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EL 131

DARKE PEAK

FINAL REPORT TO LICENCE SURRENDER FOR THE PERIOD 29/4/74 TO 16/10/74

Submitted by
Urangesellschaft Australia Pty Ltd
1974

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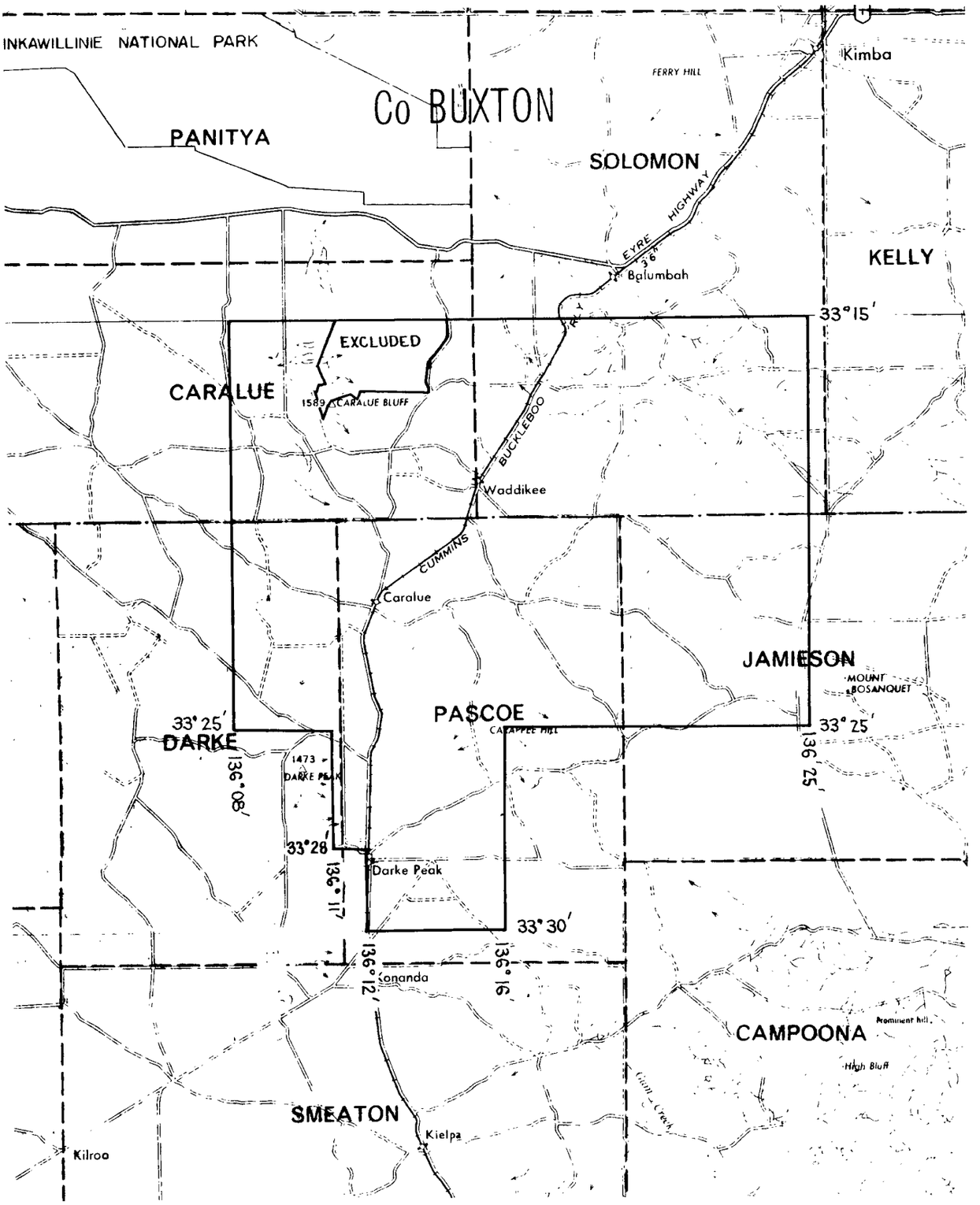
PRIMARY INDUSTRIES AND RESOURCES SA

CONTENTS ENVELOPE 2419.

TENEMENT: E.L. NO. 131. DARKE PEAK.
TENEMENT HOLDER: URANGESELLSCHAFT AUST. PTY. LTD.

SCHEDULE 'A'



URANGESELLSCHAFT AUSTRALIA P/L

DOCKET DM 1207/73 **AREA** 524 km²

1:250000 PLANS . KIMBA

LOCALITY DARKE PEAK - APPROX. 40 Km S-W OF KIMBA

E.L.No. 131 EXPIRY. **DATE**

URANGESELLSCHAFT
AUSTRALIA PTY. LTD.

608 ST. KILDA ROAD.
MELBOURNE, VICTORIA, 3004
AUSTRALIA
TELEPHONE: 51 1527/ 51 9310
TELEX: AA32138 MG MELB.

23. July 1974
HG/RW

The Director,
Department of Mines,
South Australia,
169 Rundle Street,
ADELAIDE, S.A. 5000.

Dear Sir,

Ref: Exploration Licence No. 131

Since the granting of the above exploration licence to Urangesellschaft Australia Pty. Ltd, on the 29.4. 1974 the company has carried out the following exploration programme in the area:

A.) Radiometric Survey

Regional radiometric surveys with the help of scintillometer were undertaken mostly in areas with no active farming and in areas with rock exposures.
Detailed radiometric survey, covering roughly 5 sq.km. in the North East corner of the licence area was also undertaken.

B.) Geochemical Sampling

A closely spaced geochemical sampling programme covering roughly 10.000sq.m. of the area in the North-East corner of the licence area was undertaken.
In addition a few rock samples for petrological studies etc.were also collected.

C.) Costeaning

Four costeans with a total excavation of 120m x 1m x 1m was undertaken in the North Eastern corner of the area. Geological details along with radiometric survey and chip sampling along the exposed bottom of the costeans was also carried out.

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D.) Percussion Drilling

A small percussion drilling programme, comprising 8 holes with a total drilling of roughly 300m was undertaken to test the tertiary sediments for possible Uranium mineralisation. Gamma, SP and resistivity logs for each hole were prepared and rock cuttings of 22 samples were analysed for Uranium content.

The final results of the above exploration pro - gramme are not encouraging and the company does not intend to explore any further in the area. The area is therefore surrendered to the Mines Department.

The final report, incorporating the details of the above exploration programme, is under preparation and a copy of the same will be forwarded to the Mines Department as soon as possible. The necessary drawings, analytical and petrological data, neces- sary financial statement and the duplicate samples of the drilling programme shall accompany the same.

Yours faithfully

Urangesellschaft Australia Pty. Ltd.

H. Graul.

URANGESELLSCHAFT AUSTRALIA PTY.LTD.

EXPLORATION LICENSE No.131

CARALUE PROJECT/ SA.

FINAL REPORT

AUGUST 1974

V.K.Thakur

Distribution:

Urangesellschaft MBH & Co.KG
Mines Department South Aust.
File

URANGESELLSCHAFT AUSTRALIA PTY. LTD.

EXPLORATION LICENCE No.131

CARALUE PROJECT / SA.

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SUMMARY

A small exploration programme including 8 percussion holes was carried out on E.L.131, Caralue Project South Australia, during the first half of 1974. The main purpose was to locate Uranium Mineralisation within the Tertiary sediments covering the Precambrian granitic rocks and to examine the airborne anomalies in granitic rocks, reported by Kerr McGee P/L.

The Precambrian granites of this area contain sporadically low grade Uranium mineralisation and the geological setting within the area of the Exploration Licence appears favou - rable for concentrations of Uranium within the Tertiary sediments.
However, the results of the present exploration programme was so discouraging, relinquishment of E.L.131 is recommended.

INTRODUCTION

The Exploration Licence No. 131, covering 542km^2 was granted to Urangesellschaft Australia Pty. Ltd., for a period of one year, starting from the 29th of April 1974. The licence covers exploration rights for all minerals, except gold. The present exploration efforts however, were mainly directed towards Uranium.

LOCATION AND ACCESS

The exploration licence is situated in the western part of the Eyre Peninsula SA, (See location Plan.), and is covered by the Kimba 1: 250,000 topographic sheet.
Access to the licence area is good by means of bitumen and well maintained dirt roads, as well as railway lines of which Darke Peak, Caralue, Waddikee and Bunora are the main sidings within the area.
The nearest town with good port and aerodrome facilities is Whyalla, which is roughly 150km east of the area. Landing strips are also located at the townships of Cleve and Kimba. They are within a 50km radius.

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PHYSIOGRAPHY

The area consists of low to moderate relief marked by wide spreadNW-SE trending sanddunes The dunes are well set now and normally covered by thick vegetation. Within the licence area, most of the dunes have been cleared of vegetation and developed into wheatfields.

Darke Peak,Caralue Bluff and Carapee Hill(Fig. 1) are the three main topographic features besides a few low granitic hills scattered over the area.
These three ranges are declared as water conservation re - serves and have been excluded from the exploration licence. One of them, the Carapee Hill is known for it's Uranium mineralisation at the surface and consequently was considered as one of the main exploration targets.

The Driver River System is the main drainage, which flows in a general S/Easterly direction.The ground water of the area is saline. Therefore, the collected rainwater and the recently laid pipeline are the main supplies of fresh water.

GENERAL GEOLOGY

The general geology is covered by Darke 1 mile(1: 63,360) geological map produced by the Department of Mines,South Australia and is reproduced in Fig 1.
The regional geological set-up is as follows:

Period	System	Formation	Lithology
Quarternary	Recent Pleistocene	Undifferentiated	Sand Dunes Aeolianite, Kunkar
Tertiary	Eocene	Undifferentiated	Clays,Sands, Lignite, Gravel
	Carpenta - rian	Corunna Conglome- rate	Sandstone, Conglomerate
----------	Kimban Orogeny	----------	
Proterozoic		Hutchison Group	Mica Schist, Amphibolite, Hematite Quarzite Dolomite,Gneiss Graphitic Rocks.
		Flinders Group	Gneiss,Quartzite, Dolomite,Schist, Amphibolite

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FLINDERS AND HUTCHISON GROUP

The Flinders and Hutchison Groups are metamorphosed sediments which have undergone different grades of metamorphism but are not very different in appearance when viewed in outcrops. In general the Flinders Group contain a high proportion of gneiss and granulites in contrast to the Hutchison Group, in which schists predominate.
Both contain also quartzite and dolomite. Graphitic shales in the Hutchison Group indicate a shelf-type depositional environment.

CORUNNA CONGLOMERATE

The Corunna Conglomerate consists of boulder and pebble beds, deposited on the folded Flinders and Hutchison beds. They range in thickness from 150m-2,400m and have not been metamorphosed and dip at low-moderate angles to the west.

TERTIARY SEDIMENTS

Tertiary sediments have been deposited in shallow basins and consist of horizontally bedded clay, sandstone, gravel, and lignite beds. Thickness varied from 30 m - 150 m.Pollen studies of the lignite beds show an Eocene flora, indicating a paralic depositional environment with interbedded marine and fresh water sediments.

QUARTERNARY SEDIMENTS

Quarternary sediments cover almost all of the Tertiary rocks and part of the Precambrian rocks. In the area under consideration, they consist of NW/SE trending sanddunes with thicknesses of up to 30 m.

PREVIOUS INVESTIGATION

Numerous exploration companies have operated in the area at various times. A brief summary of the work carried out by each of them,is given below.

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DEPARTMENT OF MINES, SOUTH AUSTRALIA

In the years 1953-1954, the Mines Department South Australia carried out a regional airborne radiometric survey of the eastern part of the Eyre Peninsula. A large number of anomalies were recorded in Pre- cambrian rocks and a few in younger sediments, mainly along the Driver and Dalton Rivers. Following ground inspection, none of these anomalies were found to be encouraging enough and no further work was carried out at that time.
During 1967 Phill Ensworth visited the region and noted it's similarity to the Rum Jungle Uranium province in the Northern Territory. He suggested a detailed study of the region.

KERR McGEE AUSTRALIA PTY. LTD.

In the year 1967, Kerr McGee Australia Pty. Ltd., based on the above recommendation, acquired 1,960 sq.miles of the area around Dark Peak Ranges. An aerial radiometric survey with improved instrumentation was undertaken, followed by detailed ground checks. A sample analysis from 27 of the airborne anomalies revealed low grade Thorium and Uranium mineralisation. Four of the most promising areas were core drilled, but failed to reveal economic grade mineralisation. It was found that most of the anomalies are associated with granitic or gneissic rocks. Some are associated with fault breccias or shear zones. However, none of these have any economic significance.
Furthermore, a number of strong anomalies were recorded over recent and Tertiary sediments along the Driver River. This led to an investigation of the Tertiary sediments by a drilling programme, encompassing 72 holes. The bore hole locations are shown on Fig.1.
General conclusions derived out of this drilling programme are summarised below:

> The upper section of Tertiary and Quarternary sediments, ranging in thickness from 15m-30m is oxidised. These sands are tan to brown. Below this section the sands are grey. In many of these holes, several thin lignite seams are intersected between the interval from 30m-50m.
> Marked increase in radioactivity is noted in numerous holes in this section. However, even at this increased level of intensity of radiation, the Uranium and Thorium content of sands carry no more than trace quantities. Two of the best holes were cored and the highest analytical value ob - tained was $0.029/U_3O_8$.

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The licence was finally surrendered with a note , that chances of encountering economic grade mineralisation are remote.

TAL RAY TRADING PTY. LTD.

Tal Ray Pty. Ltd. acquired the area in 1969, assuming that Uranium bearing spring water originates from a structurally controlled Uranium mineralisation at depths. A combined magnetometer and spectrometer survey was conducted. Two Uranium anomalies were detected over the lake at the head of the River Driver. It was assumed that both are of a common source which may be located near the N/W trending fault zone.

Radiometric assay up to 0.15% and 0.22% U_3O_8 were recorded by AMDEL. Check analysis on these samples by A.A.E.C. showed less than 50 ppm U, indicating radio-chemical disequilibrium between radium and it's parent elements.

MINES ADMINISTRATION

During late 1969 Mines Administration acquired three SML.s, covering 2,013 sq. miles of the area.Their exploration work consisted of ground water sampling,airborne scintillometer, survey and rotary drilling.
The results of water bore sampling were inconclusive.
A large number of water bores have been drilled, but most of the ground was proved to be saline and therefore unusable as they have been abøndoned and not accessable anymore.
Similarily the airborne scintillometer survey failed to record any anomalies, partly because of the thick sand cover in the area.
Reconnaissance rotary drilling(Fig. 1) indicated weak radioactivity in the following areas:

Rudall
Caralue Bluff

The Rudall area south - south-west of our EL 131 was drilled earlier by Kerr McGee and 10 additional holes were put down by Mines Administration. A thick Tertiary cover with highly pyritic lignites and sands were encountered. Poor radioactivity of the order of 8 - 15 ppm U was recorded, with a peak value of 0.15% U_3O_8 in one hole. The Caralue Bluff is situated west of EL 131, overlapping a little the latter area. Anomalous radiation was encountered in 5 holes. Drill cuttings from DP 24 and 30 assayed 52ppm U and 7 ppm Th respectively 12ppm U(Fig.1) The four holes (DP6,9,12, and DP13) located within our EL131 encountered modest anomalous radiactivity in a yellowish grey

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kaolinitic claystone. Assays from the drillcuttings indicated that gamma response is primarily due to Thorium mineralisation. One assay value in DP 9 was 28 ppm U and 227 ppm Th. Vergilra Geophysical Pty. Ltd. on behalf of the Mines Administration carried out a gravity survey to locate Tertiary paleo-channels. The exercise however failed to delineate such channels. Other geophysical methods were considered, but it was finally concluded that the problem seems to be one, that can only be resolved by closely spaced open hole drilling.

CENTRAL PACIFIC MINERALS N.L.

During 1971 Dr. W.E. Schindlmayr on behalf of CPM summarised the previous investigations in the Rudall area as follows:

1.)
Within the Tertiary sediments favourable host rocks for Uranium precipitation have been penetrated.

2.)
Uranium is presented in trace quantities in drill cores from these host rocks.

3.)

Uranium is present in trace quantities on the surface, immediately adjacent to springs or water seepages.

4.)
Radioactive anomalies along the River Driver, are caused by radium contained in thin mudlayers, which accummulated in many places on the stream bottom.

5.)
This radium is thought to indicate a surface mineralisation in the area, where the water seeps or springs up.

6.)
The chemical character of this course of radium is as yet undefined and could be Thorium or Uranium.

7.)
The source mineralisation is thought to be structurally controlled along the N/W trending fault zone.

8.)
A likelyhood of locating a commercial Uranium deposit is small but cannot be excluded.

A two stage drilling programme was proposed, but not carried out.

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During 1973 Dr. W.E.Schindlmayr on behalf of Urangesellschaft Australia Pty. Ltd.,paid a short visit to the Carappee Hill area. The purpose was to check,whether the granite rocks of these ranges contained rocks of "alaskitic" composition, to inspect contacts of granite to the country rock,to determine the grades,of metamorphism,to check the radiometric characters of each rock unit and to run sample profiles across the outcrop in order to determine the Uranium level of each rock type.
No rocks of "alaskitic" composition were recorded. However, some very sporadic weak secondary mineralisation of sub-economical value was found. It was suggested that the "hot"granites of the area could be a good source rock for Uranium,possibly concentrated in surrounding sediments. Therefore, a limited rotary drilling programme was recommended to test Cainozoic sediments overlying the basement.

PRESENT INVESTIGATIONS.

The main purpose of the present investigation was,to implement the proposed rotary drilling programme and to check the significance of the airborne anomaly reported by Kerr McGee in the N/E corner of the area, named"Bunora"anomaly.
The entire programme was carried out in 2 phases.Phase 1 included detailed literature study and logging of some cuttings of holes previously drilled within the licence area.During the phase 2 the entire field area was investigated, followed by a detailed evaluation of the Bunora anomaly, culminating in the drilling of 8 rotary holes in the area.
Two types of radioactive mineralisation has been reported from the area.

(a) Mineralisation associated with Precambrian granites.
(b) Mineralisation associated with pyritic lignite layers in Tertiary sediments,overlying Precambrian granites.

MINERALISATION IN GRANITES

The airborne anomalies reported by Kerr McGee on Carappee Hill and near the Bunora railway siding, fall into this category.

CARAPPEE HILL ANOMALY

The anomaly covers the top of the Carappee Hill and is caused by sporadic occurrence of secondary uranium mineral,identified as Boltwoodite.

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It occurs as a greenish yellow mineral coating joint-and fracture planes in a heavily sheared pre-cambrian granite, (Description see App:-2) The primary source of the mini-ralisation is not known.

BUNORA ANOMALY

The Bunora Anomaly is located on a low granitic outcrop,4 km S/SE of the Bunora railway siding and about 300m west of the Cleve-Kimba road (Fig.1).The following field work was carried out on this anomaly.

(a) Radiometric Survey

In order to relocate this anomaly on the ground, a regional radiometric survey was carried out at a regular spacing of 100m with the help of a scintillometer. An area of 20 sq.Km,cove-ring the entire granitic outcrop was checked in this way, however, no other anomaly than the Bunora could be located. The Bunora anomaly(Fig.2) occurs in a highly weathered gra - nitic rock with radiometric values up to 4 x background,which normally counts 60cps. But no visible mineralisation is re-corded.

(b) Geochemical Sampling

In order to carry out a systematical sampling programme, a 10 x 10m grid was laid over the Bunora anomaly. The 100 m long baseline of this grid, was orientated along the N/S direction (Fig.2) which conforms to the shape of the anomaly and the general striking of the area.
A total of 76 soil samples were taken at 10m intervals and 16 of these assayed for Uranium and Thorium. The assay results plotted on (Fig.3) suggest a Thorium source for the anomaly.

(c) Costeaning and Bedrock sampling

To confirm the results and the nature of mineralisation in the bedrock towards depth, four costeans with approximate dimensions of 30m x 1m x 1m were dug(Fig.3).Initially an attempt was made to excavate through the top weathered section of the bedrock, but it was soon realised that the zone of weathering extends very deep and was beyond the capacity of the "Halco" machine, hired for the job. No further attempts were made to dig any deeper. The costeans were surveyed with tape and compass and a plan profile for each of them prepared(Fig.6).Radiometric readings were recorded at 2m intervals along the exposed bottom and the surface. A few spot readings on the wall were also taken while mapping the costeans at a scale 1:100. The exposed rock is a weathered granite with some variations of grainsize in different patches.Few aplitic and pegmatitic veins were observed.

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Chip samples, each of these representing 1 m interval, were collected along the exposed bottom of the costeans.
These 43 samples, representing the higher anomalous zone, were assayed for Uranium and Thorium. The assay results revealed Thorium as the same radiation source known from the soil samples and Monazite as main Thorium mineral could be detected by AMDEL in one of the bedrock samples (Appendix 1)
Consequently, no further work was warranted on this anomaly.

MINERALISATION IN TERTIARY SEDIMENTS

According to the regional gravity map of Kimba (1: 250.000) our licence area is situated just north and east of two tertiary basins, namely Rudall respectively Caralue. As previously mentioned, the tertiary sediments within these basins surrounded by " hot" granites, contain pyrite bearing lignites, suitable for precipitation of sedimentary Uranium.
However, the evaluation of data of bore hole previously drilled in parts of our licence area indicated:

(a) Only a thin Tertiary cover
(b) No lignites or pyrite bearing horizons
(c) No radiometric response above background.

Although not very encouraging, the above information could not be considered conclusive for various reasons. The bore holes are widely spaced and no drilling has been conducted west of Carapee Hill. Because the gravity map represents only a generalised picture , minor palaeo - channels or sub-basins not shown on this map, may be present thus giving a suitable target for further exploration.
In this light a restricted rotary drilling programme was planned starting initially in the western part of the exploration area and later offsetting one or two of the most favourable older holes within it's eastern part.

GROUND WATER SAMPLING

Before conducting the above drilling, it was tried to collect ground water information, by sampling available water bores. Simultaneously a gamma ray mini-logger was used, in order to check the radiometric characteristics of those bores, but the attempts were futile. Unfortunately although a lot of water bores have been drilled in the area, none has encountered fresh water and have therefore been abandoned and are not accessable any more.
Therefore only four water samples could be collected from the area and additional five from adjacent areas. For assay results of these refer to drawing (Fig. 1). The data is insufficient to make any conclusions.

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ROTARY DRILLING

A total of 8 rotary holes or 296m were drilled, 6 of these in the area west and N/W of Carapee Hill and 2 N/E of Carapee Hill. All the holes were logged for gamma, resistivity and self potential. Representative samples from each 1.5m run were collected, and lithologically described.

A total of 22 samples of the favourable horizon were taken from the holes and assayed for Uranium and Thorium. The holes are numbered as UCA 1 to UCA 8 and marked on Fig.1 Logging details and assay data are plotted on Fig.4 According to the data, the Quaternary and Tertiary sandy facies are not very well developed in the area drilled. Pyrite bearing lignite horizons were not found and the radioactivity is extremely low. A typical cross section as recorded from these holes consists of tan to brown sand up to 10m, underlain by a grey clay up to 40m thick. Around this depth weathered granite is penetrated, gradually underlain by fresh granites. According to this the Tertiary sediments were laid down on an undulating Pre-cambrian topography as indicated by the rapid change in thickness in hole No.UCA4, 5 and 6, which reached the basement already at depth of 12 - 15m.

CONCLUSIONS AND RECOMMENDATIONS

The exploration programme carried out within EL 131 revealed that none of the targets explored i.e. Tertiary sediments and Pre-cambrian granites have any Uranium mineralisation of economic significance. It is therefore recommended, to apply for an early relinquishment of EL 131.

LITERATURE REFERENCES

1.) Maulton G.F. (1969) Final report of exploration on SML's 158 and 163, Kerr McGee Australia Pty. Ltd.

2.) Woyzbun P. (1970) Report of the interpretation of the geophysical investigations of SML 322 on behalf of Tal-Ray Trading Pty. Ltd.

3.) Schindlmayr W.E. (1971) Preliminary report on SML 626 in the Rudall area SA. on behalf of Central Pacific Minerals, N.L.

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4.) Brunt D. (1972) Review of exploration in the Caralue Bluff area, Eyre Peninsula, S.A. on behalf of Mines Administration Pty. Ltd.

5.) Schindlmayr (1973) Special reconnaissance trip to Carappee Hill SA. on behalf of Urangesellschaft Australia. Pty. Ltd.

URANGESELLSCHAFT AUSTRALIA PTY. LTD.

Exploration Licence No. 131

Exploration Expenditures.

Salaries:	$ 8.398.44
General Field Costs:	$ 3.634.40
Drilling Costs:	$ 2.108.00
Logging Costs:	$ 1.758.95
Trenching Costs:	$ 277.00
Chemical Analysis:	$ 403.55
Administration:	$ 2.605.05
Total:	$ 19.185.39

IDENTIFICATION OF BOLTWOODITE AND PETROGRAPHIC DESCRIPTION OF A SHEARED GRANITE

Sample: CAR 16:

Mineral:
The yellow mineral occurring as a powdery coating on the rock fragments included in this sample was identified by X-ray diffraction as boltwoodite, $K_2(UO_2)_2(SiO_3)_2.5H_2O$.

Sample: CAR 9: TS 31529:

Rock Name:
Sheared granite

Hand Specimen:
The hand specimen is of granitic appearance and has a grain size between 1 and 5 mm. Recognisable minerals include quartz, feldspar and biotite. There are a number of shears in the hand specimen and these are lined with iron oxides/hydroxides.

Thin Section:
This is a sheared granitic rock composed principally of quartz, plagioclase, potash feldspar, muscovite and degraded biotite (chlorite).

The quartz occurs as xenoblastic grains which typically display pronounced undulose (strain) extinction. Quartz also occurs in vermicular intergrowths with both plagioclase and potash feldspar.

Plagioclase occurs as equant crystals which are typically polysynthetically twinned except for a narrow marginal rim that is untwinned. The plagioclase crystals are all moderately altered and fine inclusions of sericite and ?epidote can be identified.

Potash feldspar (microcline) occurs as large, irregularly-shaped crystals up to 5 mm across. The crystals of microcline are poikiloblastic and contain inclusions of plagioclase, quartz and muscovite.

Both muscovite and degraded biotite are present as subidioblastic flakes. The degraded biotite is now chlorite and is a green colour, usually marginally altered to iron oxides/hydroxides; zircon crystals occurring as inclusions in the chlorite have small, insignificant haloes about them.

Adjacent to the shears the constituent minerals, especially quartz, are comminuted, and the rock has a schistose texture. The shear planes are lined with muscovite and iron oxides/hydroxides and small patches of green chlorite are typically situated nearby.

Rare grains of a mineral thought to be apatite are present in the rock.

This rock is a granite which has been sheared and slightly altered.

DESCRIPTION OF METAMORPHIC AND IGNEOUS ROCKS

SUMMARY OF SPECIMENS

Sample and TS number

DP-17 TS 32084 — Weathered, siliceous gneiss now composed of quartz and clay with traces of remnant mica, a few well rounded zircon and a few grains of monazite (?). It was probably a sandstone but alteration has obliterated most of the evidence.

DP-19 TS 32085 — Aplite or leucocratic, microgranite composed predominantly of quartz and microcline with minor plagioclase and traces of mica.

DP-23 TS 32086 — Gneissic granite in which a weak foliation is defined by parallel elongate aggregates of biotite and some elongate aggregates of quartz. It is an intrusive acid igneous rock which has been subjected to tectonic stress.

Sample DP-17 TS 32084

Rock Name:

Weathered siliceous gneiss, probably a metasediment.

Hand Specimen:

A weathered and altered, coarse grained gneissic rock now composed of quartz and white clay. It is cut by a vein 4 - 5 mm thick now also composed of white clay.

Thin Section:

An optical estimate of the constituents gives the following:

	%
quartz	70 - 75
clay (kaolin and opal(?))	23 - 30
leucoxene	trace
muscovite	trace
zircon	trace
sillimanite?	minute trace
monazite ?	trace
rutile	minute trace

This is a coarse grained metamorphic rock which has been extensively weathered.

It is composed predominantly of an irregular intergrowth of quartz grains 0.5 - 4 mm in size which have been extensively fractured relatively recently and the fractures are now filled with clay. The presence of a few larger (several mm) areas of clay without quartz fragments suggests that the quartz was intergrown with silicate minerals which have been completely altered. The presence of some former biotite is suggested by relict textures outlined by accumulations of very fine grained, leucoxenic material in some of the areas of clay. Smaller (0.5 - 1 mm) zones of clay in some interstices between quartz grains contain a few small remnants of muscovite, scattered traces of opaque oxide and leucoxene, numerous small (to 0.1 mm) grains of zircon and a few grains of monazite (?). Some zircon (and monazite (?)) grains appear very well rounded and they are concentrated along one zone in the rock. Some monazite (?) grains are irregular in shape.

The interstitial clay shows numerous curved concentric markings and possibly it has corroded and partly replaced some quartz. The curved markings may be a result of movement caused by alternate shrinking and swelling of the clay and this could have caused the extensive fracturing and splintering of the edges and corners of the quartz grains. Probably much of the clay now contains some opaline silica which gives it a turbid appearance due to differences in refractive index.

This is a very weathered, probably high grade metamorphic rock. The high proportion of quartz and the presence of apparently very well rounded zircon grains both suggest a metasediment, probably originally a sandstone but, because of the extensive alteration this suggestion is tentative.

Sample DP-19 TS 32085

Rock Name:

Aplite or leucocratic, microgranite

Hand Specimen:

A pale orange, medium grained rock composed of quartz and feldspar and stained by iron oxide. There are a few weathered grains now mainly leached voids and clay.

Thin Section:

An optical estimate of the constituents gives the following:

	%
quartz	35 - 40
microcline	55 - 60
plagioclase (oligoclase)	3 - 5
weathered mica (biotite?)	trace
muscovite	trace
completely weathered mineral	1 - 2

Quartz and feldspar grains vary in size generally between 0.3 and 2 mm and they are intergrown with curved to irregular grain boundaries. Some quartz occurs as globular grains 0.1 - 0.2 mm in size included within grains of potash feldspar and a few small (0.3 - 0.4 mm) plagioclase grains are also included in some potash feldspar.

A few small flakes of muscovite and weathered biotite (?) occur in interstices and also within some potash/feldspar grains and one flake of fresh biotite was found included in feldspar. There are very few traces of myrmekitic intergrowth of quartz and plagioclase.

The weathered mineral has been replaced by a porous mass of brown-stained clay and does not show sufficient textural evidence to suggest its identity with any degree of certainty. It occurred as grains up to 4 mm in size and probably had some cleavage planes.

This is an acid igneous rock. In composition and grain size it is similar to aplite but its general texture shows more similarity to a micro-granite. The most suitable name will probably depend on its field occurence - if it is a vein or dyke rock, it would be classified as aplite.

There is no evidence to suggest recrystallization. Most of the quartz grains show strain extinction between crossed nicols - a sign of tectonic stress - but this has been insufficient to cause recrystallization.

Sample DP 23 TS 32086

Rock Name:

Gneissic, granite

Hand Specimen:

A moderately coarse grained, gneissic rock with a granitic composition. It contains a few large feldspar grains up to 2 cm in size which may have been phenocrysts.

Thin Section:

An optical estimate of the constituents gives the following:

	%
quartz	25 - 30
microcline and orthoclase	60 - 65
plagioclase (oligoclase)	3 - 5
biotite (partly chloritized)	5 - 10
muscovite	trace
zircon	trace
opaque oxide	minute trace

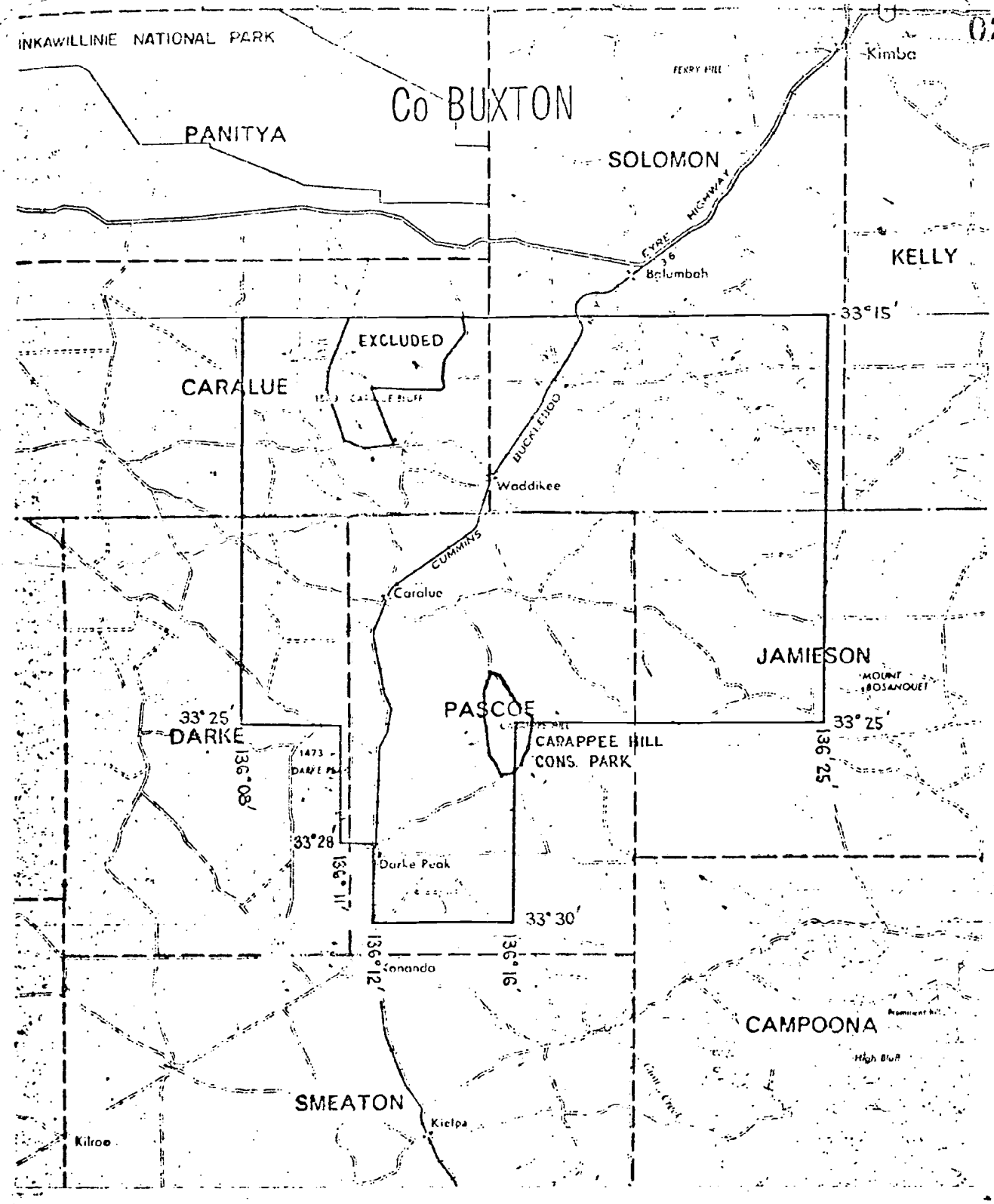
Elongate and irregular aggregates of quartz up to 4 mm are intergrown with finer grained (0.2 - 0.6 mm) zones in which microcline and quartz are intergrown with biotite and a few grains of plagioclase. There are some elongate aggregates of biotite up to 1 cm long which are subparallel to the general direction of weak foliation as defined by the elongate quartz aggregates. A few grains of zircon are associated with some of the biotite

There are a few large potash feldspar grains some over 1 cm in size which have irregular boundaries and contain numerous inclusions of plagioclase, and biotite and a few of quartz. The presence of so many inclusions suggests that these potash feldspar grains probably continued to grow late in the history of this rock and the general appearance suggests that finer grained material was engulfed during this process. The large potash feldspar grains are perthitic and show patchy or incipient cross hatch twinning typical of microcline in zones of strain adjacent to some inclusions.

Some plagioclase shows partial alteration to sericite and a few flakes of biotite have been replaced by chlorite. Some biotite shows evidence of reaction along grain boundaries which appear corroded and also have an accumulation of fine grained, secondary iron-oxide. A little muscovite is associated with some partly altered biotite.

A few plagioclase grains show or grade into myrmekitic intergrowths with quartz.

This is an intrusive acid igneous rock which has been subjected to some form of tectonic stress. This may have occurred during the final stages of crystallization or may have been a separate event.

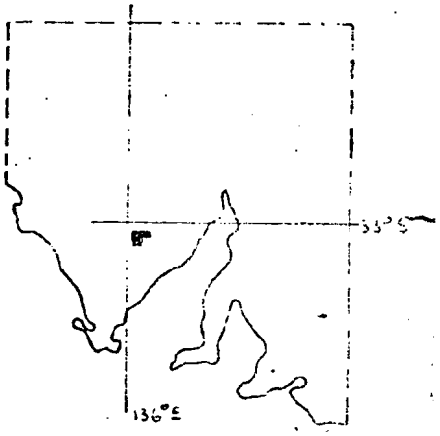


SCALE 1:250000

0 5 10 KILOMETRES

0 5 MILES

Lageplan der EL 131



LOCALITY MAP

URANGESELLSCHAFT AUSTRALIA P/L

DOCKET DM 1207/73 AREA 524 km²

1:250000 PLANS . KIMBA

LOCALITY DARKE PEAK - APPROX. 40 Km. S-W OF KIMBA

E.L. No. EXPIRY DATE

CARALUE BECKEN

RUDALL BECKEN

CARALUE BLUFF

Kimba

Darke

Darke Peak

Rudall

Belmont

Bahumbah

Ed. 131

30

20

10

0

DP18 DP22 DP21 DP20 DP19 DP17 DP23 DP23A DP16 DP15 DP14 DP31 DP32 DP30 DP29 DP28 DP27 DP26 DP25 DP24 DP13 DP12 DP9 DP8 DP7 DP6

D9 D8 D10 D7 D6 D11 D5 D4 D3 D12 D2 D1

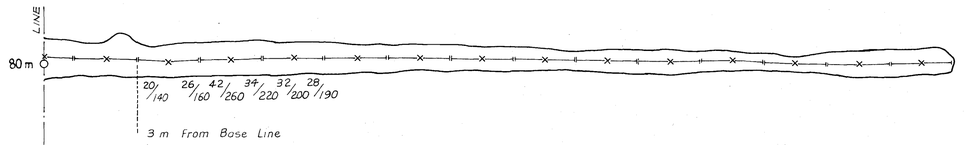
(R31) (R29) (R30) (R28) (R27) (R21) (R22) (R23) (R25) (R26) (R24) (R20) (R12) (R11) (R10) (R9) (R19) (R8) (R13) (R18) (R15) (R7) (R14) (R16) (R4) (R5) (R6) (R3) (R2) (R1)

ENV2419-1

CA-7

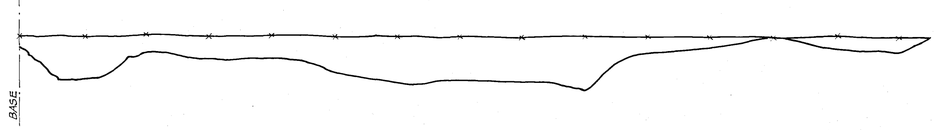
COSTEAN Nº 1

BB.	130	190	280	300	230	160	120	130	140	130	110	100	80	70	75	BB.
k+u+th	150	170	90	130	90	60	45	50	55	50	40	40	35	35	35	k+u+th
u+th	35	50	65	100	60	40	35	35	40	35	30	30	25	20	22	u+th
th	8	12	13	22	16	10	6	8	7	6	5	6	5	5	5	th



Plan

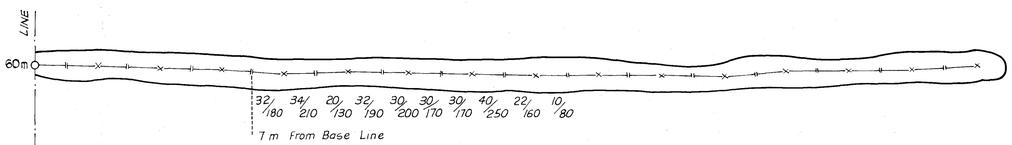
100	100	130	200	210	170	110	110	100	90	115	130	180	180	110
40	40	45	65	65	55	35	35	35	30	40	45	55	55	30
30	30	35	50	50	40	25	25	25	25	23	35	45	45	25
5	5	7	13	10	25	7	5	5	5	4	8	10	9	7



Profile North Wall

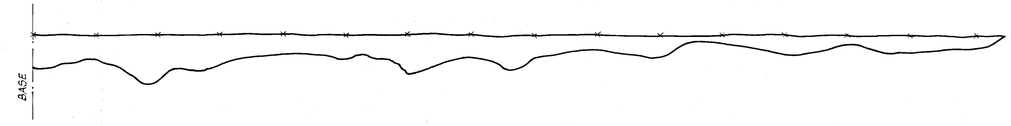
COSTEAN Nº 3

170	240	220	270	230	270	400	300	220	140	150	130	110	100	130	130	
55	75	70	110	100	85	140	100	75	45	50	45	40	35	42	42	
35	55	50	80	75	65	125	80	55	35	35	30	30	25	28	32	
7	10	10	18	17	15	24	17	13	7	8	7	7	5	5	5	

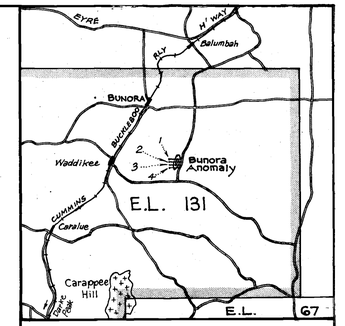


Plan

115	140	160	150	250	240	230	200	210	160	150	130	120	100	100	110	
30	40	45	45	70	70	65	60	65	50	45	40	40	30	30	40	
22	30	30	35	50	50	50	45	50	35	35	28	25	22	22	23	
4	6	8	8	12	12	13	12	13	10	8	7	7	5	5	6	



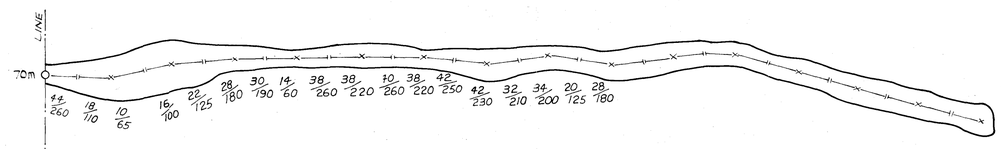
Profile North Wall



LOCALITY PLAN
Scale : 1 : 250,000

COSTEAN Nº 2

620	350	550	520	500	650	500	500	400	400	300	350	340	300	290	150
150	100	150	150	150	180	170	160	130	130	120	120	120	110	100	60
100	70	100	110	100	140	120	110	90	90	80	90	80	80	80	40
30	20	25	25	25	40	35	25	25	20	20	20	20	20	18	10



Plan

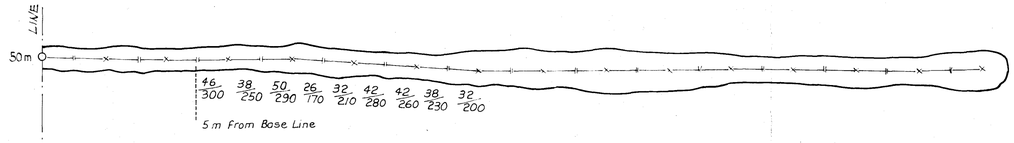
100	110	150	170	200	250	250	210	180	170	210	180	160	190	150	100	
30	35	55	55	60	80	100	60	60	65	70	60	55	60	50	40	
24	26	35	40	45	60	65	50	45	44	58	40	40	45	40	25	
8	8	10	8	12	18	20	10	10	10	13	13	12	12	9	7	

140	140	180	
75	60	80	
50	45	40	
10	10	10	

Profile North Wall

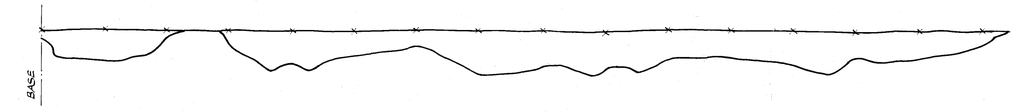
COSTEAN Nº 4

120	130	280	340	450	300	300	300	130	120	100	100	110	100	90	70	
45	50	110	140	175	130	125	130	45	45	38	35	45	40	36	28	
35	30	80	100	120	100	90	100	35	35	30	25	38	30	25	20	
8	8	20	25	30	25	24	25	7	8	5	6	5	5	6	4	



Plan

70	80	140	170	220	180	170	130	80	80	70	56	55	50	45	35	
40	45	55	80	80	84	80	65	45	45	40	35	30	30	30	28	
30	32	45	55	60	62	55	45	32	35	26	28	20	20	23	20	
7	7	12	16	18	20	16	15	9	10	7	6	6	5	5	4	



Profile North Wall

300	BB.	Total count
120	k+u+th	potassium + uranium + thorium reading
80	u+th	uranium + thorium reading
20	th	thorium reading
×		
×——		Chip sample interval (1 metre long)
216/300 - 4/15		ppm Values U/Th

NOTES :

1.) Instrument used : Gamma Ray Spectrometer Scintrex model G.I.S 3 supplied by Austral

2.) Every sample represents one entire metre

3.) For position of costeans see plan CA-2

4.) Background – BB. : 65
k+u+th : 25
u+th : 15
th : 4

1 0 1 2 3 4 5 6 METRES

URANGESELLSCHAFT AUSTRALIA PTY. LTD.

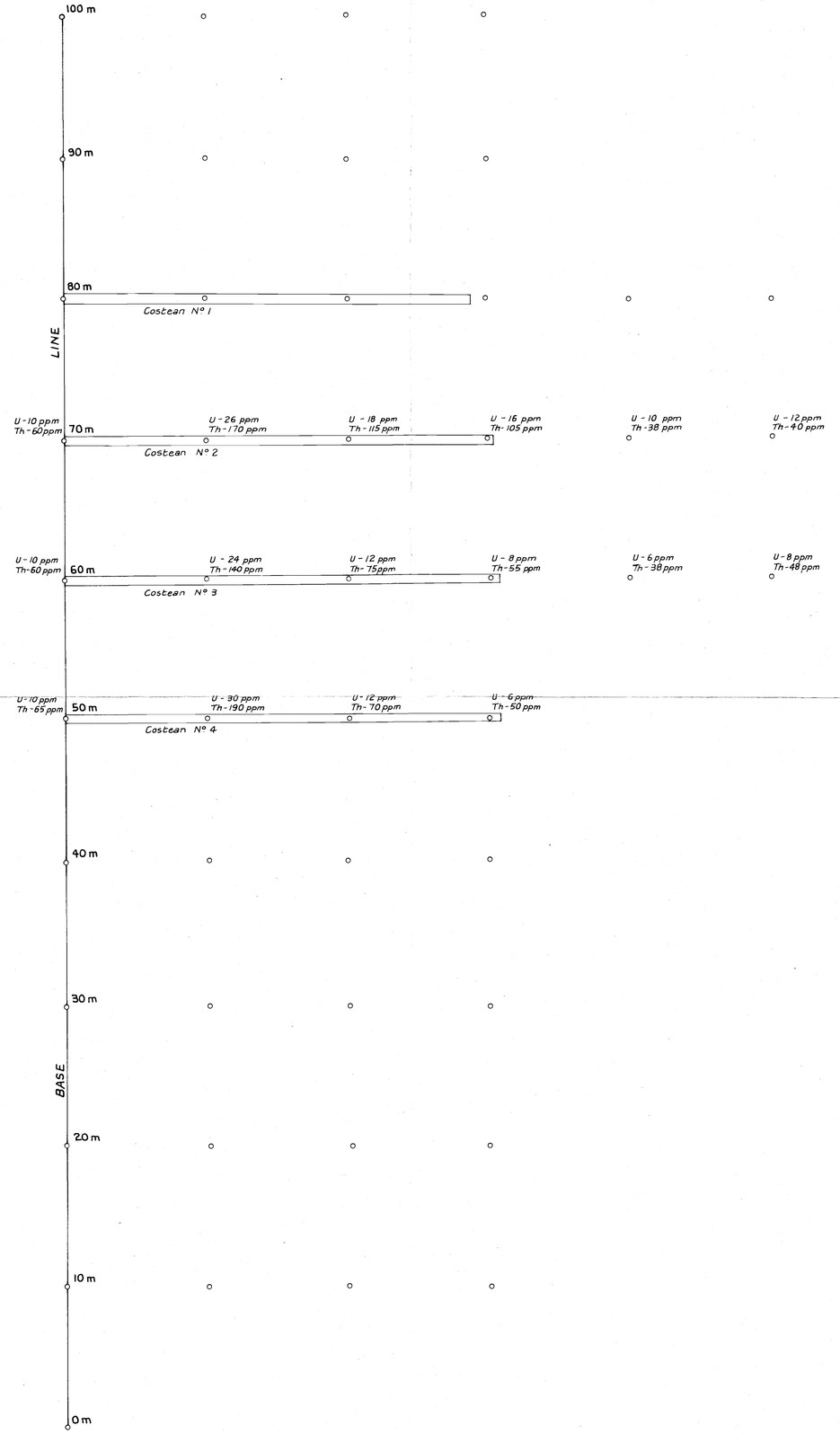
Caralue Project, S.A.
E.L. Nº 131

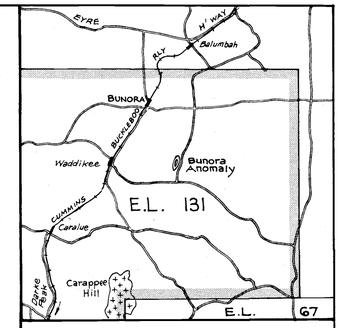
BUNORA ANOMALY
Costeans Nºs 1, 2, 3 & 4.

RECEIVED 9 SEP 1974 DEPT. OF MINES SECURITY 2419

Drawn	B. Scaggiante	Leichhardt Drafting Service Brisbane	
Geologist	V.K. Thakur D. Bennett	Date	April 1974
Scale	1 : 100	Drawing Nº	CA-6

ENV 2419-2





LOCALITY PLAN
Scale : 1 : 250,000

Costeans

U - 10 ppm / Th - 38 ppm — Sample Locations and Values

70 m — Base Line

NOTES :

1.) For details of Radiometric Contours See plan CA - 2

3.) For details of Costeans See plan CA - 6

5 0 5 10 METRES

RECEIVED
9 SEP 1974
DEPT. OF MINES
SECURITY

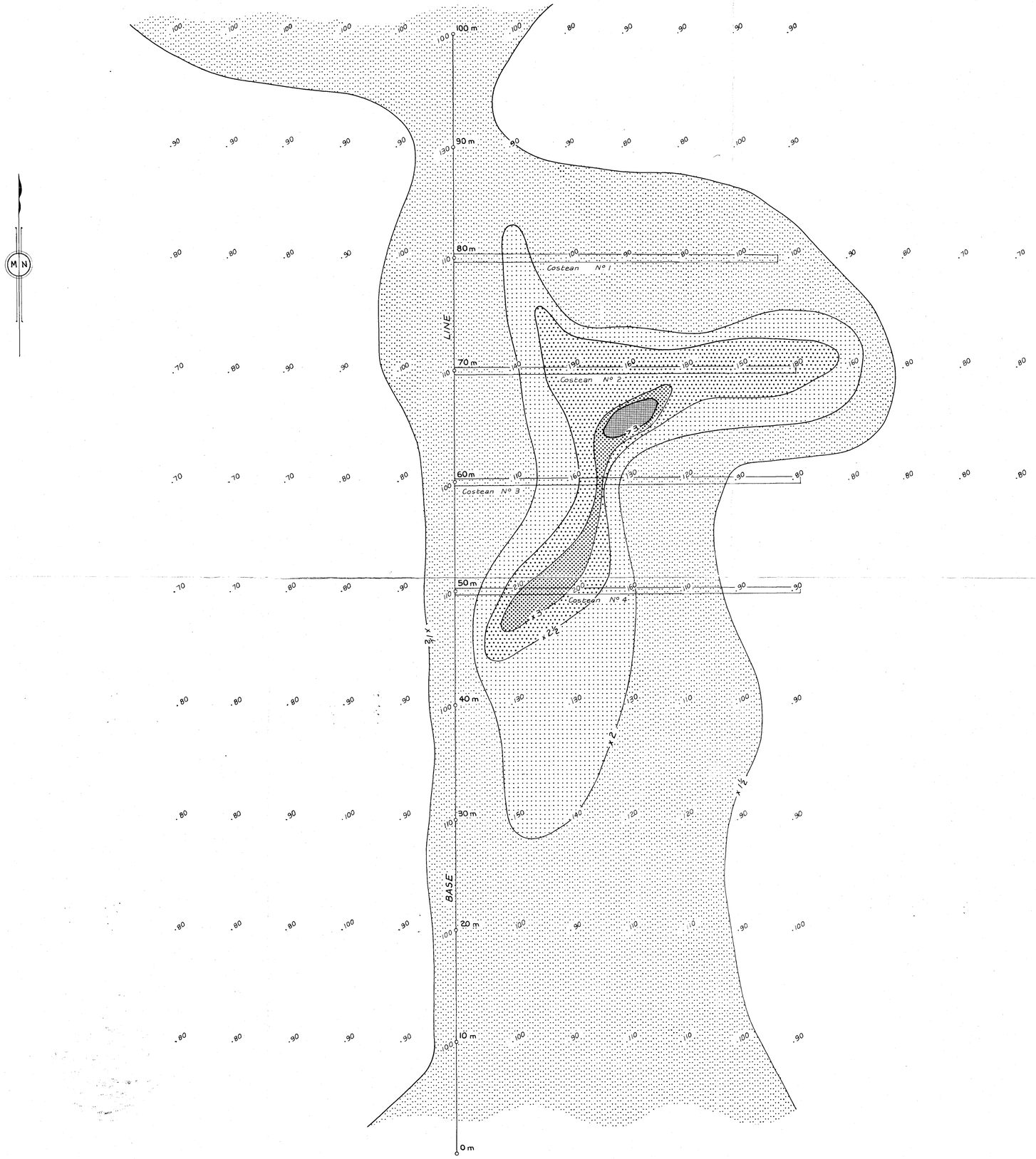
URANGESELLSCHAFT AUSTRALIA PTY. LTD.

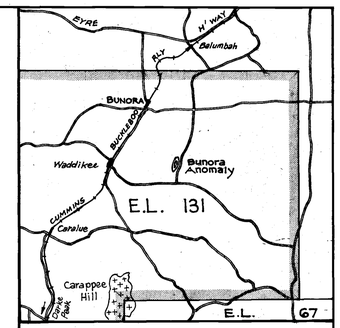
Caralue Project, S.A.
E.L. N° 131

BUNORA ANOMALY
Geochemical Sample Locations

Drawn Bruno Scaggiante	Leichhardt Drafting Service, Brisbane
Geologist V.K. Thakur / D. Bennett	Date April 1974
Scale 1:200	Drawing N° CA - 3

ENV 2919-3





LOCALITY PLAN
Scale : 1 : 250,000

Costeans

+3 Radiometric Contours (times Background)

70 m Base Line

80 C.P.S. (Total Count)

NOTES :

1.) Instrument used - SG1 Scintilometer (Australi)
Setting - 300 C.P.S.
Background - 65 C.P.S.

2.) For details of Geochemical Sampling
See plan CA-3 (overlay)

3.) For details of Costeans
See plan CA-6

5 0 5 10 METRES

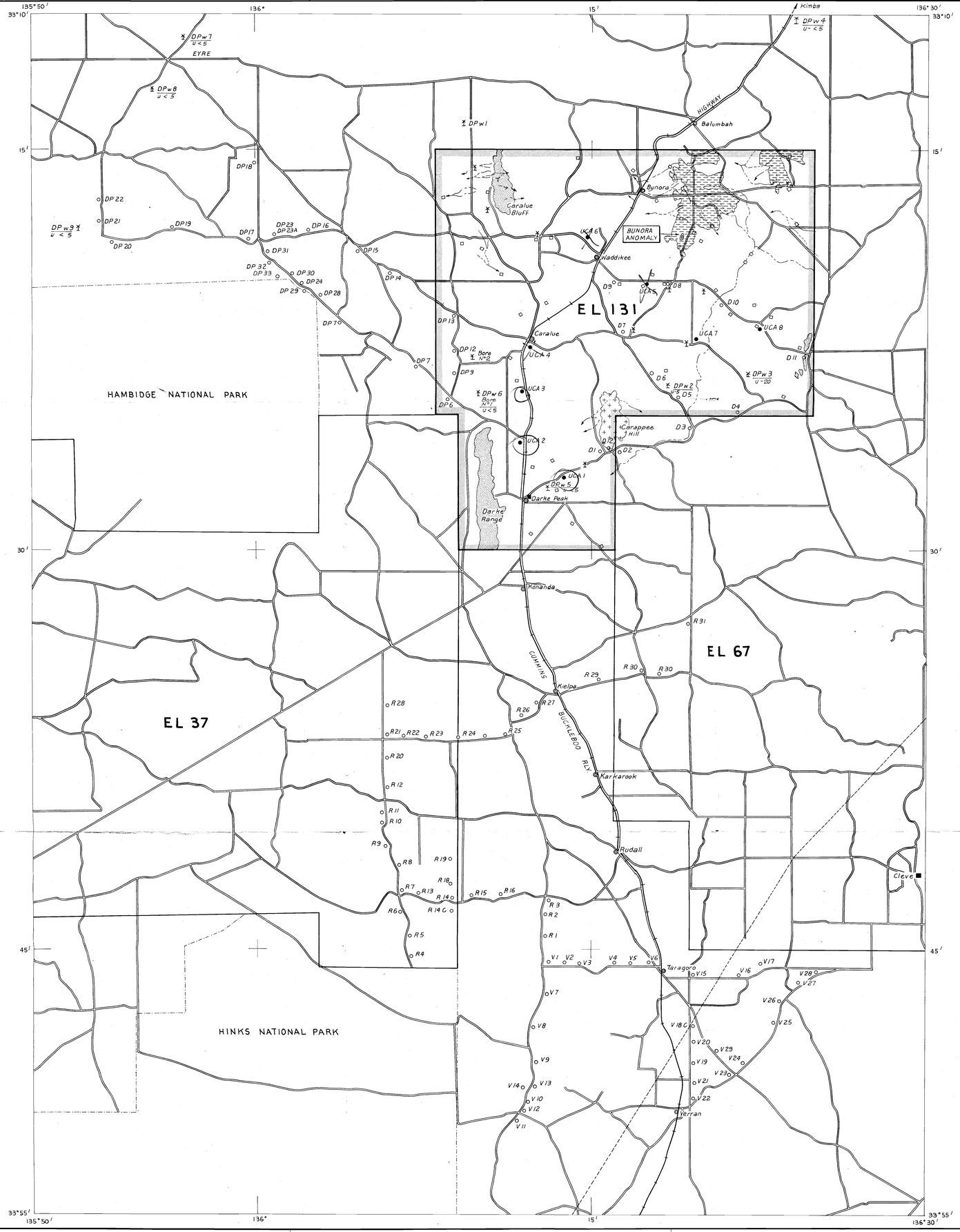
URANGESELLSCHAFT AUSTRALIA PTY. LTD.

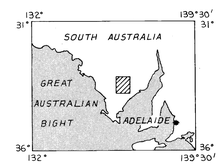
Caralue Project, S.A.
E.L. Nº 131

BUNORA ANOMALY
Radiometric Contours

Drawn Bruno Scaggiante	Leichhardt Drafting Service, Brisbane
Geologist V.K. Thakur, D. Bennett	Date April 1974
Scale 1 : 200	Drawing Nº CA-2

ENV 2419-4





LOCALITY PLAN

- National Park
- Power Transmission Line
- Railway Single Track
- River or Stream Intermittent
- Road
- Subject E.L Boundary, Adjoining
- Station
- Water Tank
- Wind Pump

- D3, R8, V4 — Rotary Holes by Kerr McGee Pty. Ltd.
- DP9 — Rotary Holes by Mines Administration
- UCA 1 — Rotary Holes by URANGESELLSCHAFT Aust. Pty Ltd
- DPw 5 <5 — Water Bore with water sample number and ppm values

- Sand Dunes – Alluvium, soils, clays, sands and gravels of drainage lines (thin) and outwash clays and gravels of coastal plain (thickness unknown) capped by travertine in parts.
- Quartzite, quartz sericite schist.
- Undifferentiated quartz-felspar gneisses, metasediments with minor quartzites, schists and amphibolite, migmatite-pegmatite abundant.
- + + + Gneissic granite

RELIABILITY DIAGRAM

- Topographic details from 'KIMBA' map SI 53-7
- Geological details from 'DARKE' map 787

2 1 0 2 4 6 KILOMETRES

URANGESELLSCHAFT AUSTRALIA PTY. LTD.

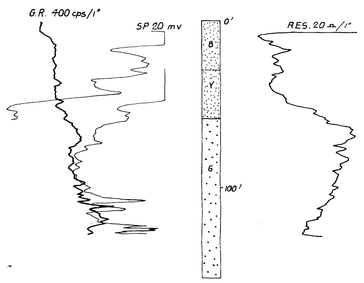
Caralue Project, S.A.
E.L. Nº 131

Regional Geology and Bore Hole Location Plan

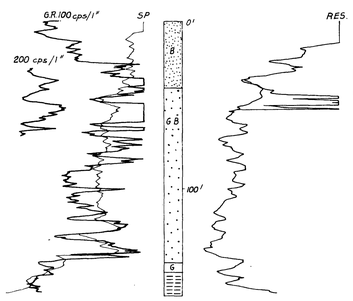
Drawn Bruno Scaggiante	Leichhardt Drafting Service, Brisbane
Geologist V.K. Thakur, D. Bennett	Date April 1974
Scale 1:125 000	Drawing Nº CA-1

ENV 2419-5

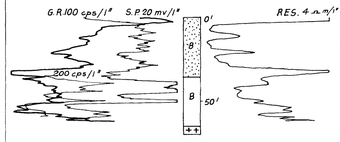
D - 1
T.D. 155'



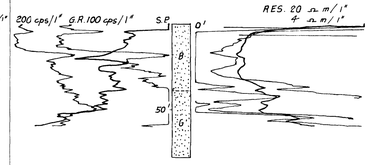
D - 2
T.D. 165'



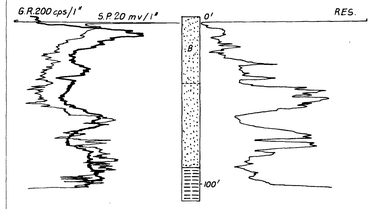
D - 3
T.D. 70'



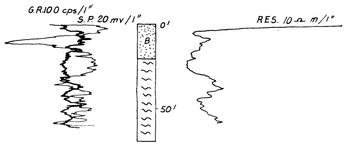
D-4
T.D 80'

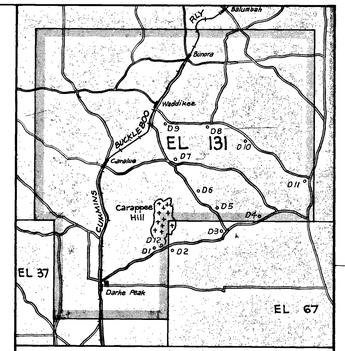


D-5
T.D. 110'



D-6
T.D. 70'



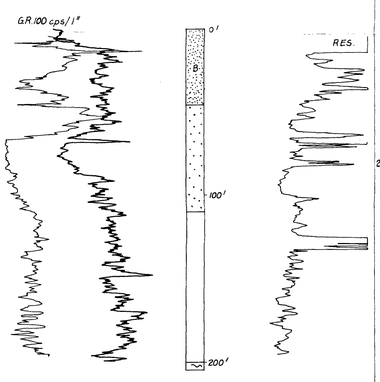


LOCALITY PLAN
Scale 1: 250,000

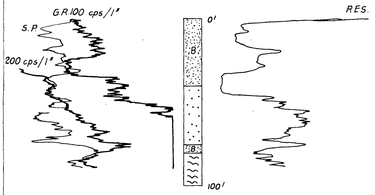
- Sand
- Sandy clay
- Clay
- Quartzite
- Schist
- Granite Gneiss

B Brown
G Grey
Y Yellow

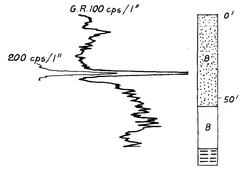
D-7
T.D. 205'



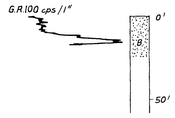
D - 8
T.D. 100'



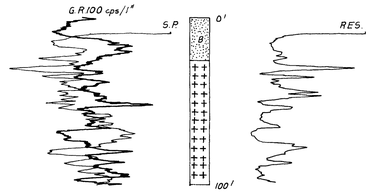
D - 9
T.D. 90'.



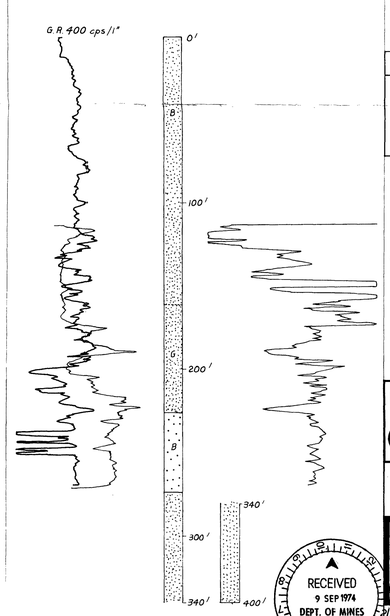
D - 10



D-11
T.D. 100'



D-12
T.D. 400'



G.R. Gamma Ray Log
S.P. Self Potential Log
RES. Resistivity Log
(All Logs as above unless otherwise shown)

NOTES :
1.) For position see general plan CA-1

40 30 20 10 0 40 80 FEET
Vertical Scale

URANGESELLSCHAFT (AUSTRALIA) PTY. LTD.

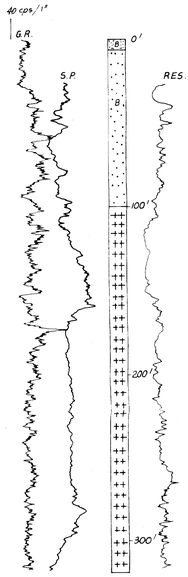
Caralue Project, S.A.
E.L. Nº 131

Bore Hole Logs D1 to D12
(by Kerr McGee Pty. Ltd.)

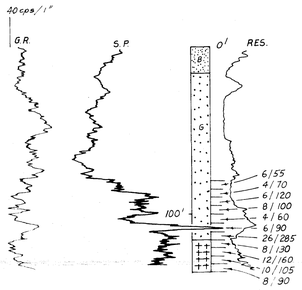
Drawn B. Scaggiante	Leichhardt Drafting Service, Brisbane
Geologist V. K. Thakur, D. Bennett	Date April 1974
Scale 40 Feet to an inch	Drawing Nº CA-5

ENV 2419-6

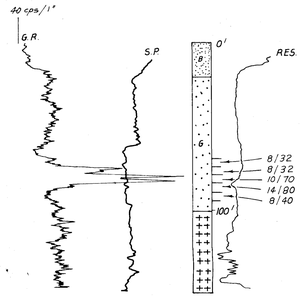
UCA 1
T.D. 319'



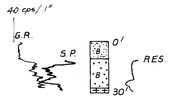
UCA 2
T.D. 135'



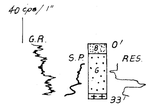
UCA 3
T.D. 150'

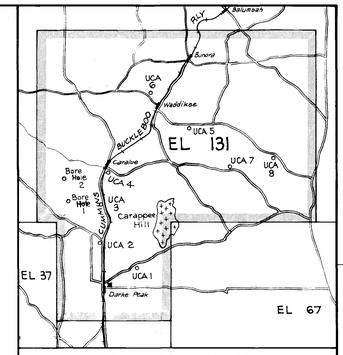


UCA 4
T.D. 30'



UCA 5
T.D. 33'





LOCALITY PLAN
Scale 1 : 250,000

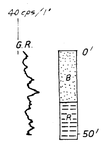
- Sand
- Sandy clay
- Quartzite
- Granite

B Brown
G Grey
R Red

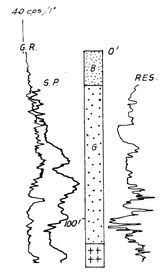
6/55 - U/Th ppm Values

G.R. Gamma Ray Log
S.P. Self Potential Log
RES. Resistivity Log

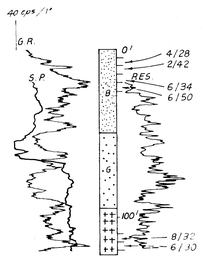
UCA 6
T.D. 53'



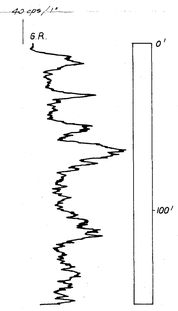
UCA 7
T.D. 129'



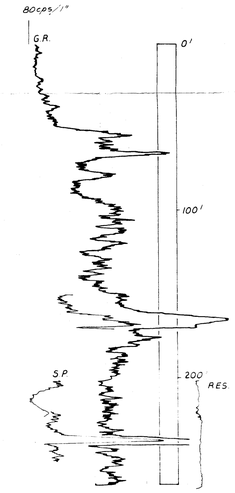
UCA 8
T.D. 123'



BORE HOLE 1
T.D. 156'



BORE HOLE 2
T.D. 263'



NOTES

1.) For position see general plan CA-1

40 30 20 10 0 40 80 FEET
Vertical Scale

URANGESELLSCHAFT AUSTRALIA PTY. LTD.

Caralue Project, S.A.
E.L. Nº 131

Bore Hole Logs UCA 1 to UCA 8 and Bores 1 and 2 by Urangesellschaft (Aust.) Pty. Ltd.

Drawn B. Scaggiante	Leichhardt Drafting Service, Brisbane
Geologist V.K. Thakur, D. Bennetts	Date April 1974
Scale 40 Feet to an inch	Drawing Nº CA-4

ENV 2919-7