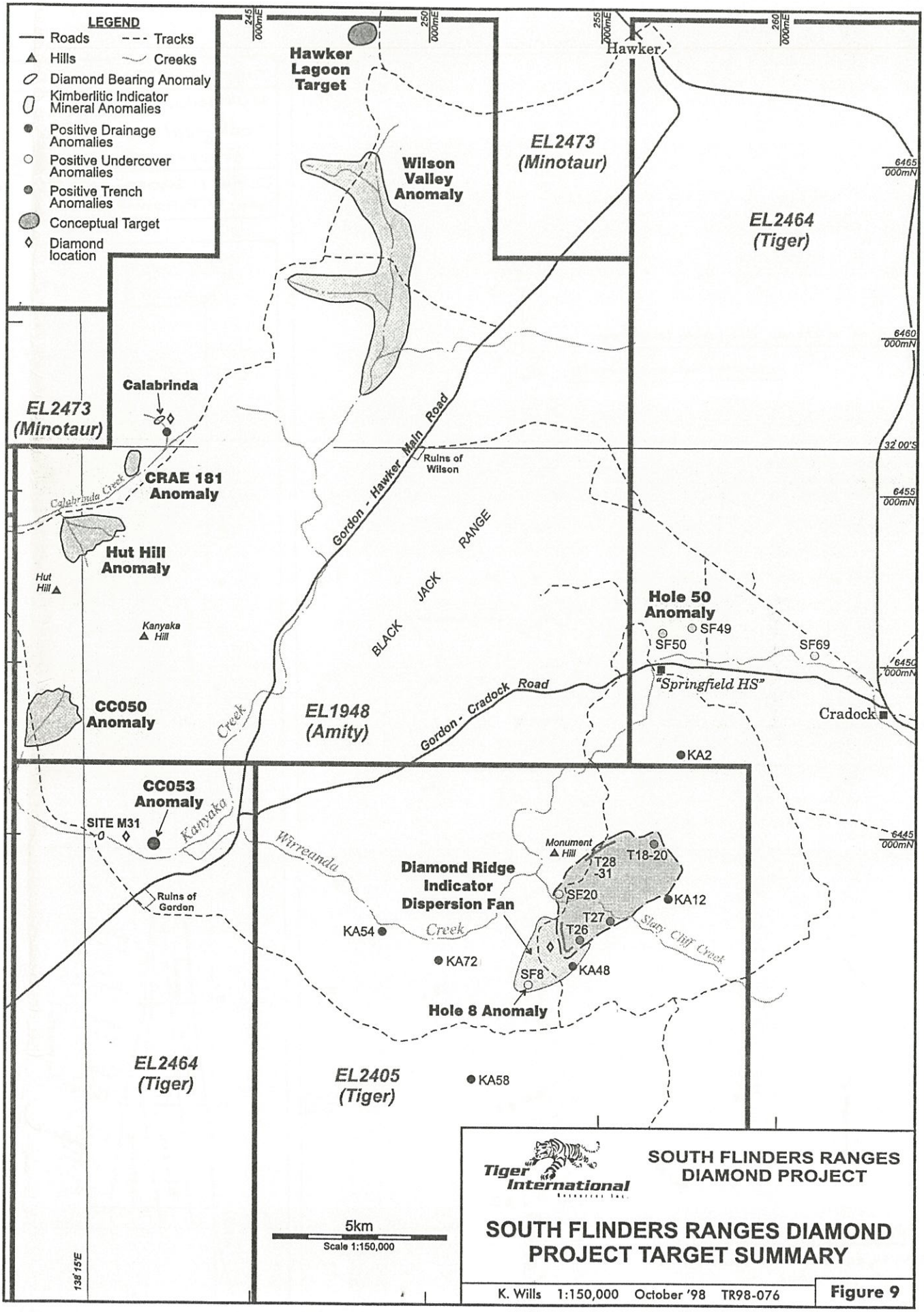
B. Anderson | Not to scale | October'98 | TR98-076 | Figure 3


Tracks
Diamond Ridge indicator dispersion fan
Bedrock at or near surface
Regolith cover
Permo-Triassic Basin
50 Drillhole with negative results
KBJ14 Magnetic Anomaly
21 Positive drillhole and number of indicator minerals >0.3mm
255000mE
260000mE
6450000mN
6445000mN
6440000mN
"Springfield HS"
Wirrenda Creek
HMS Plant Site
SPRINGFIELD BASIN
Diamond Ridge
Approx. scale 1:50,000
2 kilometres
SPRINGFIELD DIAMOND PROJECT
UNDERCOVER DRILLING RESULTS
Tiger International
K.Wills 1:50,000 August '98 TR98-076
Figure 4


Chromite
Pyrope
Picroilmenite
Chrome diopside
Phlogopite
VF Very fresh
F Fresh
FW Fresh worn
Prospective Kimberlite Corridors
Primary Paleocurrent direction (from trenches)
255000mE
NORTHERN PROSPECTIVE CORRIDOR TO 2 KM CHROME DIOPSIDE RICH SOURCE
NORTH WESTERN PROSPECTIVE CORRIDOR TO 5 KM PICROILMENITE RICH SOURCE
T30
5 ♦ F
1 ○ F
5 ● F
T31
1 ♦ FW
1 ♦ F
1 ●
T18
3 ♦ FW+F
4 ○ F
1 ● FW
3 △ FW
T19
3 ♦ FW
9 ○
1 ● FW
4 △ FW
T20
3 ● F
1 △ F
6445000mN
T29
20 ♦ F
45 ● F
T28
7 ♦ F
6 ● F
Neg
T32
1 ▭ F
T33
Not sampled
T34
PERMO-TRIASSIC SPRINGFIELD BASIN
Slaty Cliff Creek
T24
7 ♦ F
T23
Neg
T22
1 ♦ F
10 VF
6443000mN
30 ♦ VF
1 ○
T27
56 diamonds recovered in July 1998, abundant ♦ and ○
Diamond Ridge
100 ♦ VF-F
169 ○ VF-F
10% Knorringitic Pyrope
132 ♦ VF
1 ○ VF
T26
T25
0
500
1000
Metres
6441000mN
SOUTHERN PROSPECTIVE CORRIDOR TO 2 KM MULTIPLE PYROPE-RICH SOURCES
Tiger International
SPRINGFIELD DIAMOND PROJECT
SPRINGFIELD BASIN, PALAEOCURRENTS, TRENCHING AND INDICATOR MINERAL RESULTS
R. Russell 1:25,000 October '98 TR98-076
Figure 5


250000 mE
260000 mE
Negative to date
Positive results with number of indicator grains
Creeks
Tracks
Note: DR prefixes are Diamin Resources samples, 1996. KA prefixes all 1998 Tiger sample numbers.
6450000 mN
6440000 mN
Cradock
SPRINGFIELD BASIN
DR1
DR2
DR3
DR5
DR6
DR7
DR8
DR11
DR13
DR14
DR15
DR16
DR17
0 1 2 3
Kilometres
Tiger International
SPRINGFIELD DIAMOND PROJECT
DRAINAGE SAMPLE INDICATOR MINERAL RESULTS
B. Anderson 1:100,000 October '98 TR98-076
Figure 6


Tiger International
SOUTH FLINDERS RANGES DIAMOND PROJECT
CHEMISTRY OF SPRINGFIELD PROJECT
CHROMITE AND GARNET INDICATOR MINERALS
K. Wills October '98 TR98-076
%Cr2O3
%MgO
Calabrinda anomaly
Northern margin Springfield Basin
Wilson Valley anomaly
Diamond Ridge
CHROMITE (chrome spinels)
Diamond Ridge Conglomerate
Undercover drilling program with hole number anotation
Northern margin Springfield Basin
Calabrinda anomaly
Hut Hill anomaly
CC050 anomaly
Wilson Valley anomaly
Fresh Population
Worn Population
Figure 7
G10
G9
%Cr2O3
%CaO
PYROPE GARNETS
Diamond Ridge Conglomerate
Undercover drilling program
Northern margin Springfield Basin
Calabrinda anomaly
CC050 anomaly
Northern margin Springfield Basin
Diamond Ridge
Calabrinda anomaly
T007
CC050
Hole 50
Cr-Poor
Figure 8


LEGEND
Roads
Tracks
Hills
Creeks
Diamond Bearing Anomaly
Kimberlitic Indicator Mineral Anomalies
Positive Drainage Anomalies
Positive Undercover Anomalies
Positive Trench Anomalies
Conceptual Target
Diamond location
245 000mE
250 000mE
255 000mE
260 000mE
Hawker
Hawker Lagoon Target
Wilson Valley Anomaly
EL2473 (Minotaur)
EL2464 (Tiger)
6465 000mN
6460 000mN
6455 000mN
6450 000mN
6445 000mN
32°00'S
Calabrinda
EL2473 (Minotaur)
CRAE 181 Anomaly
Calabrinda Creek
Ruins of Wilson
Gordon - Hawker Main Road
Hut Hill Anomaly
Hut Hill
Kanyaka Hill
BLACK JACK RANGE
Hole 50 Anomaly
SF49
SF50
SF69
"Springfield HS"
Cradock
Gordon - Cradock Road
CC050 Anomaly
EL1948 (Amity)
Creek
KA2
CC053 Anomaly
SITE M31
Kanyaka Creek
Wirreandu Creek
Monument Hill
T28 -31
T18-20
Diamond Ridge Indicator Dispersion Fan
SF20
KA12
Ruins of Gordon
KA54
T27
T26
Slaty Cliff Creek
KA72
SF8
KA48
Hole 8 Anomaly
EL2464 (Tiger)
EL2405 (Tiger)
KA58
5km
Scale 1:150,000
138°15'E
Tiger International
SOUTH FLINDERS RANGES DIAMOND PROJECT
SOUTH FLINDERS RANGES DIAMOND PROJECT TARGET SUMMARY
K. Wills 1:150,000 October '98 TR98-076
Figure 9

TIGER INTERNATIONAL

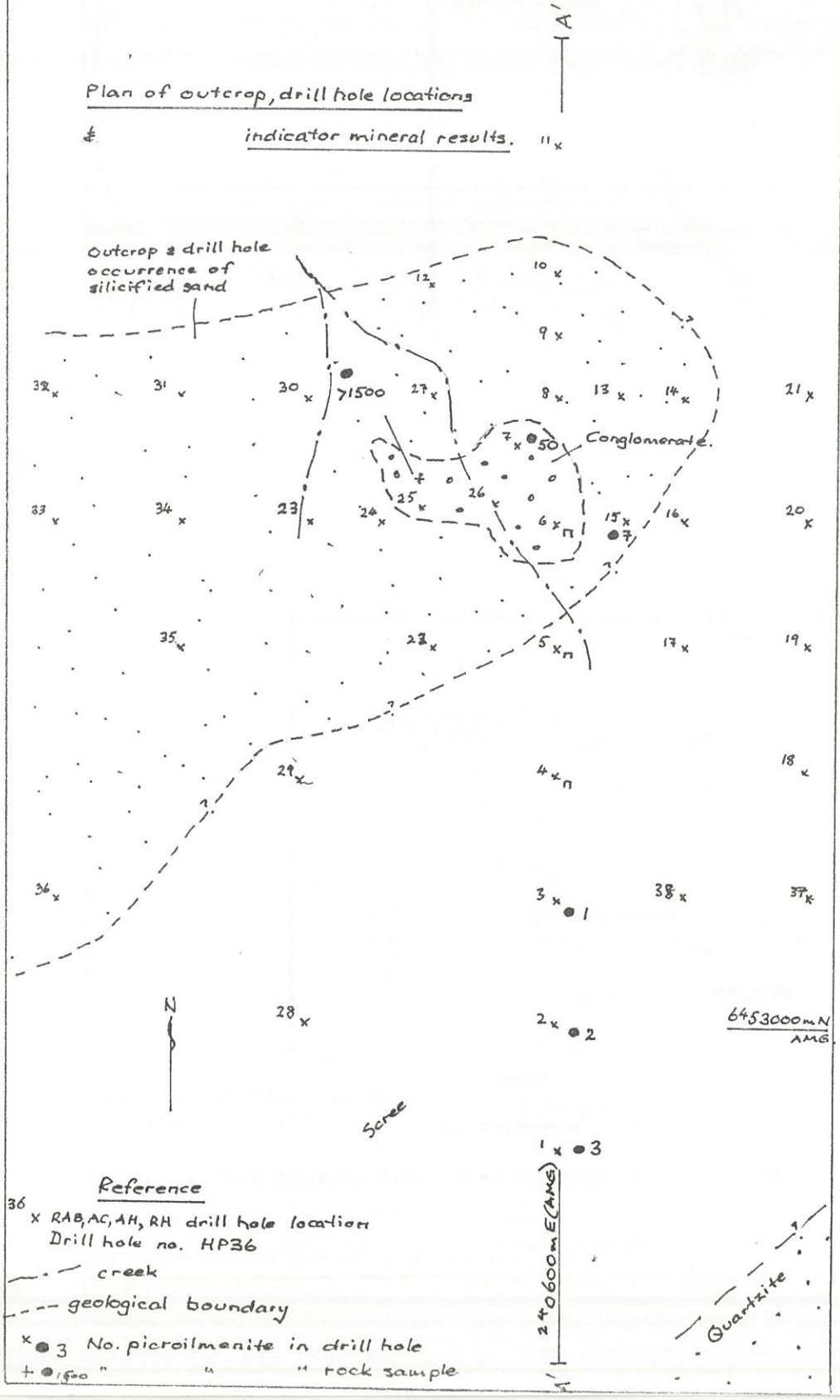
HUT HILL PROSPECT

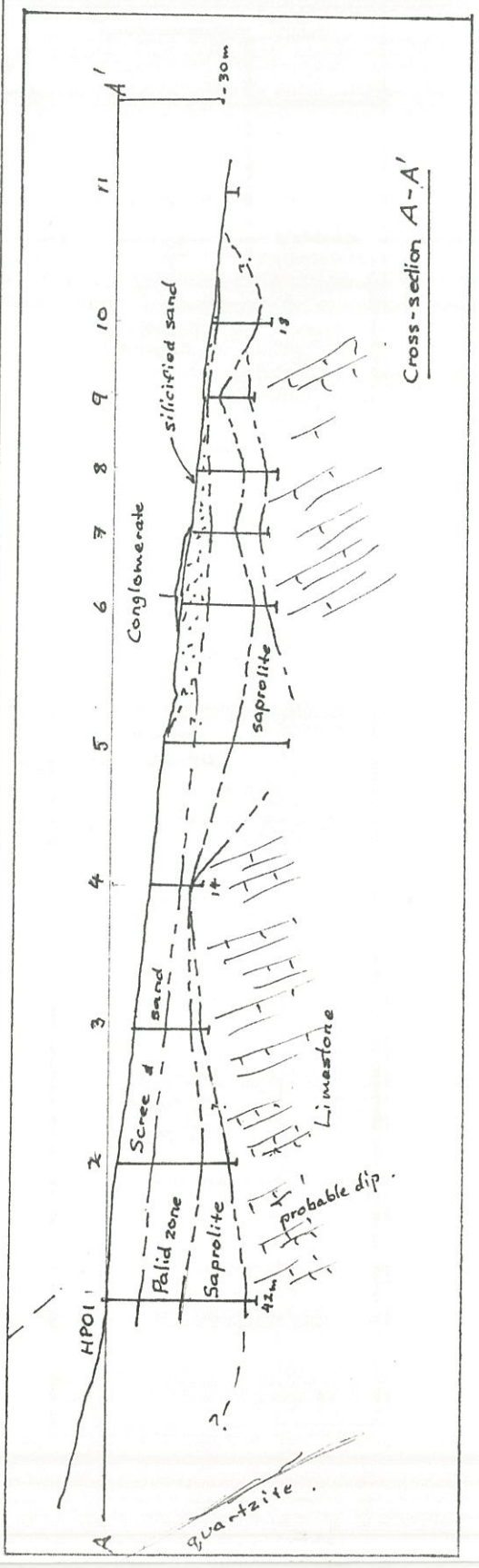
Geological plan & cross-section 12/2/99

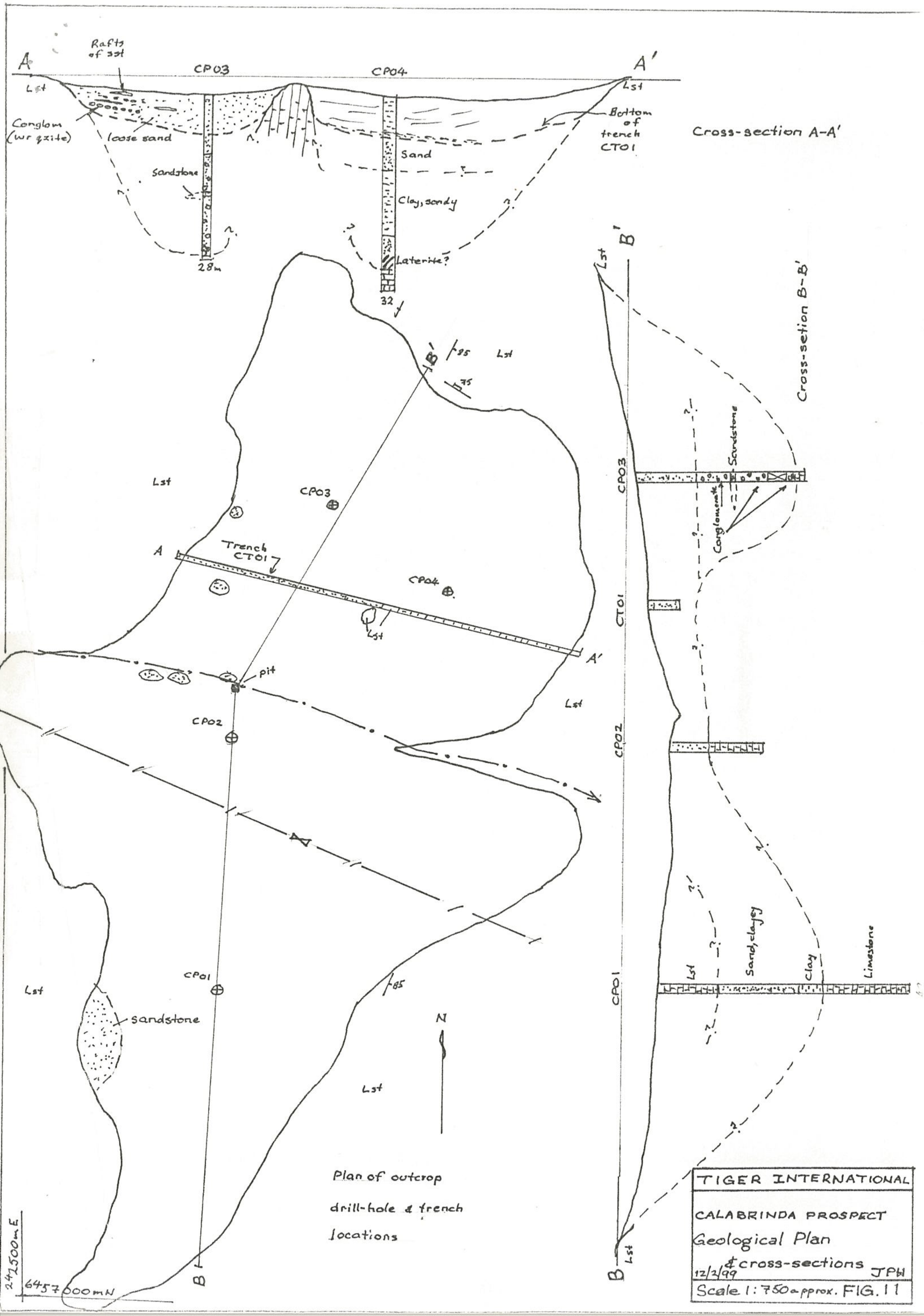
Scale 1: 20,000 FIG. 10

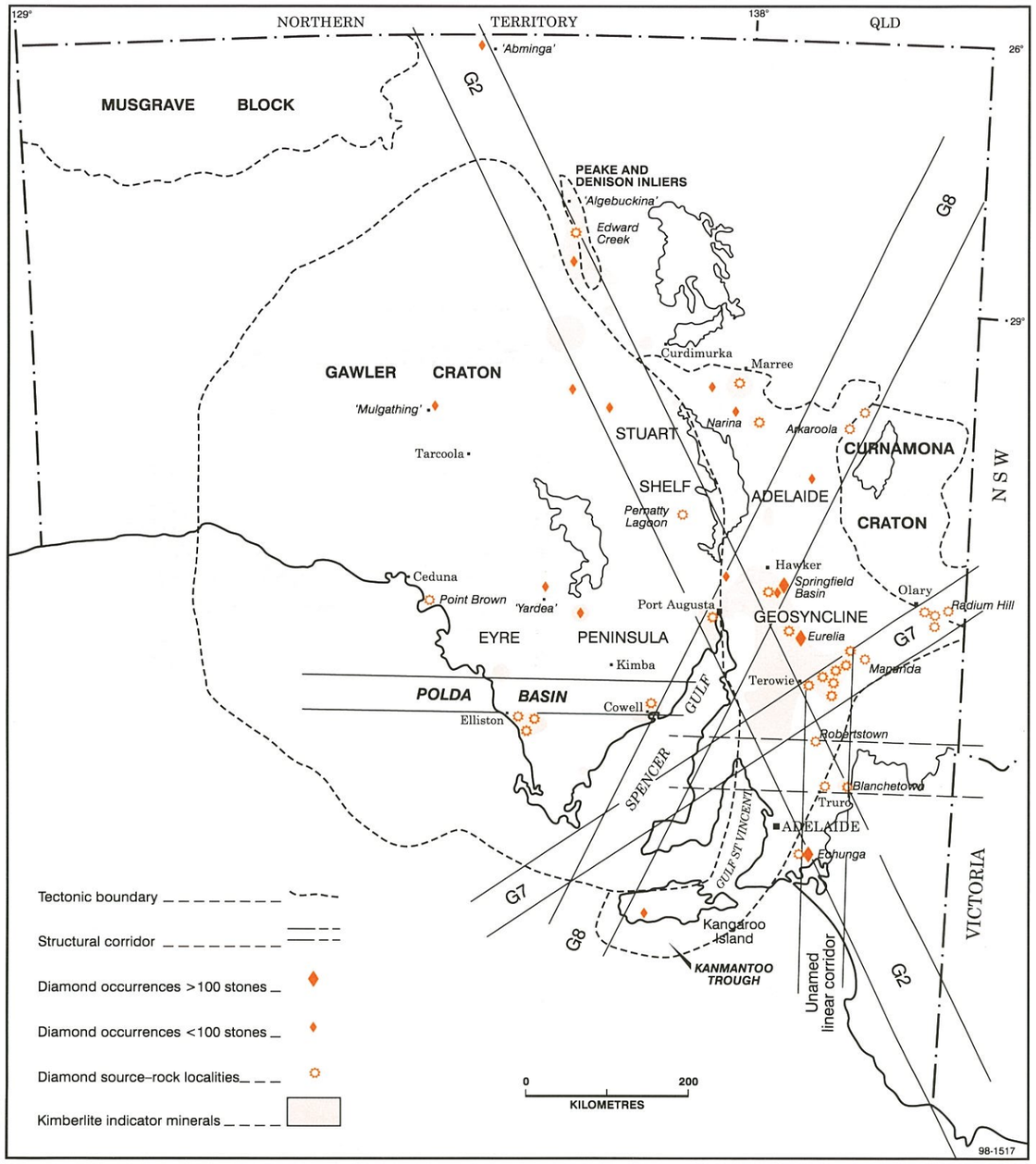
Geo: J. P. HOWARD

Plan of outcrop, drill hole locations & indicator mineral results.






Rafts of sst
CP03
CP04
Lst
Conglom (wr qzite)
loose sand
Bottom of trench CT01
Cross-section A-A'
Sand
Sandstone
Clay, sandy
Laterite?
28m
32
Cross-section B-B'
Lst
Sandstone
Conglomerate
CT01
CP02
CP01
Sand, clayey
Clay
Limestone
CP03
Trench CT01
CP04
pit
CP02
CP01
sandstone
Plan of outcrop drill-hole & trench locations
N
242500mE
6457000mN
TIGER INTERNATIONAL
CALABRINDA PROSPECT
Geological Plan & cross-sections
12/2/99
JPH
Scale 1:750 approx. FIG. 11



Diamond occurrences and tectonic setting in South Australia.

PRIMARY INDUSTRIES and RESOURCES SOUTH AUSTRALIA

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Earth Resources Information Sheet

G7

DIAMONDS IN SOUTH AUSTRALIA

South Australia hosts macrodiamonds, many of which are gem quality, microdiamonds and diamond indicator minerals, and has several favourable tectonic and geological settings:

- cratonic areas and adjacent mobile belts, the basic tectonic requirements for diamonds
- kimberlites and lamprophyres associated with cratonic fractures and lineaments
- diamonds associated with kimberlites at Eurelia and Abminga and diamonds in secondary placer deposits at Echunga and in the Springfield Basin.

Diamond occurrences

Three sites in SA have each recorded more than 100 diamonds:

- Diamonds were first found in SA at Echunga near Adelaide by gold panners in 1859, and reports of up to 200 diamonds including 50 saleable gems were recorded through to 1900. Since then only one has been found, a 0.9 ct stone in 1987.
- In the Springfield Basin, 128 diamonds and fragments were recovered in the mid 1980s from conglomerates of Permian age. In 1998, an additional 56 diamonds were recovered from renewed exploration trenching, the largest being 3.5 mm and weighing 0.34 carats. Garnet indicators with a kelyphytic rind suggest a close distance from the basin for the kimberlite source.
- At Eurelia, 140 microdiamonds have been found associated with kimberlite dykes and one pipe, this being the first area where diamonds have been retrieved from source rocks.

Localities of diamond finds and occurrences of lamprophyric rocks throughout the State are shown on the accompanying table and map.

Diamond source rocks

Lamprophyric (including kimberlitic) rocks are widespread in SA. Significant areas include:

- Eurelia — a swarm of *en echelon* Jurassic kimberlitic dykes up to 30 m wide and 1 km long extend over a distance of 20 km.
- Terowie–Manunda — five clusters of dykes and pipes occur in a 45x25 km zone.
- Eyre Peninsula — at least eight kimberlite pipes and dykes of probable Jurassic age have been defined by recent exploration, including an altered monticellite kimberlite pipe and dyke complex north of Cowell. Kimberlite occurrence is probably controlled by deep east–west trending fractures of the Polda Basin.
- Truro — work by PIRSA Mineral Assessment Branch has defined >20 lamproite dykes and a diatreme which are probably of Ordovician age.
- Radium Hill — several Ordovician phlogopitic lamprophyre dykes.
- Port Augusta — three micaceous kimberlite sills.
- Mulgathing, northwest of Tarcoola — numerous basic to ultrabasic mica-peridotite plugs and sills with kimberlitic affinities.

Exploration targets

The tectonic setting and wide range of diamond and lamprophyre occurrences suggest that much of the State is highly prospective. Specific targets include:

- Location of primary source rocks for significant secondary diamond occurrences at Echunga and in the Springfield Basin.
- Intensive investigation for diamond-bearing lamprophyre (kimberlite) occurrences in the newly defined Truro and Eyre Peninsula (Polda Basin) areas.
- Further intensive investigation of widespread kimberlitic indicator mineral occurrences in the Terowie–Hawker–Port Augusta region, and in Mesozoic sediments in the Far North.
- High-resolution aeromagnetic data flown by MESA in 1993 has led to the definition of discrete magnetic anomalies in the Abminga and Marree areas. The magnetic anomalies at Abminga are similar to those defined over the Ellendale diamond-bearing kimberlite pipes in the Kimberley region of Western Australia. A small macrodiamond (0.75 mm) and one microdiamond have been found in drill core from one of these many anomalies at Abminga.

PRIMARY INDUSTRIES AND RESOURCES SA

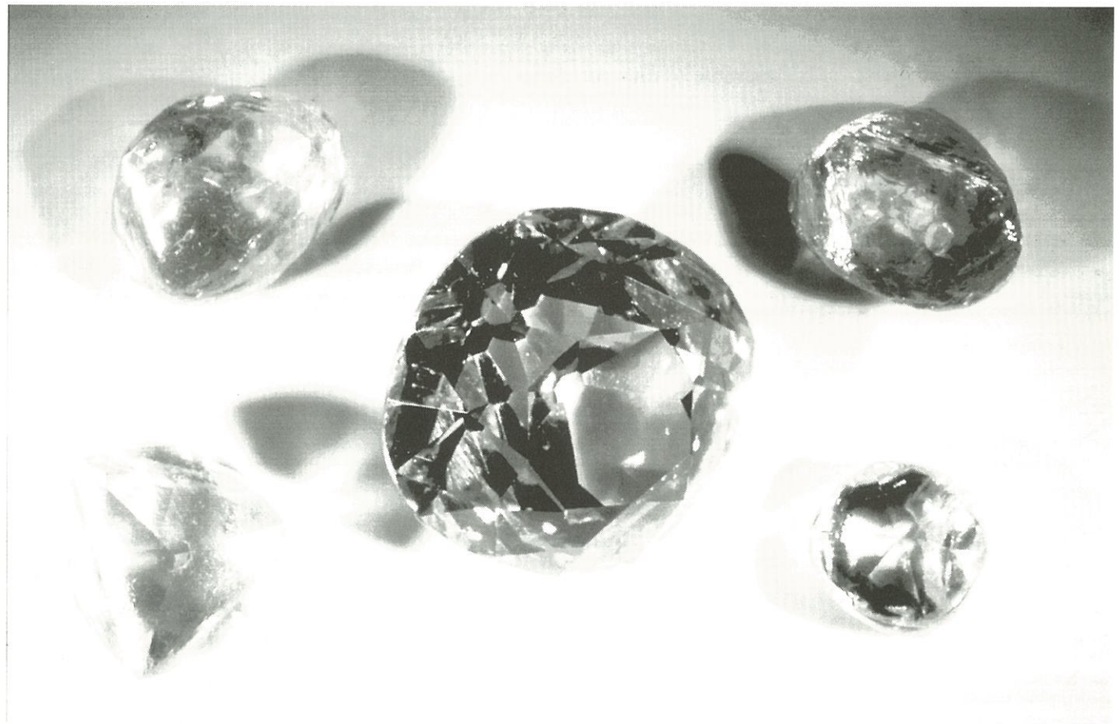
Issued December 1998

DIAMOND AND LAMPROPHYRE OCCURRENCES IN SOUTH AUSTRALIA

Area	Name	Lat. (dec. deg.)	Long. (dec. deg.)	No. of diamonds	Max. size (ct)	Map No.	Other data
Abminga	Abminga	26.7500	134.7500			5844	19 anomalies found (three chromites)
Abminga	Abminga	26.1500	134.7500	2		5844	2 small macrodiamonds from core of 1996 and 1997 drilling. Indicator minerals suggest lamproitic tuff.
Adelaide	Kapunda	34.3425	138.8953	1		6629	0.9 x 0.5 mm found in creek, east of Kapunda.
Algebuckina	Edwards Creek	28.4283	135.8628	8	0.38	6041	Eight yellow microdiamonds found in three samples; total weight 0.75 ct.
Algebuckina	Peake Creek	28.0417	135.8700	1	1	6041	Found by gold panners in alluvial gravels southwest of Mount Kingston.
Burra	Pine Creek	33.1893	139.2772	5	0.075	6731	Pine Creek, The Oaks, Macky's Dam, Oak Park and Double Dam all produced single diamonds, possibly from Pitcairn Ranges.
Burra	Whyte Yarcowie –Terowie	33.2500	139.0000			6631	Kimberlites resemble lamprophyres of Fitzroy Crossing, WA. Pine Creek, Calcutteroo, Mittopitta and Mungibbie. Several micro-diamonds found in stream and loam samples.
Copley	Narina Creek	30.9280	138.8390	1		6636	Found in Narina Creek, 12 km southwest of Mount Roebuck, Flinders Ranges. 0.5 x 0.4 mm.
Curdimurka	Tarlton Knob	29.7900	137.8900	3	0.0001	6438	A variety of kimberlite indicator minerals southwest of Marree. Suggests kimberlite but none found.
Echunga	Echunga	35.1000	138.8000	200	9	6667	Over 50 saleable diamonds and possibly up to 200 colourless to yellow and one red diamond.
Kangaroo Island	Karatta	35.9731	136.9864	3	0.0001	6426	Found near Karatta Homestead; none found on re-sampling.
Kimba	Elliston	33.6990	135.2991			5930	Two non-diamond bearing kimberlites.
Kimba	Mount Hope	33.7574	135.1910			5929	Two non-diamond bearing kimberlites.
Kimba	Sheoak	33.6661	135.0974			5930	Three non-diamond bearing kimberlites east of Elliston.
Kingoonya	Curdlawidny Lagoon	30.2067	136.3283	1	0.0074	6137	Small diamond and indicator minerals north of lagoon in creek drainage.
Kingoonya	Paisley Creek	30.0900	135.8570	1	0.0055	6037	Kimberlite indicators. Garnet, ilmenite.
Marree	Emu Hill	29.6908	139.3329	1		6738	Brown microdiamond, 0.325 x 0.25 mm and indicators.
Olary	Manunda Creek	32.7733	139.7210	1	0.0040	6832	One small diamond near Manunda Creek.
Olary	Radium Hill	32.4130	140.5120			7033	Ages of 431, 451, 455 and 472 Ma. Dyke is 17 km west of Radium Hill near Maldigo Bore.
Olary	Yunta	32.8458	139.5650	1	0.0001	6832	Thought to be related to diapirism. One microdiamond in gravel, 0.3 x 0.3 mm.
Orroroo	Bangor	32.9958	138.1602			6592	Lamproite diatreme in road cutting, others to the south.
Orroroo	Boolcunda	32.2425	138.2783	2	0.01	6533	Gravels of a river terrace north of the area. Probably derived from the Springfield Basin.
Orroroo	Eurelia	32.5000	138.5000	140	0.08	6632	Swarm of kimberlite dykes up to 30 m wide and 1 km long over 20 km length.
Orroroo	Kanyaka Creek	32.1033	138.2500	3	0.003	6533	0.375 x 0.3 mm. May have been derived from Eurelia or an extension of known kimberlites.
Orroroo	Springfield Basin	32.1225	138.3875	128		6533	Microdiamonds from basal conglomerate (Permian). SW margin.
Orroroo	Wirreanda Creek	?	?	1	0.0001	6533	Wirreanda and Willochra Creeks gravel sampling found two small diamonds (0.02 ct), probably from Springfield Basin.
Parachilna	Willochra	31.9867	138.1708	1		6534	One microdiamond (0.375 x 0.3 mm)
Parachilna	Calabrinda Creek	31.9933	138.2750	1	0.34	6534	Small macrodiamond (0.3 x 0.18 x 0.125 mm) in an oxidised polymict breccia.
Torrens	Pernatty Lagoon	30.2000	137.2500			6335	4 km north of Pernatty Lagoon in Gawler RangeVolcanics.
Pitcairn	Manunda Creek	32.9000	139.4750	30	0.0017	6732	30 splinters at three sites in catchment of Manunda Creek.
Port Augusta	El Alamein	33.5500	137.6667			6432	Three kimberlites, may be outliers from Eurelia. No diamonds.
Tarcoola	Lepa	30.1346	134.0915	1	0.0001	5737	Microdiamond found in stream sediment sample.

DIAMOND AND LAMPROPHYRE OCCURRENCES IN SOUTH AUSTRALIA

Area	Name	Lat. (dec. deg.)	Long. (dec. deg.)	No. of diamonds	Max. size (ct)	Map No.	Other data
Tarcoola	Muckanippie Ruins	30.1675	134.1017	1	0.2	5737	65 km north of Malbooma.
Truro	Blanchetown	34.2600	139.5980			6829	Kimberlitic breccia.
Truro-Frankton	Karinya Syncline	34.7500	139.3300			6729	K-Ar date of ~480 and 458 Ma on phlogopite.
Whyalla	Mount Desperate	33.6160	136.5333			6230	Monticellite kimberlite with olivine phenocrysts.
Yardea	East Well	32.4800	136.0960	1	0.001	5933	Microdiamond found in heavy-mineral trap.
Yardea	Walpuppy Dam	32.1808	135.6867	1		6033	Microdiamond 0.2 x 0.175 mm.



Echunga diamonds. Clockwise from top right (in carats): 0.84, 0.46, 1.00, 0.91. The faceted stone (centre) is 9 mm across and weighs 2.84 ct. (Photo 39282)

- With widespread onshore lamprophyre occurrences there is potential for placer deposits both onshore (including Kangaroo Island) and over large tracts of Gulf St Vincent and Spencer Gulf, which are to be investigated.
- Very large palaeodrainage systems in north-western SA should be investigated as potential hosts for alluvial diamonds.

PIRSA diamond study

A study of diamond and lamprophyre occurrences in SA, together with development of a digital database (currently operating) and a review of all past private sector diamond exploration, is continuing. A report on diamond and lamprophyre occurrences is now available and a review of company exploration and geochemistry of all lamprophyre occurrences is ongoing.

For further information on diamond exploration and occurrence in SA contact:

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  fax: (08) 8463 3031

CORE LIBRARY DISPLAY

DRILL HOLE DD92TR1

Drilled by CRAE (Rio-Tinto) in 1992 to a depth of 85.14m and angled at 060deg.
Located 7km east of Angaston.

Hole drilled into a magnetic anomaly and intersected a kimberlite diatreme about 300m by 50m in size.
Diatreme breccia intersected between 34.7m and 63.2m (34m – 60m interval on display) is a grey to green colour comprising subangular to subrounded mafic clasts often displaying reaction rims. Reddish pyrope crystals occur within eclogite clasts and as small rounded grains in the matrix. Eclogite clasts are rare but up to 7cm in size. Trace disseminated pyrite is common within diatreme matrix. Late stage calcite veining and alteration is widespread.

DRILL HOLE TS DD2

Drilled by Diamond Ventures in 1994 and located 2km south of Terowie.

Drilled into topographic, magnetic and gravity anomaly and intersected a kimberlite pipe.

On display;

50.42 – 50.93m	sandy kimberlite
51.51 – 54.96m	kimberlite breccia
59.60 – 60.02m	micaceous sandy kimberlite
72.87 – 76.72m	kimberlite
83.60 – 84.60m	kimberlite