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**REVIEW OF COMPANY MINERAL  
EXPLORATION CURNAMONA  
SOUTH AUSTRALIA**

**REPORT BOOK 93/48**

DEPARTMENT OF MINES AND ENERGY

GEOLOGICAL SURVEY

SOUTH AUSTRALIA

REPORT BOOK 93/48

REVIEW OF COMPANY MINERAL EXPLORATION  
CURNAMONA 1:250,000 SHEET SOUTH AUSTRALIA

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## Review of Company Mineral Exploration CURNAMONA 1:250 000 Sheet South Australia

K R YATES, M H RANDELL

Company exploration within the Curnamona 1:250 000 sheet area (CURNAMONA) was reviewed by the study of data incorporated in the open file reports on 42 Special Mining Leases, 80 Exploration Licences and one group of Mining Leases dating from 1961. This data package, complemented by Report Book 92/34 on the adjacent Olary sheet area, completes a project commenced in 1991 to review all company exploration in the Willyama Block and its environs. Information recently released on an important additional group of 10 sequential tenements will be reviewed in 1994 and produced as an addendum to this report.

The southern third of CURNAMONA contains outcropping zones of Palaeoproterozoic Willyama Supergroup rocks which extend into the Broken Hill district of N.S.W. where a relatively recent age determination has dated the sequence close to the Broken Hill orebody at  $1690 \pm 5$  ma. The northern sector of the sheet area has a multiply deformed Willyama basement overlain by varying combinations and thicknesses of relatively undeformed Mesoproterozoic volcanics and Neoproterozoic (Adelaidean) platform sediments, together with Cambrian, Mesozoic and Tertiary sedimentary sequences. Several cored holes up to a maximum 802 metres have been drilled to basement in this area. At least 95% of the projected Willyama is covered by varying thicknesses of younger sediments and the application of detailed airborne magnetics and less expensive drilling methods will be necessary to explore beneath this cover. Only very minor production of copper, cobalt and industrial minerals is recorded from the area.

The data generated from company and Government (MESA) activities includes geological mapping currently being collated at 1:25 000 scale, and a complete coverage of airborne magnetic data mostly at a line spacing of 500 metres or less. Some parts of the area not presently covered by digitally recorded surveys are under consideration to be reflown by MESA in 1994.

By most standards CURNAMONA is underdrilled. Open file data reviewed showed only 43 diamond core holes totalling 13586 metres were drilled to test Proterozoic base metals and uranium targets, while in the northern sector, only 11 significant cored holes have tested the covered basement. An additional 234 percussion holes totalling 20543 metres were drilled, largely in the Kalabity area. The vast majority of drilling (86%) has been of the rotary type to explore for roll front uranium targets in lower Tertiary palaeochannels. A total of over 200 000 metres is recorded in more than 1900 holes.

The data review has highlighted some exploration models which are deserving of further attention. These include:

**Stratiform Lead-Zinc-Silver (i)** The Bimba Formation is a potential host to stratiform Pb-Zn-Ag mineralisation over much of its strike length which may be up to 250 km on CURNAMONA. Low grade to anomalous metals have been discovered virtually wherever this relatively thin lithologically distinctive sulphidic unit has been explored. This has been where it is present in outcrop or shallow subcrop. The majority of its strike is in south-east CURNAMONA under Tertiary sedimentary cover up to 120 metres thick. Best intersections to date are at Hunters Dam including 54 metres at 0.84% Zn, 0.17% Pb in a metasilstone/shale sequence.

(ii) In the Benagerie H.S. area on the Benagerie Ridge limited diamond drilling has intersected up to 79 metres of 0.38% Zn, with individual one metre intercepts to 3.4% Zn, as stratiform mineralisation in pyritic graphitic shales containing scapolite. The host rocks are probable low metamorphic grade Willyama Supergroup which is under Tertiary cover. Recent age determinations are confirming that Mount Isa - McArthur River style mineralisation is a realistic search model in

northern CURNAMONA, especially on the Benagerie Ridge where deformation and metamorphism of probable Willyama pelitic units is less intense and Cainozoic cover thickness averages 100 metres or less over large areas. Here the depth of cover will largely permit the use of less expensive geochemical drilling methods while more detailed airborne magnetic and gravity surveys should prove advantageous in target definition.

**Ironstone Hosted and Stratiform Copper-Gold** The Starra-Osborne- Ernest Henry models of the Maronan Supergroup at Cloncurry can be pursued in CURNAMONA by the testing of selected under cover magnetic anomalies especially in the Calcsilicate (Upper Albite) Suite where the typically magnetic stratigraphy, including calcsilicate units, may have been intruded by late tectonic granites. The Calcsilicate Suite has demonstrably anomalous copper content over much of its strike length. Drilling near the Waukaloo Mine was intersected up to 35 metres of magnetite-albite rock containing greater than 0.3% Cu as disseminated chalcopyrite and pyrite with anomalous gold. Hole BH 2 drilled by Billiton - Marathon near Benagerie H.S. showed greater than 500 ppm Cu over 88 metres, including one metre at 5.5% Cu, in finely laminated pyritic graphitic shales. Gold values to 0.24 g/t were also recorded in this hole.

**Breccia Hosted Copper-Gold-Uranium** The relatively close match in age and composition between Mesoproterozoic bimodal volcanics intersected in drilling on and immediately west of the Benagerie Ridge, and the Gawler Range Volcanics, provides promise that similar igneous and hydrothermal events to those which generated the giant Olympic Dam copper deposit may also have been active east of the Adelaide Geosyncline. Four cored holes up to 802 metres deep were drilled with disappointing results by the CSR group in the early '80s to test this concept but the range of potential targets was not exhausted by their work. Drilling by Newmont in 1991 23 kilometres north of Benagerie has shown that there are granitoids in close proximity to these volcanics. Detailed gravity surveying at 1 kilometre or even 500 metres station spacing should prove to be very advantageous in the search for large iron rich bodies. (The current regional coverage is on 7 kilometre station spacing).

**Willyama Hosted Uranium** Bulk low grade dissemination of uranium minerals is to be found in sodic - granitoids of the Crocker Well area. The prospective geology extends northwards onto CURNAMONA where small uranium deposits are known in outcropping areas. There is potential for more significant sized discoveries as a considerable amount of the prospective zone is under shallow cover, and exploration methods employed to date were not designed to detect radioactive minerals beneath this cover. RAB/aircore drilling through the surficial material, combined with downhole radiometric logging, should prove effective.

**Sedimentary 'Roll Front' Uranium** Although there has been extensive drilling for sedimentary uranium in the lower Tertiary palaeochannels draining northwards from the Willyama basement and several possibly economic deposits such as Honeymoon with up to 3400 tonnes of contained  $U_3O_8$  have been discovered, the areal extent of the known deposits is such that the existing drill pattern does not preclude the possibility of discovering an additional deposit of comparable size in channels known or yet to be fully defined.

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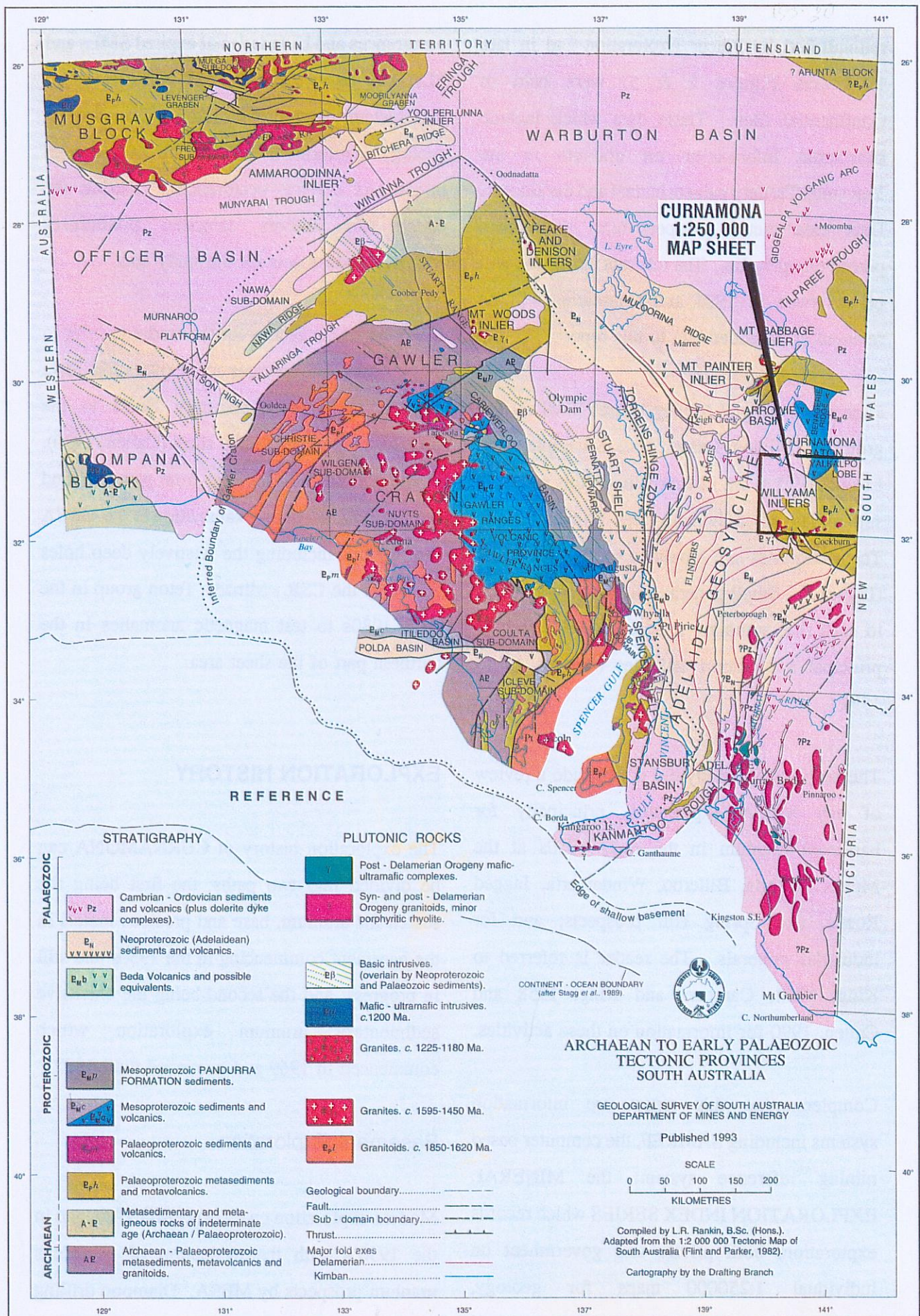
## INTRODUCTION

The South Australian Department of Mines and Energy (MESA, also referred to as SADME and DME) commissioned Keith Yates & Associates Pty Ltd in December 1992 to review open file exploration data covering the CURNAMONA 1:250 000 sheet (Figure 1). This review is part of a more extensive study which commenced in June 1991 covering the entire Willyama Block on OLARY and CURNAMONA. The OLARY

portion of the review was released as Report Book 92/34 and is complementary to this report.

The CURNAMONA study involved a review of company exploration since 1961 undertaken under Special Mining Lease or Exploration Licence. No reference was made to confidential envelopes and, at the time of completion of this review, a sequence of 10 titles commencing with SML 415 granted in 1970 to Sedimentary Uranium N.L. and ending with EL 1763 part





CURNAMONA 1:250,000 MAP SHEET  
 REVIEW OF MINERAL EXPLORATION  
**ARCHAEOAN TO EARLY PALAEOZOIC TECTONIC PROVINCES,  
 SOUTH AUSTRALIA, SHOWING STUDY AREA**



relinquished by Placer Exploration Ltd in late 1993 (see Figures 2 & 5) were held in Confidential files. These data which include substantial information on uranium in the Yarramba Tertiary palaeochannel and the Hunters Dam base metals prospect have since been placed on open file. The relevant envelopes will be reviewed in 1994 and summaries will be released as an addendum to this report.

Data on 42 Special Mining Leases (SMLs), one group of Mining Leases, and 80 Exploration Licences (ELs) are incorporated in this report as summaries of individual titles (Appendix A). The summaries are tabulated on a spreadsheet (Figure 2). Small generalised maps are attached to each title summary to record the location of principal exploration activities (Figures 13 to 159).

The scope of the study did not include a review of any MESA exploration, principally for basement uranium in the early 1950s at the Mount Victoria, Billeroo, Windamerta, Jagged Rocks, and Spring Hill prospects; and for industrial minerals. The reader is referred to King, 1954; Campara and King, 1958 and Callen, 1990 for information on these activities.

Complementing this report are information systems including SAMREF, the computer based mining reference system; the MINERAL EXPLORATION INDEX SERIES which records exploration, both private and government on individual 1:250000 maps for geology, geochemistry, geophysics, drilling, mineral

occurrences and boundaries of expired SMLs and ELs; and lastly the MINDEP computer based data system which provides key information on geology, exploration and mining of recorded mines and mineral occurrences. During the review the authors compiled preliminary MINDEP data sheets for the study area.

It will be advantageous for the reader to refer to these additional sources of exploration data together with the Explanatory Notes to the Curnamona 1:250 000 map sheet (Callen, 1990). In addition much of the core from past diamond drilling is available for examination in the MESA core library, including the relatively deep holes drilled by the CSR - Minad - Teton group in the early 1980s to test magnetic anomalies in the northern part of the sheet area.

## EXPLORATION HISTORY

The exploration history of CURNAMONA can be divided into two paths; the first being the search for uranium, base and precious metals in the basement commencing in the 1950s and still in progress; and the second being the extensive sedimentary uranium exploration which commenced in 1969 and continued until 1982.

### Basement Exploration

Modern exploration on CURNAMONA began in the 1950's with the evaluation of numerous uranium prospects by MESA. Diamond drilling was conducted at Mt Victoria, Spring Hill,

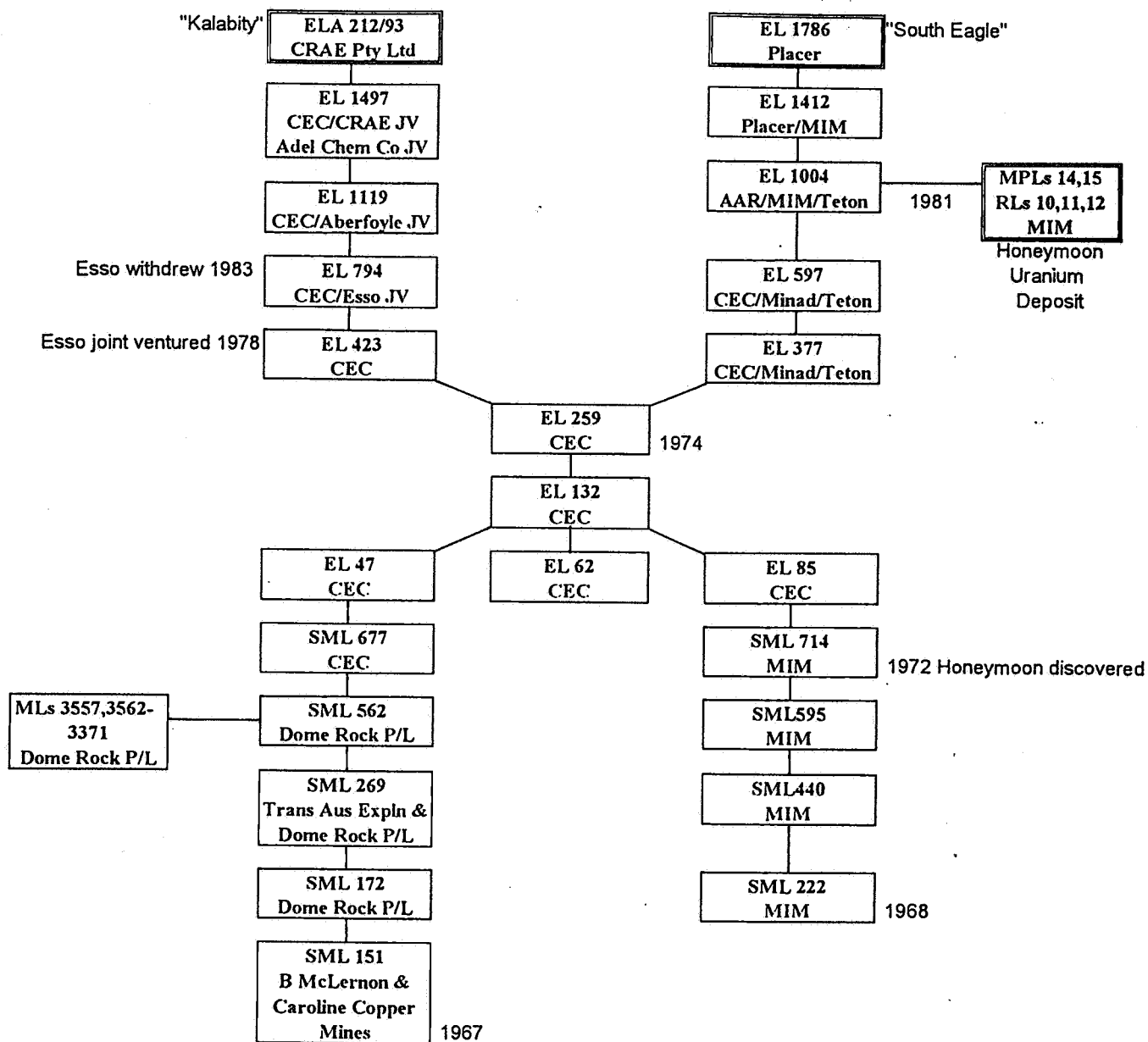
Windamerta (North and South) and Jagged Rocks, and many other areas were mapped and prospected using ground radiometric methods (Campana and King, 1958). Several companies, principally Electrolytic Zinc Company of Australasia Limited (EZ), Newmont Australia Limited (Newmont), Esso Mineral Exploration Proprietary Limited and Production Australia Inc (Esso), Mount Isa Mines Limited (MIM), continued this uranium exploration through the 1960's and early 1970's when the emphasis changed toward Tertiary sediment hosted uranium (see later section). MESA also described the base metal mines and prospects in the Olary Block in 1958 and the geological map provided by Campana and King in Geological Survey of South Australia Bulletin 34 no doubt provided an incentive for company base metal exploration in the following decade.

In 1967 Mines Exploration Pty Ltd commenced extensive geophysical testing of SML 90 but most activity was confined to OLARY. Other early activity occurred at the Dome Rock Copper Mine which has been held continuously as a series of SMLs, MLs and ELs since the mid 1960's. Companies involved at Dome Rock have included Dome Rock Pty Ltd, MIM, Newmont and Adelaide Chemical Company although activities of the latter company are confidential. Open file reports indicate percussion and diamond drilling in excess of 1400 metres but it is suspected that substantially more has been completed. The prospect has also been tested by costeaning (> 1000 metres), RAB drilling (787 holes, 2310 metres), rock chip

sampling (> 100 samples), soil sampling (> 900 samples), IP, EM, ground radiometrics, ground magnetics, and airborne magnetics. The property is currently covered by EL 1497 held by Carpentaria Exploration Company Pty Ltd (CEC) and CRA Exploration Pty Limited.

MIM and its subsidiaries CEC and Carpentaria Gold Pty Ltd have been the major contributors to hard-rock exploration of the CURNAMONA area since the granting of SML 222 in 1968. The sequence of tenements covering the Kalabity area in which MIM have had an interest is illustrated in Figure 3. Initially the company concentrated on exploration for Broken Hill type mineralisation and uranium. Airborne radiometrics with ground follow-up located minor uranium and widespread low grade copper mineralisation in the Waukaloo area. Detailed mapping established the local stratigraphy and outlined the Bimba Formation, a thin sequence of sulphide-bearing volcanoclastics and chemical sediments. Exploration then centred on the Bimba and this intensified when Esso joint ventured with CEC in 1977. Work completed by CEC included regional mapping at 1:20000 scale; regional aeromagnetic and radiometric surveys (line spacing 400 metres, flying height 100 metres); regional rock chip sampling; detailed mapping, rock chip sampling, ground magnetics at Waukaloo, Burdens Dam, Calico Creek and Dome Rock.

Drilling included RAB testing (> 100 holes) at the above named prospects and Koolka, Kalkaroo; percussion drilling at Waukaloo (22



#### LEGEND

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#### Company Abbreviations:

AAR	AAR Limited
Aberfoyle	Aberfoyle Resources Limited
CEC	Carpentaria Exploration Company Pty Ltd
CRAE	CRA Exploration Pty Limited
Esso	Esso Exploration and Production Australia Inc
Minad	Mines Administration Pty Limited
MIM	Mount Isa Mines Limited
Placer	Placer Exploration Limited
Teton	Teton Exploration Drilling Co Pty Ltd
Trans Aus Expln	Trans Australian Explorations Pty Ltd

## CURNAMONA 1:250,000 MAP SHEET REVIEW OF MINERAL EXPLORATION SEQUENTIAL TENEMENTS COVERING THE KALABITY, SOUTH EAGLE AND HONEYMOON URANIUM DEPOSIT

holes), Burdens Dam (11 holes) and Dome Rock (5 holes); and diamond drill testing at Waukaloo (3 holes) and Nancatee (one hole). Esso completed detailed 1:5 000 scale mapping at the major prospects within the Bimba and introduced a stratigraphic subdivision which they had devised during the tenure of ELs 376, 450 and others which had been incorporated into or adjoined MIM tenements. In addition, Esso completed detailed rock chip sampling and petrology on all outcropping gossans; geophysical surveys (IP, SIROTEM, ground magnetics and scintillometry) and drilled 121 percussion holes at ten prospects. Twenty diamond drill holes were completed at Mount Howden, Telechie and Calico Creek. Esso's introduction to the Olary Block had been through joint ventures with Petrocarb Mineral Exploration (SA) Pty Ltd on SMLs 534, 535 672 and 673 as well as tenements held in its own right.

Aberfoyle Resources Limited joint ventured into MIM's ground in 1983 with an initial target being an untested barite-quartz-haematite-magnetite outcrop near South Burdens Dam. This prospect and other Bimba targets were tested using UTEM, mapping, sampling, and drilling (645 RAB holes, 11 percussion holes and 1 diamond hole). The anomalous geochemical signature of the Bimba Formation was confirmed in this drilling but economically significant intercepts were not obtained.

Exploration by other companies progressed from work concentrated around outcrop or sub-outcrop of Willyama Supergroup rocks to the south of

CURNAMONA to efforts directed at hard rock targets beneath Tertiary and even Adelaidean cover of several hundred metres thickness. This progression is illustrated in the following descriptions of significant exploration programs.

North Broken Hill Limited held SML 438 in 1970 to search beneath soil cover for an extension of the Baratta silver-lead field using shallow open hole drilling. A campaign of 514 holes for 11947 metres was drilled with about half of the holes drilled on CURNAMONA, the others being to the west on PARACHILNA.

International Nickel Australia Limited held EL 159 for a year in late 1974 and selected three areas for detailed study with only one (Spring Hill) on CURNAMONA. Soil sampling at this old copper occurrence identified an anomaly of limited extent coincident with the workings.

After the discovery of the Olympic Dam copper-gold-uranium deposit on the Stuart Shelf in 1975 there was renewed interest in the basement of CURNAMONA especially by the CSR group. CSR Limited and partners commencing in 1978 on ELs 411 and 522 and follow-on titles (ELs 722, 911, 1065, 1203), searched for sedimentary uranium then investigated the base metals potential of magnetic anomalies M1, M5, M9, and M10 between 1980 and 1982. A vertical hole was drilled to test M1 to a depth of 600 metres but returned only low base metal values in Mesoproterozoic volcanics. Vertical diamond drill holes to a maximum of 802.4 metres were drilled in each of M5, M9 and M10 to test the



basement beneath Tertiary, Cambrian and Adelaidean cover (for hole locations see CURNAMONA geological map). Mesoproterozoic volcanics were intersected in all but M9. After purchasing CSR's interests Placer Exploration Limited continued the search for lateral equivalents of the Bimba Formation and Olympic Dam style mineralisation under Tertiary cover. On EL 1487 twenty one percussion holes were drilled for a total of 1475 metres.

Oilmin NL, Transoil NL and Petromin NL explored EL 385 from early 1978 with a target of Olympic Dam style mineralisation but gravity, ground magnetic and track etch surveys did not provide sufficient encouragement for drilling. Later, with Western Nuclear Australia Limited, on Els 679 and 549 a joint venture managed by Marathon Petroleum Australia, Ltd drill tested a magnetic anomaly located by aerial and ground surveys. Hole MU 2 was drilled in 1980 to a depth of 614.5 metres with Willyama rocks intersected in the last 70 metres but with disappointingly low base metal values. Marathon searched for sedimentary uranium on ELs 802 and 957 before 1982 when the emphasis changed to base metals and three diamond core holes were drilled to basement on the west flank of the Benagerie Ridge. Marathon's interest transferred to Pan Australian Mining Limited in 1984 and, in joint venture with Billiton Australia, a further two diamond holes were drilled bringing the total for EL 957 to nearly 1500 metres. Billiton's targets were defined by SIROTEM anomalies and these were adequately explained by the presence of graphitic shales in

the holes. Base metal values in most holes were anomalous.

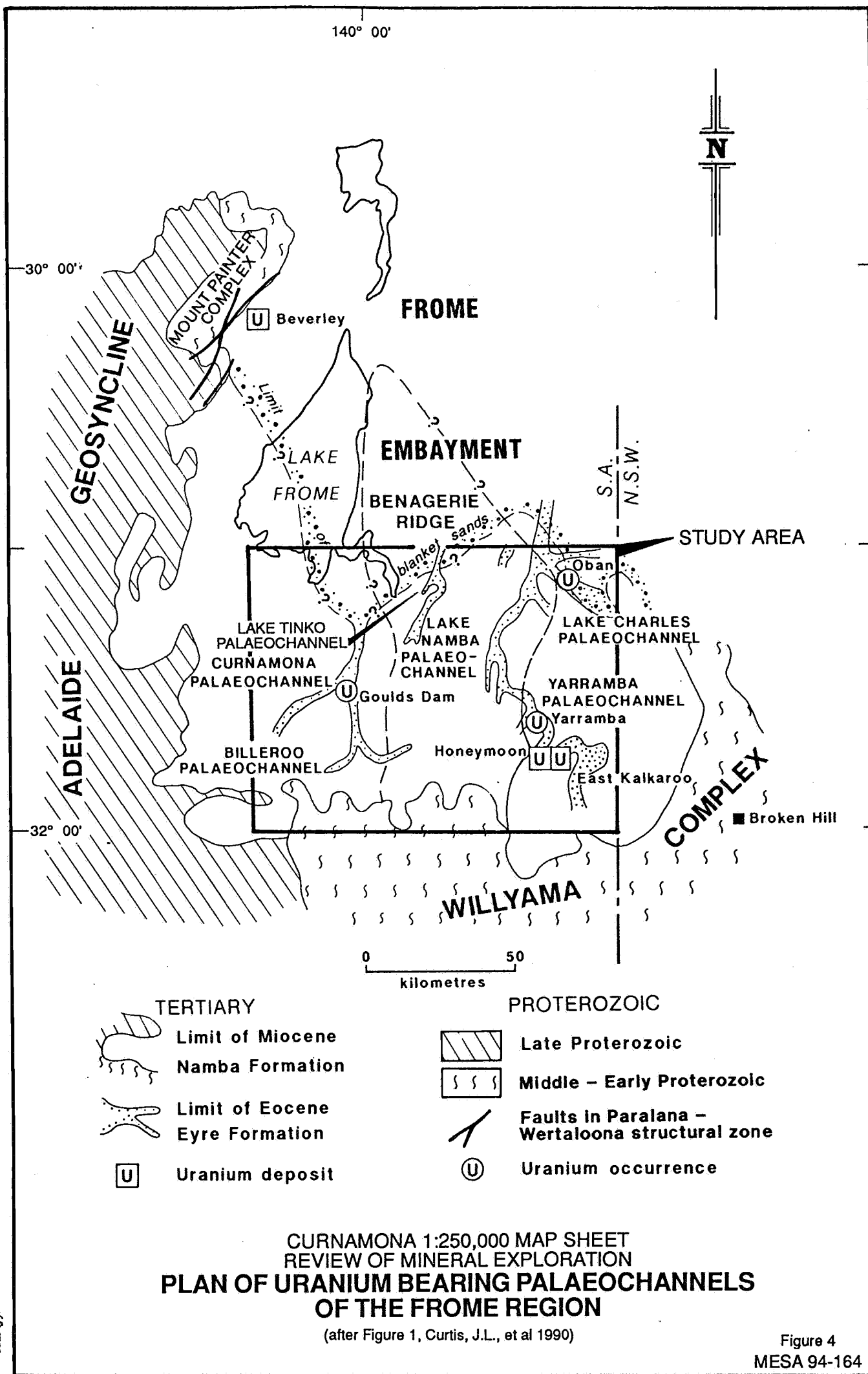
BHP Minerals Limited explored adjoining licences (ELs 970, 971) commencing in 1983 for Olympic Dam style mineralisation. Magnetic anomalies were identified at Spring Hill, Johnny Hill and Lignum Dam with 5 holes drilled at the latter. Two gravity anomalies thought to be sourced at 1500 metres were considered to be too deep to be drilled.

In 1990 Newmont used MESA aeromagnetics to select EL 1684 and after ground magnetic and gravity follow-up identified six targets. Seven holes were drilled with an average depth to basement of 38 metres but no significant discovery resulted.

Other exploration on CURNAMONA recorded in open file reports has included relatively minor searches for trona, heavy mineral sands, wollastonite and andalusite.

## Sedimentary Uranium Exploration

The potential of the Tertiary sediments of the southern Frome Embayment to host North American style sedimentary uranium deposits was recognised by Prof. Eric Rudd when he applied for SMLs 267 and 268 in early 1969. Drilling during the first year of these titles intersected radioactive intervals in the lower Tertiary section of the Billeroo Palaeochannel including some intercepts near Goulds Dam



which ultimately lead to the discovery of the Goulds Dam deposit by Minad-Teton in 1974.

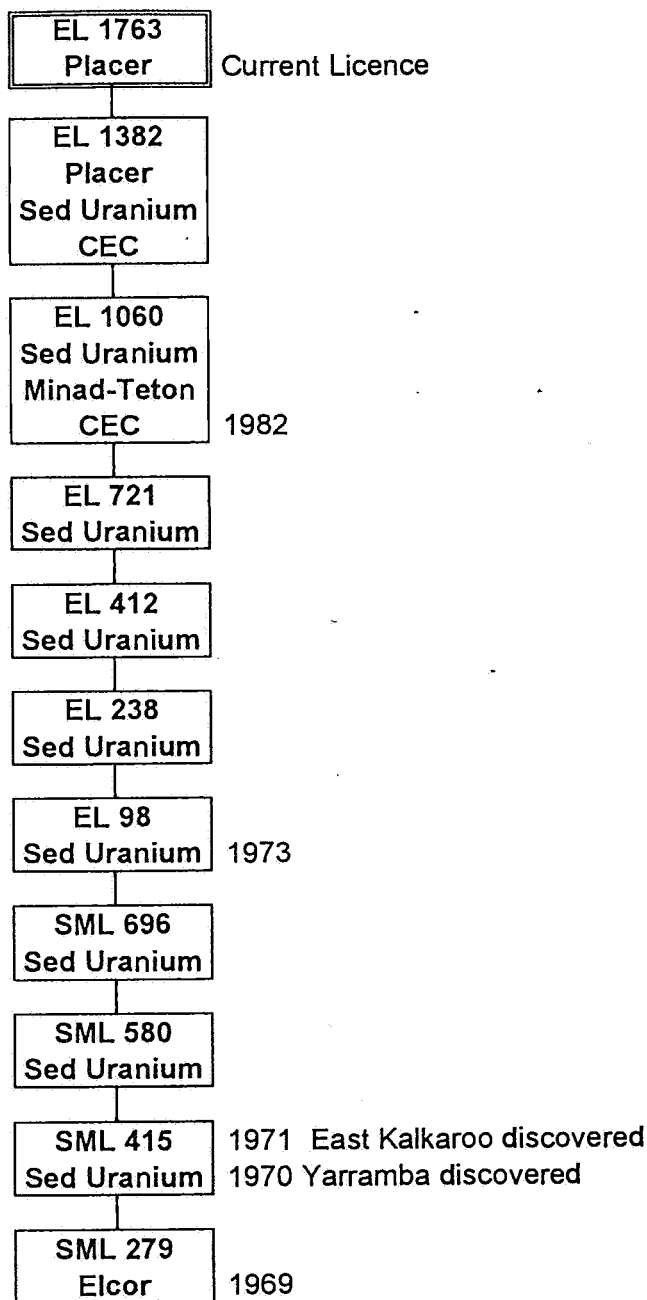
In 1970 Sedimentary Uranium N.L. commenced exploration under SML 415 and discovered the small Yarramba and East Kalkaroo deposits (see Figure 4) in 1970 and 1971 respectively. The former was the first indication of significant grade sedimentary uranium in the Yarramba Palaeochannel in the southern part of the Frome Embayment.

Also in 1971 under SML 595, MIM intersected anomalous radioactivity in drilling Tertiary sands at the South Eagle Prospect in the Yarramba Palaeochannel close to the Honeymoon Deposit which was discovered in the same channel in November 1972 by the Minad-Teton partnership in joint venture with MIM (SML 714). Exploration at Honeymoon including extensive drilling, reserve estimates, a pilot in-situ leach plant and associated feasibility studies continued into the mid 1980s under ELs 85, 132, 259, 377, 597 and follow-on Retention Leases. Reports relating to work on the latter leases were not sighted. The sequence of tenements covering the Kalabity area (including South Eagle and Honeymoon) and the East Kalkaroo area are shown as flow charts on Figures 3 and 5. Reports relating to East Kalkaroo were held as confidential at the time of compilation of this report. Curtis, Brunt and Ellis (1990) state that the Honeymoon deposit has been defined by 286 drill holes totalling 35260 metres.

Exploration activity in the vicinity of the Billeroo Palaeochannel escalated after Pacminex Pty Limited, the mining subsidiary of CSR Limited, entered into a joint venture with E A Rudd Pty Ltd over SMLs 543 and 544 in 1971. (See Figure 6 for sequence of tenements). Follow-up work by this company using resistivity and gravity surveys and rotary drilling resulted in the delineation of the Billeroo and Curnamona Palaeochannels, and pervasive low grade uranium mineralisation within them, while in the south a farm-out to Esso in 1972 of part of SML 544 lead to an extensive gravity survey and the drilling of 53 holes which showed that the Tertiary sand sections in that area were oxidised and devoid of significant uranium mineralisation. Esso withdrew in 1973.

Pacminex holding EL 109 negotiated a joint venture with Mines Administration Pty Ltd and Teton Exploration Drilling Co Pty Ltd (Minad - Teton) in 1972. This resulted in a marked increase in the amount of drilling within the Billeroo Channel as well as systematic resistivity surveys. Drilling in late 1974 further delineated the Curnamona and Billeroo Palaeochannels and resulted in the discovery of the Goulds Dam deposit.

Intensive drilling by this joint venture continued until 1980 under ELs 227, 411 and 722 when resource estimates for the Goulds Dam deposit were completed and the Curnamona Channel was more thoroughly tested. Partly cored holes in 1979 were used to determine the permeability of the mineralisation and showed its amenability to



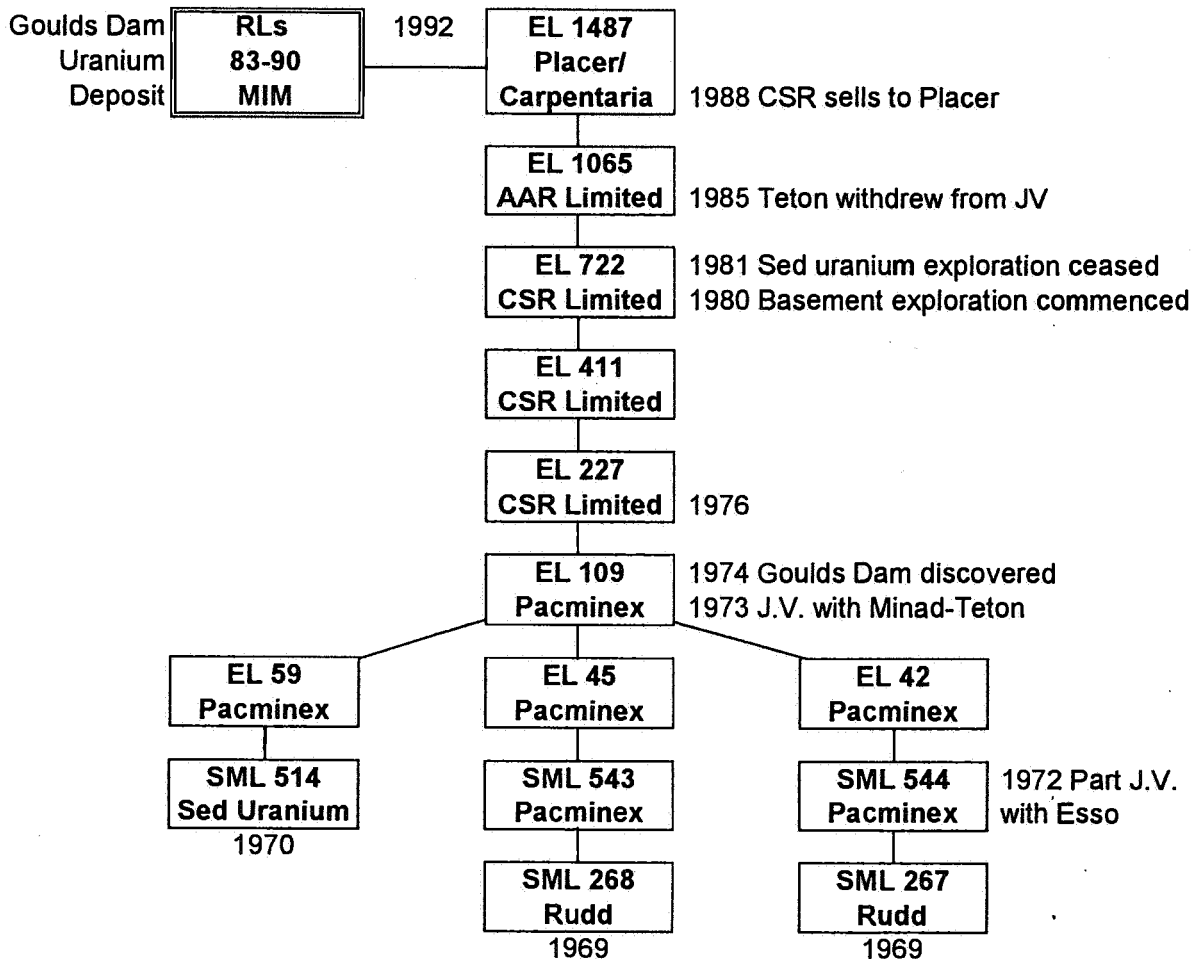
## LEGEND

### Company Abbreviations:

CEC	Carpentaria Exploration Company Pty Ltd
Elcor	Elcor Aust Pty Ltd
Placer	Placer Exploration Limited
Minad	Mines Administration Pty Limited
Sed Uranium	Sedimentary Uranium NL
Teton	Teton Exploration Drilling Co Pty Ltd

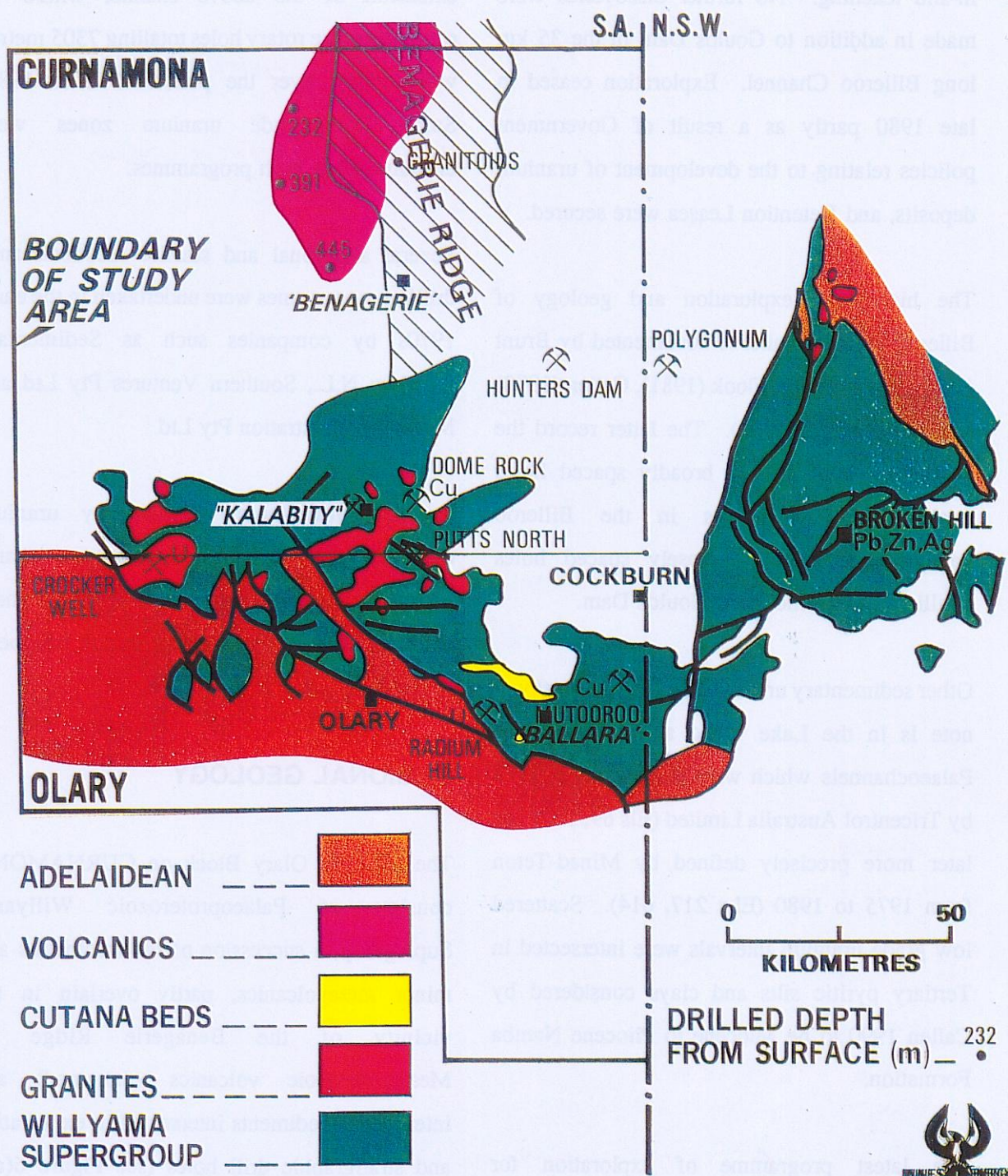
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 REVIEW OF MINERAL EXPLORATION  
**SEQUENTIAL TENEMENTS COVERING  
 THE EAST KALKAROO URANIUM DEPOSIT**

Open Ground, November 1993



CURNAMONA 1:250,000 SHEET  
 REVIEW OF MINERAL EXPLORATION  
**SEQUENTIAL TENEMENTS COVERING**  
**THE BILLEROO PALAEOCHANNEL AND GOULDS DAM URANIUM DEPOSIT**





CURNAMONA 1:250,000 MAP SHEET  
 REVIEW OF MINERAL EXPLORATION  
**OLARY BLOCK - BENAGERIE RIDGE**  
**SUBSURFACE MESOPROTEROZOIC VOLCANICS**

in-situ leaching. No further discoveries were made in addition to Goulds Dam in the 35 km long Billeroo Channel. Exploration ceased in late 1980 partly as a result of Government policies relating to the development of uranium deposits, and Retention Leases were secured.

The history of exploration and geology of Billeroo Palaeochannel is documented by Brunt (1978), Ellis (1980), Flook (1981), Callen (1990) and Curtis et al. (1990). The latter record the drilling in total of 473 broadly spaced holes totalling 56 900 metres in the Billeroo Palaeochannel and 98 closely spaced holes totalling 12 450 metres at Goulds Dam.

Other sedimentary uranium exploration worthy of note is in the Lake Tinko and Lake Namba Palaeochannels which were discovered in 1973 by Tricentrol Australia Limited (Els 69, 127) and later more precisely defined by Minad-Teton from 1975 to 1980 (ELs 217, 614). Scattered low grade uranium intervals were intersected in Tertiary pyritic silts and clays considered by Callen 1990 to be Miocene to Pliocene Namba Formation.

The latest programme of exploration for sedimentary uranium was by Marathon Petroleum in the Oban Bore - Berber Dam area, 65 km to the north of Honeymoon, where 195 holes totalling almost 18 500 metres were drilled under ELs 549 and 957 (Anderson and Ellis, 1983) into a possible tributary of the northern reaches of the Yarramba Palaeochannel; and secondly in the Lake Carnanto area a possible northerly

extension of the above channel where 76 reconnaissance rotary holes totalling 7305 metres were drilled over the period 1978 to 1982. Small low grade uranium zones were encountered in both programmes.

Several additional and smaller reconnaissance drilling programmes were undertaken in the early 1970s by companies such as Sedimentary Uranium N.L., Southern Ventures Pty Ltd and Mines Administration Pty Ltd.

In expenditure terms sedimentary uranium exploration has to date dominated over "hard-rock" exploration in the Willyama basement while production from either sector has been negligible.

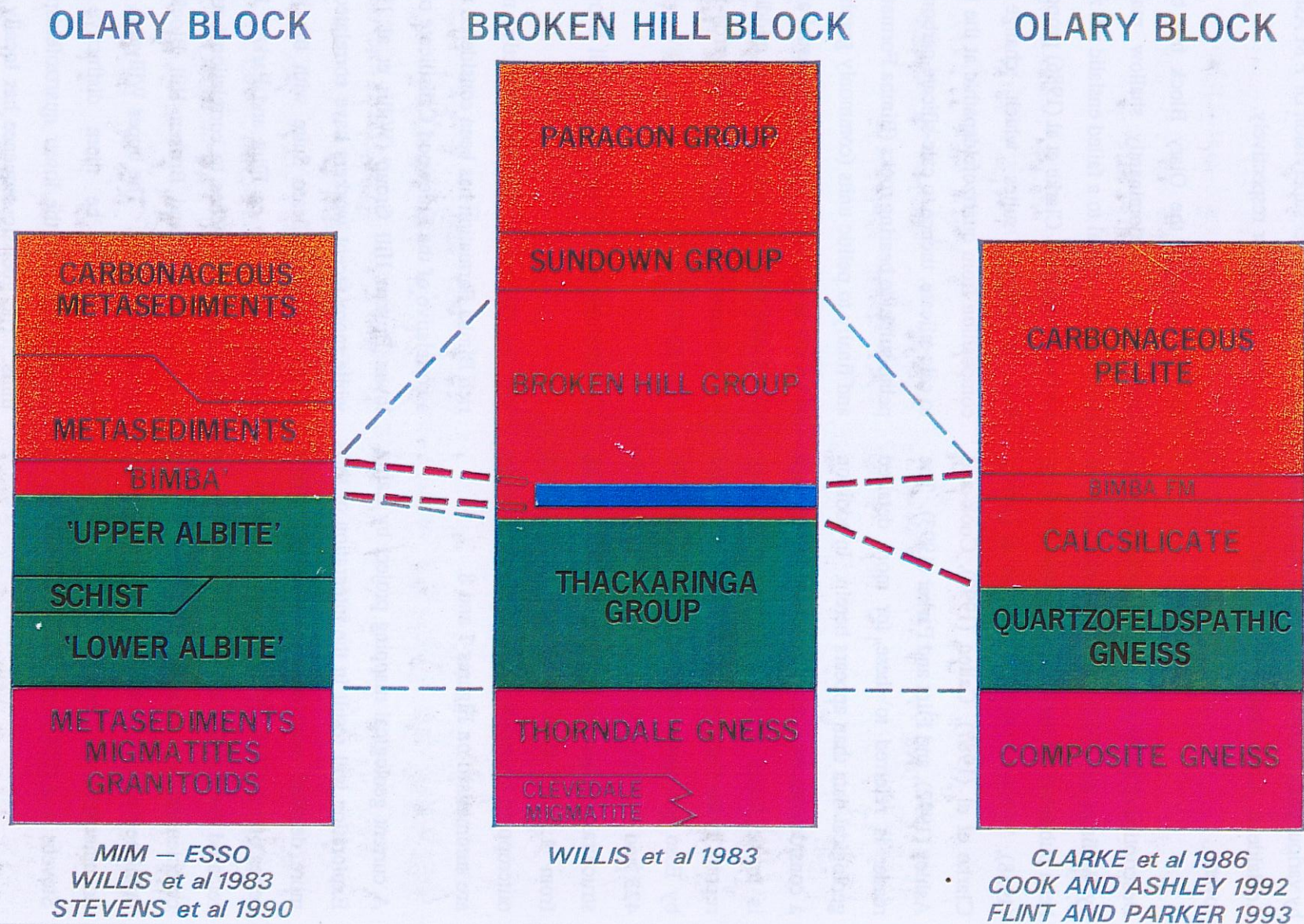
## REGIONAL GEOLOGY

The northern Olary Block on CURNAMONA consists of Palaeoproterozoic Willyama Supergroup, a succession of metasediments and minor metavolcanics, partly overlain in the vicinity of the Benagerie Ridge by Mesoproterozoic volcanics (unnamed) and interbedded sediments intersected in exploration and stratigraphic drill holes (see Figure 6(a)). The complexly deformed sequence has metamorphic grade which decreases from granulite facies in the south to greenschist facies in the north. A number of syn to late tectonic granitic bodies intrude the metasedimentary succession eg Crockers Well - Mount Victoria, and Triangle Hill area. In the northern half of the sheet area the Proterozoic rocks are overlain



# STRATIGRAPHIC CORRELATION OF THE WILLYAMA INLIERS

CURNAMONA 1:250,000 SHEET  
REVIEW OF MINERAL EXPLORATION





by various combinations of relatively undeformed Adelaidean, Cambrian, Mesozoic or Tertiary cover.

Description of the Willyama Supergroup (defined by Willis et al., 1983) of CURNAMONA have been published primarily by Campana and King (1958), Wiltshire (1975), Clarke et al (1986), Clarke et al (1987), Callen (1990), Cook and Ashley (1992), and Flint and Parker (1993). The reader is referred to these for more detailed geological data than appears herein. In addition a considerable amount of important information is to be found in the unpublished company reports by the Carpentaria/Esso joint venture and by Esso principally under ELs 259, 263, 376, 423 and 450 from 1976 to 1981. Included is structural/stratigraphic mapping at scales ranging from 1:5 000 to 1:25 000 of most of the outcropping basement. Details of this mapping are summarised on Figures 7 and 8.

A current geological mapping project by Laing Exploration will result in the integration of this more detailed mapping into a comprehensive series of 1:25 000 lithostratigraphic maps to be released by MESA in 1994. These will be complementary to the adjacent 1:25 000 mapping published by the NSW Geological Survey and documented by Stevens and Stroud (1983), Stevens et al (1983) and Willis et al (1983).

Localised detailed mapping in the Willyama of South Australia is currently in progress by students from the Universities of New England,

and Melbourne under supervision Dr P M Ashley and Prof J R Plimer respectively.

The Willyama of the Olary Block has been interpreted as predominantly shallow marine shelf facies marginal to a failed ensialic rift zone further to the east. Clarke et al (1986) proposed five lithological suites which change in composition from quartzofeldspathic at the base to calc-silicate, thence to calc-silicate-carbonate-pelite-sulphide bearing rocks (Bimba Formation) and finally to pelitic units (commonly graphitic) at the top as shown on Figure 9. Unusual albite (soda) rich units are common in the middle of the sequence which also grades upwards from oxidized to reduced.

#### Correlation With The Broken Hill Block

The thin (50 metres average) distinctive metal rich Bimba Formation has been considered to be a correlative of the Ettlewood Calisilicate of the lower Broken Hill Group (Willis et al 1983), while more recent workers have correlated the Bimba and Calcsilicate Suite with the lower Broken Hill Group eg Flint and Parker, 1993. The current approaches to correlation between the Olary Block and Broken Hill Block are shown in Figure 9. The upper Willyama units have proved to be more distinctive and correlateable than the lower quartzofeldspathic units. The gneissic sequence has locally been migmatized with the development of anatectic granites including sodic granites and adamellites such as those in the Crocker Well - Mount Victoria area (Ashley, 1984).

In contrast to the Broken Hill Block the Olary Block shows a paucity of amphibolites and garnet - bearing quartzofeldspathic gneiss ("Potosi" or Hores meta volcanic type) and a greater proportion of sodic (albite rich) rocks interpreted by Cook and Ashley (1992) to be meta - evaporates. Presumed chemical sediments or exhalites such as quartz - gahnite rock, garnet - quartz rock and phosphatic iron formation are rare or absent. Distinct metallogenic differences are the dearth of lead - zinc - silver to date and abundance of uranium occurrences in the Olary Block as compared to the Broken Hill Block where the reverse applies.

Cook and Ashley (1992) considered that, at the time of Broken Hill lead-zinc mineralisation, the Broken Hill Group was being deposited in deeper water while in the Olary region, shallow non-marine evaporitic rift conditions may have prevailed.

### Variation In Willyama Metamorphic Grade

Low - grade metasediments have been mapped in the southern part of the Benagerie Ridge and are recorded in a number of drill holes, principally one partly cored hole and six cored holes drilled by Marathon Petroleum and joint venture partners Billiton Australia in the general area of Benagerie H.S. between 1982 and 1988 under ELs 957 and 1391 (see Figure 119); and MU2 drilled near New Chum Dam, 9 km west of the NSW border in 1980.

The rocks in all these holes are low grade metasediments, often metal anomalous, and consisting of laminated quartz - albite - magnetite rocks, scapolite magnetite marble, laminated quartz - biotite - potash feldspar shales and graphitic sericitic shales.

Scapolite is a common component of the pelitic lithologies. Teale (1985) in consulting to Marathon considered this saline shallow water sequence to be unconformably above the Willyama Supergroup. Based on their sodic chemistry and the superimposition of lithologies it seems more likely that these metasediments are low grade Willyama Supergroup and probably Calcsilicate, Bimba and Carbonaceous Pelite Suite equivalents.

### Age Of The Willyama Supergroup

Relatively recent U-Pb dating on zircon of the Hores (Potosi) Gneiss at Broken Hill has yielded an age of  $1690 \pm 5$  Ma (Page and Laing, 1992). This unit which is interpreted as metafelsic volcanic in origin and closely associated with the Broken Hill orebody, places an apparently reliable date on the Broken Hill Group or middle Willyama Supergroup.

Metamorphism has been dated at  $1600 \pm 8$  Ma while late orogenic sodic granites at Crockers Well have been shown to be early Mesoproterozoic,  $1579 \pm 2$  Ma (Ludwig and Cooper, 1984) by the U-Pb method. The relatively undeformed porphyritic rhyolite - rhyodacite in Mudguard No 1 on the northerly

projection of the Benagerie Ridge on FROME has been dated at  $1599 \pm 40$  ma (Sheard et al, 1992).

Very recent work by Page (1993) is tending to show that the Willyama Supergroup is of similar age to the Maronan Supergroup at Cloncurry and in turn the Mount Isa Group. A gneiss from the Soldiers Cap Group, yielded a maximum U - Pb age of  $1677 \pm 9$  Ma thus supporting the concept of the Diamantina Orogen linking the two areas as proposed by Laing in 1990.

### Calcsilicate Suite

This unit, which equates with the Upper Albite in Esso terminology, consists of laminated biotite - quartz - feldspar gneisses and their retrograde schist equivalents within which there are distinctive, often finely laminated, calc - silicate and albite rich rocks which may be up to 500 metres thick. It is thickest and most continuous in CURNAMONA from Billeroo Hill to Wiperaminga Hill where a distinctive laminated to banded albite - actinolite - epidote - magnetite gneiss is predominant (Flint and Parker, 1993).

The transition from this suite to the overlying Bimba Formation corresponds with a change from widespread disseminated magnetite to iron sulphides. This change has enabled the contact between the two units to be mapped with good precision using airborne magnetic data eg Hunter's Dam area.

The abundant albite - quartz rocks have been interpreted by Cook and Ashley (1992) as meta-evaporites based on pseudomorphs after gypsum and carbonate; unusual mineralogy including halogen rich minerals such as scapolite, fluorite and piemontite; hypersaline fluid inclusions; and tourmalines with isotopically light boron. They concluded that the premetamorphic stratigraphy was comparable with a red-bed to evaporite sequence including iron formation deposited in a non-marine saline - lake rift environment with some hydrothermal exhalation especially in the Bimba Formation.

### Bimba Formation

The Bimba and underlying Calcsilicate Suite, because of their base metal content, have been the stratigraphic units of the Willyama Supergroup to receive most exploration attention throughout the Olary Block. These units are regionally anomalous in copper, lead, zinc, cobalt, nickel and tungsten and contain numerous gossans after pyrite/pyrrhotite sulphide bodies. In the Kalabity and Hunters Dam areas of CURNAMONA Carpentaria and Esso focussed much of their intensive exploration at this stratigraphic level.

The distinctive layered Bimba marker forms the boundary between quartzose albitic metasediments of the Calcsilicate Suite below and predominantly pelitic, often graphitic, Carbonaceous Pelite Suite above. It is thin, averaging around 30 metres, and commonly approaching 50 metres, and strike extensive.

Complex folding and poor outcrop create difficulties in estimating the strike extent which is at least 200 kilometres and perhaps up to 500 kilometres.

The lithologies are well layered sulphidic metasilstone, metapelites and calcsilicate with minor iron formation. Rock types include pyritic quartz-sericite-feldspar rocks, pyritic albite rocks, varying calc-silicate assemblages, calc-silicate albite rocks and minor quartz-magnetite-garnet iron formations.

Cook and Ashley (1992) interpret this mixed carbonate - pelite unit to represent a shallow water sequence with local hot spring derived chemical sediments which is transitional from the oxidized evaporitic Calcsilicate Suite to the reduced deeper water marine Carbonaceous Pelite Suite.

## Mesoproterozoic of the Curnamona Craton

Extending through the central part of CURNAMONA there is a north-south zone of Willyama Supergroup and Mesoproterozoic volcanics and sediments terms the Benagerie Ridge (Figure 10) defined by Callen (1976). Along this feature the above mentioned rocks are covered by up to 120 metres of Cainozoic sediments while, especially in CURNAMONA, there is no superimposition of almost flat-lying Adelaidean, Cambrian and Mesozoic cover. The 150 km long ridge deepens northwards from

CURNAMONA where it is buried progressively under thickening Mesozoic sediments.

Situated on this ridge and its flanks is a belt of undeformed bimodal volcanics ranging from porphyritic rhyolite or rhyodacite to amygdaloidal basalt and interlayered sediments (see Figure 10). The volcanics have been intersected in the bottom of widespread sedimentary uranium drill holes in the general Lake Namba area (ELs 69, 127, 217, 614) and in deeper CSR - Minad - Teton cored holes LNM 10, BWM 1 and ETM 5 drilled in 1980-81. These deeper holes drilled on the western flank of the Benagerie Ridge also penetrated Adelaidean platform cover while ETM 5 showed the volcanics extend at least as far south as the latitude of Benagerie H.S.

North of CURNAMONA knowledge of the distribution of the volcanics is limited to MESA stratigraphic holes Mudguard No 1 and Bumbarlow No 1 (Youngs 1977, 1978) and Oilmin WK1. Nonetheless it is evident that they have a large areal extent.

The nature of the volcanic rocks intersected in Mudguard No 1 and Bumbarlow No 1 has been documented by Giles and Teale (1979, 1981) who noted certain geochemical similarities to the Gawler Range Volcanics. The Mesoproterozoic of the Curnamona Craton was recently reviewed by Teale and Flint (1993).

Sheard et al (1992) have dated porphyritic rhyolite - rhyodacite from Mudguard No 1, north

of CURNAMONA, at  $1599 \pm 40$  Ma and conclude that "despite the very large error limits, the age is statistically indistinguishable from those obtained for the Gawler Range Volcanics of the Gawler Craton".

It is of interest that Newmont in 1991 (EL 1684) drilled seven RC holes into combined gravity and magnetic anomalies 23 kilometres north of Benagerie H.S. and intersected weathered basaltic volcanics and granitoids described as adamellite and granodiorite. The presence of these granitoids presents the possibility of intrusives coeval with the volcanics. This possibility is also supported by the previously mentioned date of 1579 Ma for the Crookers Well granitoids.

### Depth of Cover

At least 70% of the projected Willyama Supergroup in the Olary Block is covered by Cainozoic continental sediments up to 120 metres thick in palaeochannel sections, but averaging less than 100 metres (see Figure 10). This younger cover thickens away from outcrop in the south and from the Benagerie Ridge.

Exploration over the past decade has been progressively directed towards covered areas using high quality airborne magnetics and RAB drilling. This trend is expected to continue in the northern part of the block, especially on the Benagerie Ridge where low-grade metamorphic rocks of the Willyama Supergroup have yielded very anomalous base metal drill intersections.

Open file data show only 11 significant diamond drill holes have tested the covered basement in northern CURNAMONA.

## EXPLORATION METHODS

Because exploration within CURNAMONA has been directed towards mineralisation in the Willyama Supergroup as well as sedimentary uranium in Tertiary palaeochannels a wide variety of exploration methods have been applied.

These methods include:

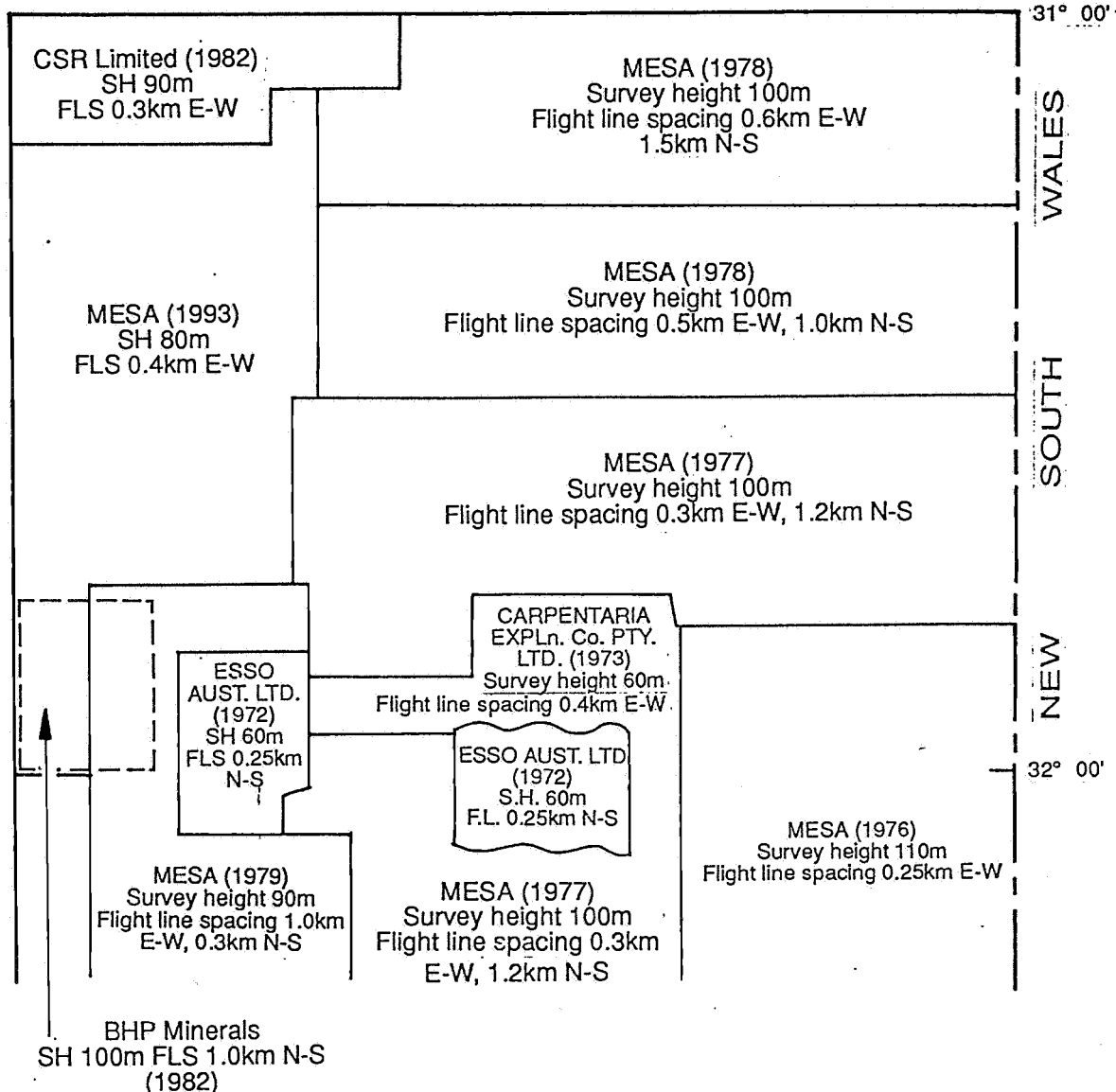
### Airborne Geophysics

Numerous airborne geophysical surveys have been flown in the area. An index to low level airborne magnetic and radiometric surveys is shown in Figure 11 (modified from Mills, 1986) and tabulated in Figure 2. The entire sheet area is covered by airborne magnetic and radiometric surveys at 400 metre or less line spacing except for the two 1978 MESA surveys in the central north and north-east which are on 500 to 600 metres spaced lines. The most recent survey was over the B1 area by MESA on 400 metre lines in 1993.

Prior to 1972 most of the surveys used analog recording and were flown primarily for radiometric data as part of uranium exploration programmes. Line spacing in many of these earlier surveys was 400 metres or more.

139° 30'

141° 00'



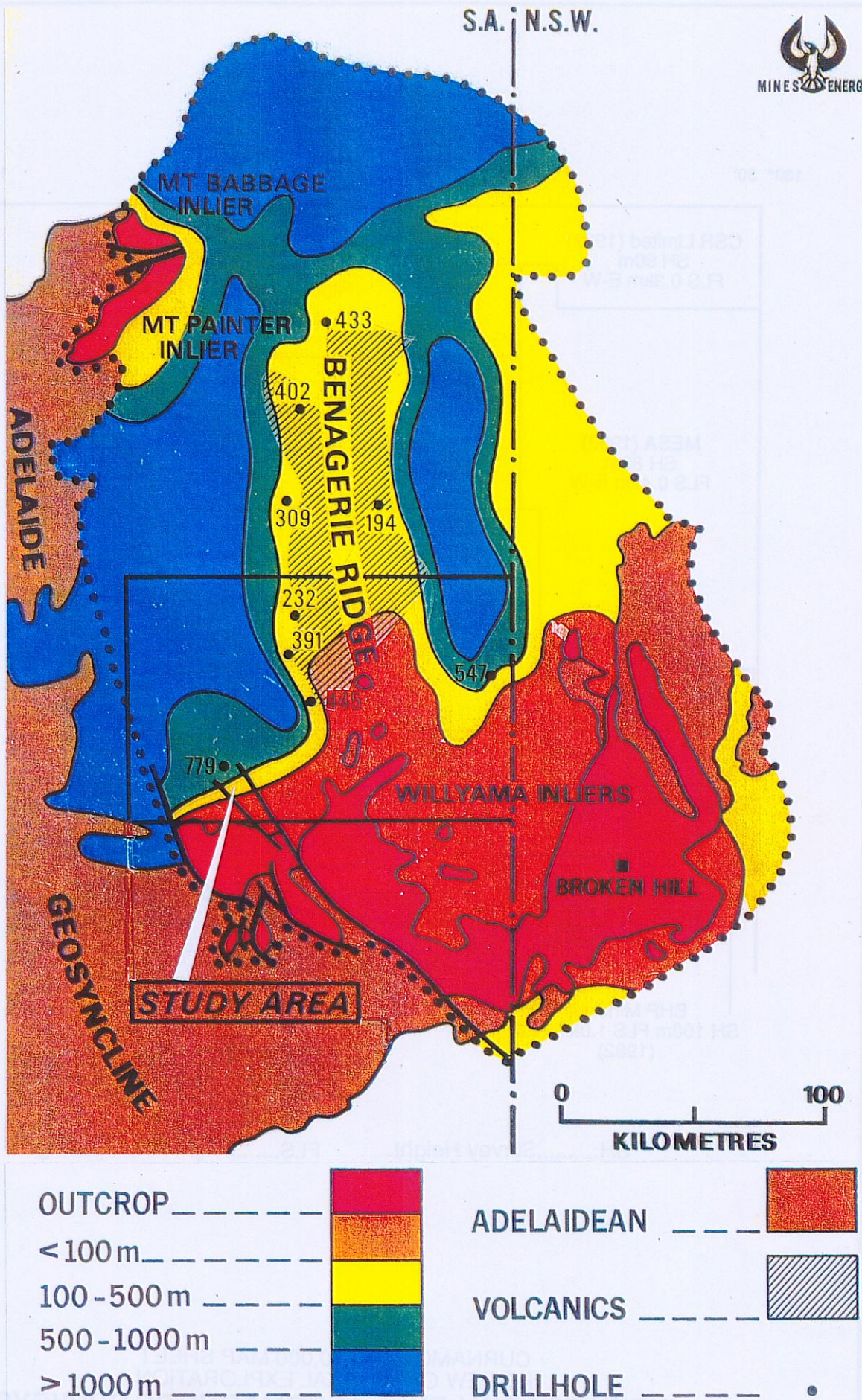
SH.....Survey Height

FLS.....Flight Line Spacing

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**INDEX TO LOW LEVEL AEROMAGNETIC SURVEYS**

Figure 11  
MESA 94-168





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 REVIEW OF MINERAL EXPLORATION  
**DEPTH TO BASEMENT - CURNAMONA PROVINCE**



Radiometric coverage in the outcropping Willyama area is reasonably extensive including not only the surveys shown on Figure 11 but also the pre 1972 surveys and the helicopter borne spectrometer flying by Esso in the late seventies in the Crocker Well - Mount Victoria - Kalabity area (ELs 263, 343, 423, 450, 457). Extensive surveys were also flown by MESA and the then Bureau of Mineral Resources in the early fifties (Campana and King, 1958).

Most of the later fixed wing surveys are available on digital tape and are therefore amenable to image processing.

MESA is considering the flying of additional area in 1994.

There is no record of airborne electromagnetic surveys having been flown.

## Ground Geophysics

Ground magnetic surveys have been completed on many surveyed grids particularly by MIM and its partners Esso and Placer in exploring the Kalabity and Mulyungarie-Kalkaroo areas, e.g. ELs 423, 794, and ELs 1060, 1382. These surveys have proved to be particularly effective as a means of mapping the contact between the relatively magnetic Calcsilicate Suite (Upper Albite) and the overlying weakly responsive Bimba Formation. An example is at the Hunters Dam prospect where outcrop is masked by 100 metres of Cainozoic cover. Marathon-Billiton

employed magnetics in a similar way in the Benagerie H.S. area (ELs 957, 1391).

When the Olympic Dam model was in vogue in the early eighties ground magnetic surveys were used along with gravity methods to more precisely define airborne magnetic anomalies prior to drilling basement targets, e.g. ELs 522, 722, 911, Minad-Teton and CSR.

Radiometric surveys, both ground reconnaissance, and on grids, have been extensive especially in the Crocker Well-Mount Victoria-Windamerta Hill area starting in the 1950s with the prospecting activities of MESA (Campana and King, 1958) and continuing through to the intensive programmes by Esso in the late seventies, e.g. ELs 263, 343, 376.

Electrical methods including IP, EM, Crone Pulse EM, SIROTEM and UTEM have been applied to the search for base metals principally by Carpentaria and Esso especially in the better outcropping areas of the Kalabity licences eg ELs 423, 794, 1119. Similarly the Marathon - Billiton joint venture under ELs 957 and 1391 completed extensive SIROTEM surveys in the Benagerie H.S. area. Graphitic units in the upper Willyama stratigraphy have proved to be the source of many EM anomalies in both of these areas.

Resistivity and, to a lesser degree, gravity traversing was used widely for the definition of palaeochannels in sedimentary uranium exploration notably by the CSR - Minad - Teton



Group using MESA and Murdoch Geophysics in exploring the Billeroo, Curnamona, Yarramba, Lake Namba and Lake Tinko channels commencing with SMLs 543, 544 in 1971 and extending to EL 411 in 1979. An acceptable degree of precision was achieved in defining the course of these channels using the resistivity method.

### Downhole Geophysics

The hundreds of rotary holes drilled in sedimentary uranium exploration were almost all logged using gamma, resistivity and spontaneous potential probes. In occasional programmes neutron and/or density probes were also employed in the logging procedure (see Figure 2).

The Marathon - Billiton joint venture logged their drill holes at Benagerie with a downhole EM probe.

Downhole IP was trialled as Waukaloo by MIM (SML 714) however the strong response was interpreted to be due to magnetite rather than base metals.

### Stream Sediment Geochemistry

Because of the poorly developed stream system in CURNAMONA stream sediment geochemistry has had very limited application and is restricted to the extreme south. Five surveys are recorded

on open file with four of these substantially on OLARY and PARACHILNA. Esso's survey of SML 595 was of limited extent in the Wiperaminga area.

There is no record of any bulk cyanide leach (BCL) gold surveys of streams in the areas of outcropping basement but some BCL soils were collected under EL 1119 at Dome Rock and Waukaloo.

### Soil Geochemistry

Soil geochemical surveys have had some application in areas of minimal or thin soil cover but generally companies exploring these areas, such as Carpentaria and Esso, have preferred rock chip and rotary airblast drill chips as their principal medium for geochemical sampling. Individual soil surveys are recorded on Figure 2.

### Radon Geochemistry

Esso used some 'Track-etch' radon gas geochemistry in their uranium exploration programs in southern CURNAMONA primarily in the Crocker Well - Mount Victoria area (see EL 263).

### Rotary Airblast/Auger Drilling

Geochemical sampling using rotary airblast or auger drilling has been widely employed in areas where rocks of the Willyama Supergroup are masked by thin surficial cover. Carpentaria and its partners, Esso and Aberfoyle used this

approach extensively in base metals exploration of the Waukaloo, Dome Rock, Nancatee, Burdens Dam, Ironstone, and Mount Howden prospects in their Kalabity licences (ELs 62, 132, 259, 423, 794, 1119).

Over 4000 rotary airblast/auger holes totalling almost 53 000 metres have been drilled in the CURNAMONA area on base metals and uranium prospects.

### Rotary Drilling

By far the greatest proportion of bedrock drilling on CURNAMONA (86%) has been completed in the drilling of open rotary holes in sedimentary uranium exploration. A total of 1906 holes for 208 803 metres are recorded in these activities excluding much of the work in the Yarramba Channel which is yet to be reviewed. All of these holes were logged with down hole probes and in a limited number there was partial coring.

### Percussion and Reverse Circulation Percussion Drilling

A total of 234 holes for 20 543 metres has been drilled using this method, and 85% of the total metres were drilled on the series of Carpentaria titles covering the Kalabity area to test prospects such as Waukaloo, Dome Rock, Nancatee and Mount Howden. Most drilling was completed during the term of Esso's joint venture on EL 423 from 1978 to 1980.

### Diamond Drilling

Diamond core holes drilled to test Proterozoic targets total only 43 for 13,586 metres. Most of these holes were drilled in the Carpentaria Kalabity tenements while six holes were drilled by Marathon Billiton in the Benagerie H.S. area (Els 957, 1391), and four relatively deep holes were drilled by the CSR - Minad - Teton group to test basement magnetic anomalies in pursuit of Olympic Dam type targets.

## ECONOMIC GEOLOGY

Most minerals exploration expenditure on CURNAMONA has been directed to the search for uranium with sedimentary uranium dominating basement hosted uranium. An excellent summary of uranium and other exploration activity and the deposits discovered can be found in Callen (1990). The data herein should be read in conjunction with the Explanatory Notes.

### Willyama Hosted Uranium

To date only small resources of uranium bearing minerals have been discovered in the basement although radioactive minerals, principally davidite, are widespread.

Outcropping Willyama rocks have been thoroughly explored for uranium by both government agencies and companies. Geological Survey of South Australia Bulletin 34 summarises government work before 1958

including diamond drilling at Mt Victoria, Jagged Rocks, Spring Hill, and Windamerta (North and South).

At Mount Victoria, davidite (a titanite of iron, uranium and rare earths) occurs in association with rutile, haematite, quartz, and minor copper sulphides in sheared magnetite-biotite lodes in migmatite and granite. Thirty core holes by MESA outlined a resource of 2965 tonnes of uranium oxide. EZ-Newmont completed detailed mapping (1:600), magnetics and radiometrics under SML 118 concluding that biotite-magnetite-davidite zones mapped by MESA as separate lodes may be a folded horizon but that major extensions were unlikely. During the tenure of SMLs 210 and 210A EZ-Newmont drilled 11 percussion holes to test for 'buried southern lodes' with disappointing results.

EZ-Newmont also investigated the Jagged Rocks uranium occurrence under SMLs 118, 210 and 210A with the completion of detailed mapping, magnetics, radiometrics and drilling of 19 wagon holes totalling 432.9 metres. Small discontinuous lenses did not persist at depth. Esso confirmed the low potential of Jagged Rocks when a helicopter radiometric survey failed to locate outcropping extensions (EL 343). More recently PNC Exploration (Australia) Pty Ltd (EL 1307) identified a circular structure during airphoto interpretation with quartz-albite-mica pegmatite up to 100 metres wide in a semi circle of 2 kilometre radius. The pegmatite was radiometrically anomalous with visible davidite.

The Spring Hill uranium occurrence was tested by four MESA core holes in 1954 and remapped and sampled by M.A.T. Exploration Pty Ltd under SML 242 in 1968-70. Mapping showed small isolated occurrences of davidite in lateritic soils and associated with sericitic alteration in gneiss and biotite granite.

Esso in joint venture with Petrocarb Mineral Exploration (S.A.) Pty Ltd on SML 673, investigated radiometric anomalies around Mt Victoria, Billeroo North and at Billeroo South where felspathic quartzites and pegmatites contain scattered disseminated davidite which also occurs in a restricted stockwork of narrow quartz veinlets. The Billeroo prospects had been previously called Windamerta.

MIM drilled five holes at the KN/6 radiometric anomaly 1.6 km north of Waukaloo Mine but concluded that uranium must be absorbed on carbon particles and that the prospect was too small and low grade to warrant further rework.

Many other radiometric anomalies in areas of sub-cropping basement rocks were found to be due to radioactive pegmatites and granites, or monazite occurrences.

### Tertiary Hosted Uranium

By far the most dominant component of exploration on CURNAMONA has been for this style of mineralisation.

Uranium occurs in lower Tertiary sediments in palaeochannels within the Eyre and Namba Formations. Six palaeochannels draining northwards off the Willyama basement have been identified in the study area in extensive rotary drilling programmes (see Figure 4). The channels which may be incised into Precambrian, Cambrian or Mesozoic basement, contain several upward fining cycles of uncemented, poorly consolidated sand terminating in clay units. Most of the palaeochannel sands are oxidised but where permeability is low due to silts or clays or where aquifer flow is impeded, the sands are reduced and contain pyrite and humic matter. Uranium accumulations occur, primarily in the earliest cycle, at the interface of oxidised and reduced sands in a form similar to the roll front or geochemical cell deposits of North America.

The palaeochannels and uranium deposits are well documented by Brunt (1978), Ellis (1980), Flook (1981), Curtis et al (1990), and Callen (1990). Full documentation of Honeymoon and Yarramba and East Kalkaroo is yet to reviewed when currently confidential data are released.

Table 1 (modified after Table 1 of Curtis, J.L. et al, 1990) lists the significant, uranium occurrences of the study area.

DEPOSIT	PALAEO-CHANNEL	RESOURCES TONNES (t U <sub>3</sub> O <sub>8</sub> )	GRADE (% U <sub>3</sub> O <sub>8</sub> )
Honeymoon	Yarramba	3400	0.157
East Kalkaroo	Yarramba	791	0.17
Yarramba	Yarramba	Not Determined	Not Determined
Oban	Lake Charles	Not Determined	Not Determined
Goulds Dam	Billeroo	2300	0.148

Table 1 Tertiary Hosted Uranium Occurrences of Curnamona Area

Although some details remain confidential it is known that the largest Honeymoon Deposit, at least, is amenable to in situ leaching and could be exploited without detriment to the local environment provided that proper procedures are followed. Development and mining of the uranium resources of the CURNAMONA area are currently precluded by Government policy.

Although there has been extensive drilling for sedimentary uranium in the channels presently defined on CURNAMONA the areal extent of the known deposits, as exemplified by Honeymoon and Goulds Dam, is such that the existing drill pattern density does not preclude the possibility of discovering an additional deposit of comparable size in channels known or yet to be fully defined.

### Copper

Copper is the most widespread base metal in the study area although recorded production is relatively insignificant (126 tonnes of copper from oxide ore at the Dome Rock Mine).

The most important type of copper mineralisation in CURNAMONA is that associated with the Bimba Formation. This unit comprises quartz-biotite-albite-(muscovite-sillimanite) metasilstone interlayered with marble, chert and calcsilicate gneiss. The formation is up to 50 metres thick and contains finely laminated pyrite-pyrrhotite-

(chalcopyrite-arsenopyrite) layers several metres thick which at the surface are exposed as distinctive gossans. Company drilling has targeted these gossans as well as non-outcropping extensions indicated by geochemical and geophysical responses.

Selected drilling results are listed in Table 2. The location of prospects named in the table are shown in Figure 12. The highest assays received have exceeded 10% Cu from intervals which, even though from vertical depths greater than 200 metres, contained secondary copper minerals. Copper intercepts are often 10 metres or more at about 0.5% Cu, with the best enriched intercepts being 7 metres at 5.3% Cu and 5.6 metres at 8.5% Cu at Telechie.

The Dome Rock Mine copper production was obtained from material grading 7 to 20% Cu and resource estimates in the late 1960's indicated that 1100 tonnes of 11% Cu remained. Recent drilling by Adelaide Chemical Company is believed to have revised oxide resource estimates for this area but the results were confidential at January 1994.

Anomalous copper has been located during drilling of SIROTEM anomalies on the Benagerie Ridge by Pan Australian Mining Ltd and Billiton Australia Ltd (Els 957, 1391). Hole BD 001 (Pan Aust) intersected 4 metres averaging 0.54% Cu from 152 metres. This interval also returned 0.24% Mo and 2 g/t Ag. Hole BH 2 (Billiton) returned a best assay of 5.5% Cu over one metre but was anomalous

(>500 ppm Cu) over 88 metres in finely laminated pyritic graphitic shales.

Disseminated chalcopyrite and pyrite occur in a hard grey magnetite-albite rock at Waukaloo. Geophysical testing and percussion drilling by MIM showed the copper mineralisation to be stratabound with intercepts of tens of metres of 0.2% Cu (SML 714, ELs 62, 85, 132) and a best intersection of 35 metres at > 0.3% Cu as disseminated pyrite-chalcopyrite. Copper content in a cored hole reached 1% over several 1 metre intervals. This mineralisation opens up the possibility for Osborn/Starra/Ernest Henry type deposits in the district. This model is supported by a rock chip sample from Waukaloo which returned 4 g/t Au (see later section).

CSR and Minad-Teton drilled four holes to test magnetic/gravity targets with potential for breccia - hosted copper-gold-uranium mineralisation of Olympic Dam type (ELs 522, 722 and 911). The holes intersected "Benagerie Volcanics" and Willyama feldspathic microgneiss which contained sufficient magnetite to explain the anomalies being tested. Base metal values were low with maximum values of 350 ppm Pb and 100 ppm Cu. Other magnetic targets in the north of CURNAMONA have been judged by the CSR group to be too deep to warrant drill testing.

### Lead-Zinc Silver

Lead-zinc and silver mineralisation is noted for its paucity in exploration to date of the study area, particularly considering the relative

**SELECTED DRILL INTERCEPTS IN THE BIMBA FORMATION**

TENEMENT	COMPANY	REFERENCE	PERCUSSION DRILLING			DIAMOND DRILLING			BEST INTERSECTIONS				HIGHEST INDIVIDUAL ASSAYS				LOCATION
			NUMBER	HOLE NAMES	METRES	NUMBER	HOLE NAMES	METRES	HOLE	METRES	% Zn	% Cu	Pb ppm	Ag ppm	Cu ppm	Zn ppm	
SML 269	Trans Aust.	Env 1035				3	DDH 1-3/69 *	628.4	DDH1/69	9		0.44					Dome Rock
	Exploration P/L																
EL 423 & EL 794	CEC/ESSO JV	Env 3365	121	KP1-121	9887				KP004	5		0.35	160	3	1900	90	Mt Howden
									KP010	14		0.18	280	3	1800	4100	Telechie
									KP011	32	0.34		210	3	230	6800	Telechie
									KP012	20	0.22		290	5	500	6300	Telechie
									KP014	38		0.46	480	3	1.66%	230	Telechie
									KP017	14		0.11	40	2	1900	520	Telechie
									KP049	11		0.12	310	8	1900	840	Telechie
									KP055	11		0.87	30	1	1.22%	390	Mt Howden
									KP061	5		0.19	55	3	3000	190	Telechie
									KP062	11		0.14	80	3	1800	210	Telechie
									KP064	5		0.16	150	3	1900	315	Telechie
									KP066	147	0.22		340	2	2800	1.1%	Telechie
									KP068	10		0.13	1000	2	2600	150	Telechie
									KP069	12		0.23	680	85	3200	460	Telechie
									KP072	18		0.23	2000	2	4000	360	Telechie
									KP075	6		0.2	220	2	2800	400	Telechie
									KP076	1	0.12		120	2	220	1200	Toraminga
									KP077	13		0.21	380	4	4200	6400	Toraminga
									KP080	4		0.11	70	1	1700	520	Toraminga
									KP091	10		0.32	115	4	4400	500	Wiparaminga
									KP092	5		0.13	35	3	2000	300	Eagle Well
									KP095	5		0.18	130	2	3700	350	Eagle Well
									KP097	7		0.19	15	3	4100	170	Wiparaminga
									KP105	13		0.45	73	4	5360	288	Telechie
									KP106	4		3.58	89	5.5	3.56%	73	Telechie
									KP108	13		0.38					Telechie
									KP109	4		0.28	15	1	2800	425	Telechie
									KP111	22	0.21						Toraminga
									KP118	17		0.18					Telechie
						20	KD1-20 *	7021.76	KD02	2		4.36	20	6	4.36%	500	Telechie
									KD04	4		1.75	200	5	5.40%	310	Telechie
									KD05	5		1.24	95	5	1.84%	700	Mt Howden
									KD07	7	0.28		70	2	600	3200	Telechie
									KD08	8		0.18	980	2	4000	530	Telechie
									KD09	7		5.34	115	9	14.4%	170	Telechie
									KD11	1		1.44	134	2	1.44%	137	Telechie
									KD12	5.6		8.5	380	5	16.8%	619	Telechie
									KD13	6		0.32	91	4	4030	348	Telechie
									KD15	3		1.86	242	2	1.86%	3090	Telechie
									KD17	4		1.48	267	4	5.95%	552	Telechie
									KD18	1.4		1.65	44	1	1.65%	200	Telechie
									KD19				630	2	1100	1450	Telechie
									KD20				4600	54	530	4200	Waukaloo
EL 47	CEC	Env 2251	1	DR 1	201.2								12	<1	520	160	Dome Rock
MLs 3557- 3562, 3371	Newmont	Env 3261				1	DR 4 *	272.6							1000		Dome Rock

TABLE 2

abundance of these metals in the Willyama of the Broken Hill Block.

The Bimba Formation and the top of the underlying Calcsilicate Suite or Upper Albite, which may have a strike extent of as much as 500 kilometres in the Olary Block, are regionally anomalous in copper, lead, zinc, cobalt, nickel and tungsten and contain numerous gossans after pyritic sulphides (see Figure 12 showing key Bimba prospect in Kalabity area). The Bimba, which averages less than 50 metres thickness, consists of well layered sulphidic metasiltstone and calcsilicate with minor iron formation. Cook and Ashley (1992) interpret it to represent a transitional oxidized to reduced shallow water sequence with local hot spring derived chemical sediments.

The most significant low grade intervals intersected to date in drilling the Bimba Formation are shown in Table 2. Of note is an intercept of 147 metres averaging 0.22% Zn drilled at Telechie by Esso (EL 423). Lead values in the Bimba occasionally approach 0.5% Pb but generally do not exceed 500 ppm. Silver is usually less than 5 ppm with two spot high values of 85 ppm and 54 ppm at Telechie and Waukaloo.

Not reviewed in this report, as the data were confidential, is the Hunters Dam prospect (see Figure 1 (a) which was discovered in 1989 by the Placer Sedimentary Holdings joint venture on ELs 1382 and 1763. Intersections in the Bimba Formation of up to 54 metres at 0.84% Zn and

0.17% Pb are reported from the diamond drilling of a 700 metre long zone of anomalous zinc-lead bedrock geochemistry on a relatively straight Bimba/Calcsilicate contact which is very well defined by magnetic data. The 54 metre zone included 8.9 metres averaging 2.0% Zn, 0.27% Pb, 0.08% Cu and 7.9 g/t Ag. Host rock is a laminated pyritic metasiltstone/shale sequence. This prospect, which is masked by 80 to 120 metres of Cainozoic sediments, has the best lead-zinc intersections recorded from the Bimba Formation in the Olary Block.

By interpretation of detailed airborne magnetic data the prospective Bimba/Calcsilicate contact can be traced eastwards from Hunters Dam under cover into N.S.W. where CRA Exploration discovered the Polygonum Prospect about 3 km east of the border during exploration from 1984 to 1988. Best intersection was 103 metres at 0.13% Pb, 0.14% Zn with a highest narrow interval of 3.2 metres at 0.10% Pb, 0.63% Zn.

Elsewhere the Bimba is consistently anomalous in its base metal content, sometimes over significant thicknesses, however best intercepts have generally been less than 0.5% combined lead and zinc.

Although the Bimba has received considerable attention, particularly over the past decade, because of its great regional extent, especially under cover, much of it remains poorly explored. The magnetite content in the underlying Calcsilicate Suite enables the unit to be mapped

with good precision using airborne magnetic data before geochemical testing with bedrock drilling.

In the northern part of the Block on the Benagerie Ridge, e.g. the Benagerie area and further east, Cainozoic covered low grade metasediments are likely Calcsilicate, Bimba and Carbonaceous Pelite Suite equivalents. These show widespread anomalous base metals in drill holes, e.g. BD002 in EL 957 which intersected 79 metres at 0.38% zinc (individual 1 metre intercepts to 3.4% Zn) in pyritic graphite sericite calcareous shale rich in scapolite. Open file reports show only five significant drill holes completed in the immediate Benagerie area by Marathon-Billiton in the early to mid '80s, which are shown on Figures 119(a) and 136. A sixth hole was drilled about 27 kilometres to the north-north-east into quartz-albite rocks.

Teale, in consulting to Marathon, considered this saline shallow water sequence to be unconformably above the Willyama Supergroup and to be prospective for stratiform Pb-Zn-Ag mineralisation with similar age and depositional environment to the Mount Isa Group. On chemical and lithological evidence it seems more likely that the Benagerie rocks are low grade Willyama Supergroup while the analogy with Mount Isa is receiving increasing support from recent age determinations. Mount Isa-McArthur River style is a realistic search model especially on the Benagerie Ridge where deformation becomes less intense and Cainozoic cover thickness averages 100 metres or less over large areas.

Most explorers have been tempted to draw analogies to the Broken Hill ore environment where modern interpretation is of a deeper water rift environment characterised by basic to acid vulcanism and widespread exhalative sedimentation.

While it may be advantageous to seek at the Bimba level a thickening of section and an influx of possible volcanic rocks, it is possible that in the Olary Block there may occur economic base metal mineralisation of a style not directly analogous to Broken Hill.

## Gold

Company gold exploration on CURNAMONA has been of limited areal extent. Early base metal exploration did not routinely include analysis for gold, however with the advent of Olympic Dam as an exploration model, gold has become important in its own right and as a pathfinder element.

In the 1980's, CEC assessed the gold potential of EL 1119 by soil and rock chip sampling and re-assaying drill cuttings and core. This programme, which concentrated on the Bimba Formation, identified anomalous gold at Dome Rock (8.6 ppb Au BCL in soil), Waukaloo (4 g/t Au in a 10 metre rock chip), and Telechie (6 metres averaging 0.51 g/t Au in KD 12).

Previous work by Newmont at Dome Rock Mine had obtained up to 3.5 g/t Au in gossanous rock chip channel sampling but fire assays of all



major pyrite-arsenopyrite drill sections showed only trace values.

Drilling on the Benagerie Ridge during the tenure of EL 957 returned 1 metre at 0.7 g/t Au from 94 metres in BD 001.

It is apparent that the primary concentrations of gold determined from drilling is on average considerably less than the values from surface rock chip sampling. This leads to the conclusion that surface weathering processes have resulted in gold enrichment in the general district.

### Industrial Minerals

Industrial minerals such as barite, andalusite-sillimanite, kyanite, wollastonite, feldspar, beryl, apatite and graphite are to be found in Willyama rocks. Other minerals associated within later cover rocks include various clays (palygorskite, kaolinite, montmorillonite), gypsum and heavy mineral sands. Occurrences are documented in numerous reports by MESA, by Campana and King (1958) and by Callen (1990).

Companies exploring for industrial minerals have included: Planet Mining Company Pty Ltd (gypsum, SML 266); Matfor Mining Pty Ltd (palygorskite, EL 463); Commonwealth Aluminium Corporation Limited (trona, EL 559); Aberfoyle Resources Limited (mineral sands, EL 1471); and Clay and Ceramic Products Pty Ltd (andalusite, EL 1480).

In the late 1960's and early 1970's MESA engaged Amdel to evaluate and test pegmatites in the Olary Province as possible sources of ceramic minerals (Collins et al., 1976).

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TENEMENT: SML 41

AREA: 725 sq. km

COMMENCEMENT DATE: 17/7/61

EXPIRY DATE: 18/12/61

COMPANY: BROKEN HILL SOUTH LIMITED

ENVELOPE: Dkt 897/61

REFERENCES:

LOCATION: Bimbowrie area

1:250 000 SHEET: OLARY, CURNAMONA

1:100 000 SHEET: OLARY 6933, KALABITY 6934

TARGETS: Beryllium

AGE/ROCK UNITS: Palaeoproterozoic Willyama Supergroup.

EXPLORATION SUMMARY: No report is on file other than a letter (14/11/61) stating that geological reconnaissance and sampling attempts proved unsuccessful in exploring for beryllium minerals.

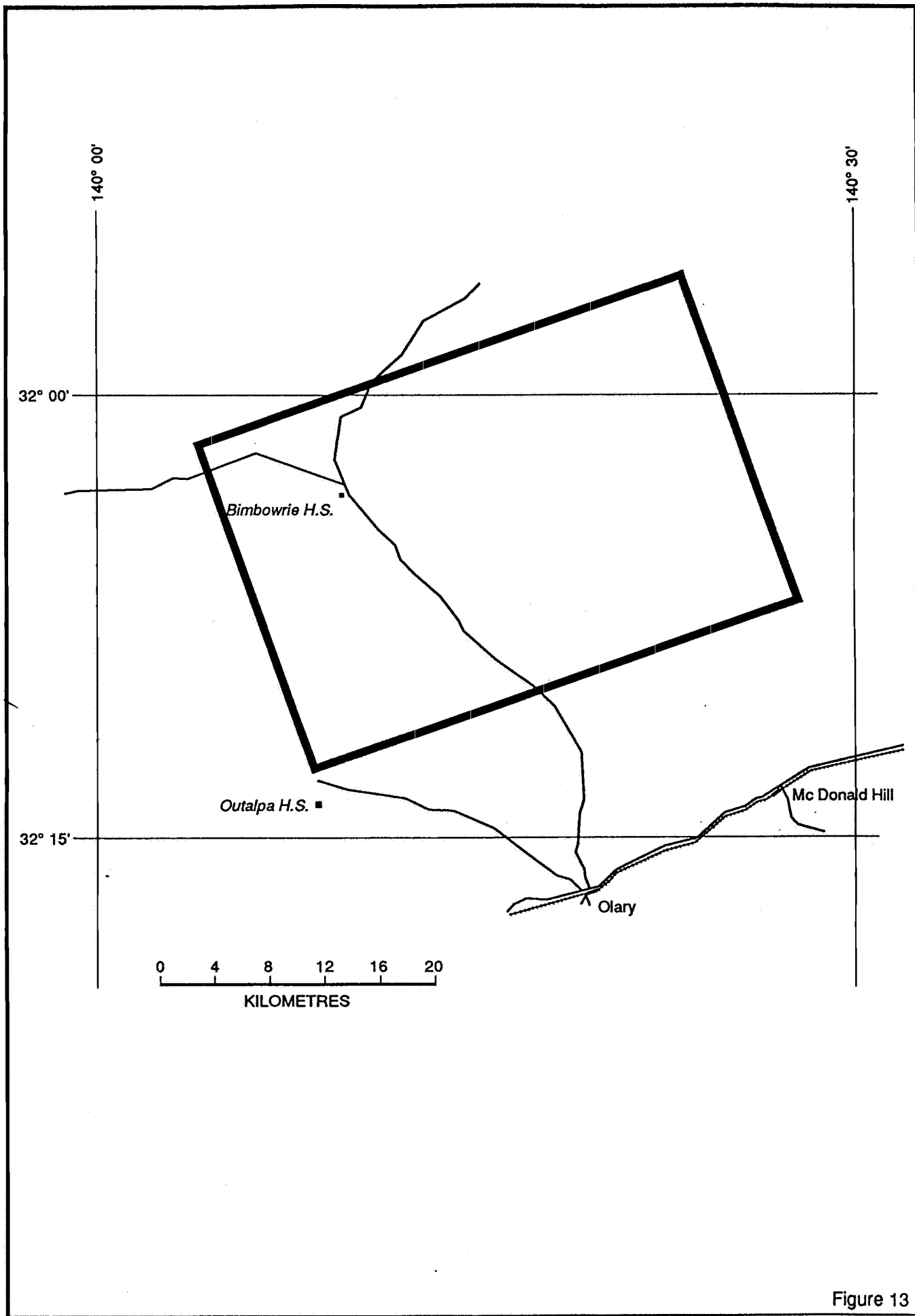


Figure 13

Applicant / Title Holder: Broken Hill South Ltd.

Licence N° : SML 41

DME\_SA 93-1545

56/95/1.2a

**TENEMENT:** SML 90

**AREA:** 443 sq. km

**COMMENCEMENT DATE:** 1/8/65

**EXPIRY DATE:** 31/7/67

**COMPANY:** MINES EXPLORATION PTY LTD

**ENVELOPE:** 726, 785

**REFERENCES:** Roberts, J B, 1967: Final Exploration Report Special Mining Lease No 90 Olary District, South Australia Mines Exploration Proprietary Limited.

**LOCATION:** Outalpa - Boolcoomata area (east block), Walparuta (west block)

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** OLARY 6933, KALABITY 6934

**TARGETS:** Copper, lead, zinc

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** Broad reconnaissance coverage of IP throughout much of the extensive eastern portion of SML on lines spaced 1220 metres (4000 feet) apart with largely electrode spacing of 122m (400 feet). Detailed IP follow-up in Abminga and Lady Louise Mine areas. Detailed stream sediment geochemical survey (1310 samples) for Cu, Pb, Zn over much of larger eastern block. Soil sampling and magnetics over IP anomalies. One DDH (A1) to test IP anomaly at Abminga (292m at -55°). In small western Walparuta block reconnaissance IP coverage on 610 metre (2000 feet) spaced lines over strike interval of 7.3 km together with detailed IP survey around MC 4849 copper showing plus soil auger sampling for Cu, Pb, Zn; magnetics and EM over the smaller detailed grid. Three diamond drillholes (WP 1-3) totalling 388m were drilled on the detailed grid near Walparuta Copper Mine including one to 196 metres. Lady Louise IP anomaly was shown from mapping to be strongly graphitic mica schist horizon.

Geological mapping 1:12000 Lady Louise and Abminga with regional mapping at 1:63360.

**MINERALISATION/PROSPECTS:** Drilling of DDH A1 at Abminga intersected finely disseminated pyrite-pyrrhotite with occasional very minor chalcopyrite, galena and sphalerite over 108 m interval of biotite sericite gneiss and schist plus some graphite together with a quartz vein over 2.1m with strong pyrite and some chalcopyrite-galena-sphalerite (Mount Perseverance vein) showing best interval 0.6m at 2.5% Pb, 1.05% Zn, 0.02% Cu, 19 g/t Ag, no significant Au. Best individual assays elsewhere were 0.15% Pb, 0.12% Zn.



Drilling on detailed Walparuta grid yielded:

WP1: Quartz-biotite-sericite schist and quartz-biotite-feldspar gneiss with abundant disseminated pyrite from 22.2m to 42m including a strongly graphitic shear with very minor chalcopyrite.

WP2: Quartz-biotite-sericite quartzite and "aplite" with disseminated chalcopyrite and pyrite.

15.2 to 27.4m - 0.4% Cu

27.4 to 51.8m - 0.2% Cu

21.3 to 27.4m - 0.52% Cu

15.2 to 54.8m - 0.4g/t Au

WP3: Magnetite rich feldspar biotite quartzite with disseminated and veinlet chalcopyrite over most of first 79m including 59.5m to 65.5m at 1.04% Cu and 15.2m to 22.8m at 95 g/t Ag and 1.5g/t Au. Coincident magnetic and copper anomalies.

Conclusions were that there were long zones of pyritic (and graphitic) schists and gneisses. Geochemical results and drilling indicate that these zones contain, almost ubiquitously, trace to sub-economic base metal mineralisation.

No overly significant geochemical anomalies were located in the stream sediment survey which pinpointed many previously unmapped small copper showings. Copper was the most useful metal. Lead values were low and higher zinc values occur with higher copper zones.

Lower order IP anomalies were associated with discontinuous iron formations, while the ends of lines on Adelaidean sediments often showed stronger anomalies over carbonaceous and pyritic sediments.

DRILLING: Four diamond drillholes totalling 680m. A1 Abminga area, Mount Perseverance Mine (292m); WP1-3 (388m) in Walparuta Mine area.

All drilling on OLARY.

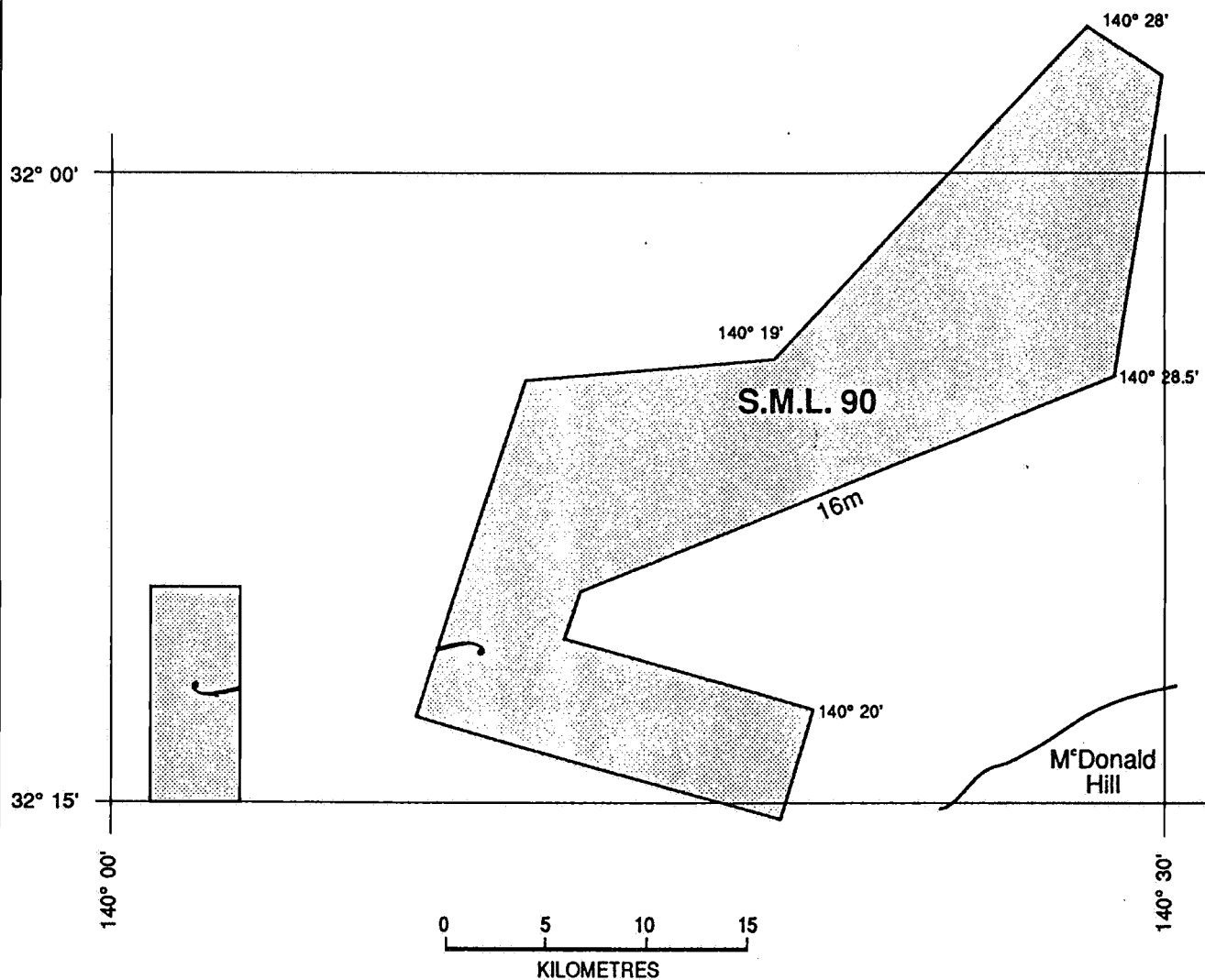


Figure 14

**Applicant / Title Holder:** Mines Exploration Pty Ltd

**Licence N° :** SML 90

DME\_SA 93-1546

**TENEMENT:** SML 118 (followed by SMLs 209, 209A, 210, 210A, 534, 535, 672, 673, ELs 62, 132, 259, 376, 423, 629, 794, 1119, 1308, 1480, 1497, 1591, 1864)

**AREA:** 2383 sq km

**COMMENCEMENT DATE:** 1/7/66

**EXPIRY DATE:** 30/6/68

**COMPANY:** ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED AND NEWMONT PROPRIETARY LIMITED

**ENVELOPE:** 913, 846

**REFERENCES:** Liverton, T, 1967: The Petrology of a Uranium Bearing Adamellite Body at Crocker Well, Olary Province SA.

Johnson, W, 1968: Exploration for New Uranium Ore Bodies, Crocker Well Area, South Australia. W Johnson and Associates Pty. Ltd.

Johnson, W, 1968 : Mineralisation, Geology, and Structure, SML 118 Olary Province, South Australia. W Johnson & Associates Pty Ltd.

**LOCATION:** Crocker Well

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** WINNININNIE, 6833, CURNAMONA 6834, OLARY 6933, KALABITY 6934

**TARGETS:** Uranium

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** Structural/photogeological interpretation of SML area. Helicopter scintillometer survey of 17 sq km of Crocker Well area on 30 m spaced N-S lines with nominal terrain clearance of 9 m. Major grid in Crocker Well area followed by magnetic survey on 305 m line spacing and good quality geological mapping (B Wilson) at 1:6000 enlarged from 1:7920 of 32 sq km area. Ground radiometric survey at Crocker Well East. Ground radiometrics over two areas to follow up airborne anomalies.

At Mount Victoria detailed appraisal including good quality geological mapping at 1:600, magnetics and radiometrics over a 0.33 sq km grid. Drilling of 164 auger holes totalling 1125 m to establish depth of cover and geology between Crocker Original and Crocker East and near Victoria Hut (16 holes for 172 m).

Rotary percussion drilling (20 holes totalling 725 m) of which 10 holes (CEZ2-11) totalling 570 m were drilled for calibration and grade on 3800E at Crocker East Central and 10 holes totalling 155 m were for exploration at several locations including Crocker East. 1.5 m intervals were assayed for U, Ti, P, Bo, Zr) and holes were radiometrically probed. Petrological study of Crocker Well area (Liverton, 1967).

**MINERALISATION/PROSPECTS:** Helicopter scintillometer survey yielded a number of minor anomalies outside the main prospects. Two were selected for follow-up grid radiometrics, one adjacent to and east of Crocker Original (Original Crocker Extended, see SML 210) and one 0.8 km south of Crocker Well Camp (Camp South, see SML 210).

Geological mapping of Crocker Well area revealed adamellite is in a large number of separate bodies of irregular shape and dimension with geometry controlled by major shear zones eg Crocker East Shear. The major shears do not contain brannerite/absite mineralisation. Adamellite has low magnetic susceptibility.

Auger drilling showed cover in Crocker Well area was about 9 m deep. The test drilling on 3800'E at Crocker East Central and subsequent evaluation lead to the conclusion that the inclined diamond drilling by Mines Department (5 holes spaced at 27-30 m) and subsequent radiometric logging resulted in overestimation of the grade with likely impact on total resource in Crocker East area. While spacing on holes and sample size probably resulted in underestimation of grade from assaying.

"Rough" estimate comparison as follows:

		Lbs per long ton $U_3O_8$ (% $U_3O_8$ )		
	Long tons	EZ Est. Assay	Mines Dept Assay	Mines Dept Probe
Main Eastern	409 000	1.0 (0.04)	0.69 (0.03)	1.63 (0.07)
Central	599 000	1.2 (0.05)	1.18 (0.05)	1.94 (0.09)
South-Western	<u>175 000</u>	<u>0.7</u> (0.03)	<u>0.64</u> (0.03)	<u>1.27</u> (0.06)
	<u>1183 000</u>	<u>1.05</u> (0.05)	<u>0.93</u> (0.04)	<u>1.73</u> (0.08)

True grade is probably somewhere between assay and probe results but the poddy nature of small high grade pockets created some concern eg Main Eastern 10 m level.

Best holes were CEZ6 with 59.5 m at 1.65 lbs  $U_3O_8$  per long ton (0.07%) and CEZ7 with 50.3 m at 1.63 lbs  $U_3O_8$  per long ton (0.07%). Highest assays over 1.5 m intervals were 18.1, 17, 10.8 and 7.4 lbs per ton but these are in pods of limited volume.

At Mount Victoria mapping lead to conclusion that the biotite rich zones mineralised with davidite mapped by SADME as separate lodes may be a folded horizon. Overall conclusion with radiometric data was that no major extensions were likely.

Petrological study revealed the high plagioclase and Na/K ratios for the adamellite which could more readily be termed leucocratic quartz syenite.

#### **DRILLING:**

164 auger holes totalling 1125 metres.

20 rotary percussion holes (CEZ1 to 20) totalling 725 metres.

Sixteen auger holes totalling 172 m on CURNAMONA, remainder on OLARY.

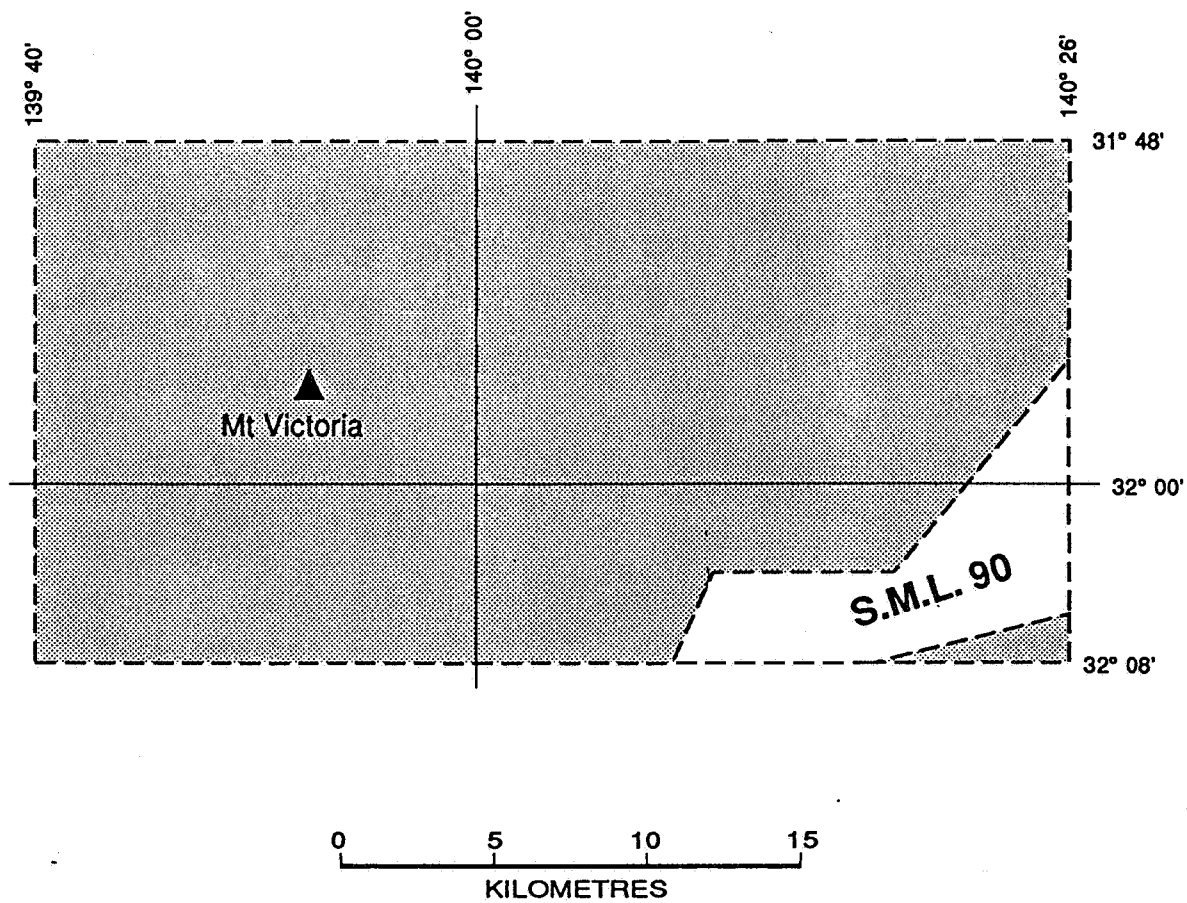


Figure 15

**Applicant / Title Holder:** Electrolytic Zinc Co. Aust. Ltd.  
and Newmont Pty. Ltd.

**Licence N° :** SML 118

DME\_SA 93-1547

581917-14

**TENEMENT:** SML 151 (followed by SMLs 172, 269, 562, 677, MLS 3371, 3557 to 3562, ELs 47, 132, 259, 423, 794, 1119, 1497, 1864)

**AREA:** 20.7 sq km

**COMMENCEMENT DATE:** 8/5/67

**EXPIRY DATE:** 21/12/67

**COMPANY:** B McLERNON and CAROLINE COPPER MINES

**ENVELOPE:** 802

**LOCATION:** Dome Rock Mine

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934

**TARGETS:** Copper

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** Exploration was directed toward locating oxide copper mineralisation suitable for recovery by leaching. Eight rotary percussion holes totalling 358.5 metres were drilled including seven totalling 336 metres north and north-east of the Dome Rock mine workings. The eighth hole (22.5 metres) was drilled into a large micaceous hematite body 1415 metres south-south-east from Day Shaft.

**MINERALISATION/PROSPECTS:** Only two of the seven holes to the north of Dome Rock intersected copper and these were sited about 500 metres north of the north-west corner peg of lease No 3371. The best intercept was 0.5% Cu over a true width of 1.5 metres in the interval between 19.5 and 22.5 metres.

The eighth hole also intersected copper up to 0.5% from 19.5 metres.

**DRILLING:** Eight percussion holes totalling 358.5 metres.

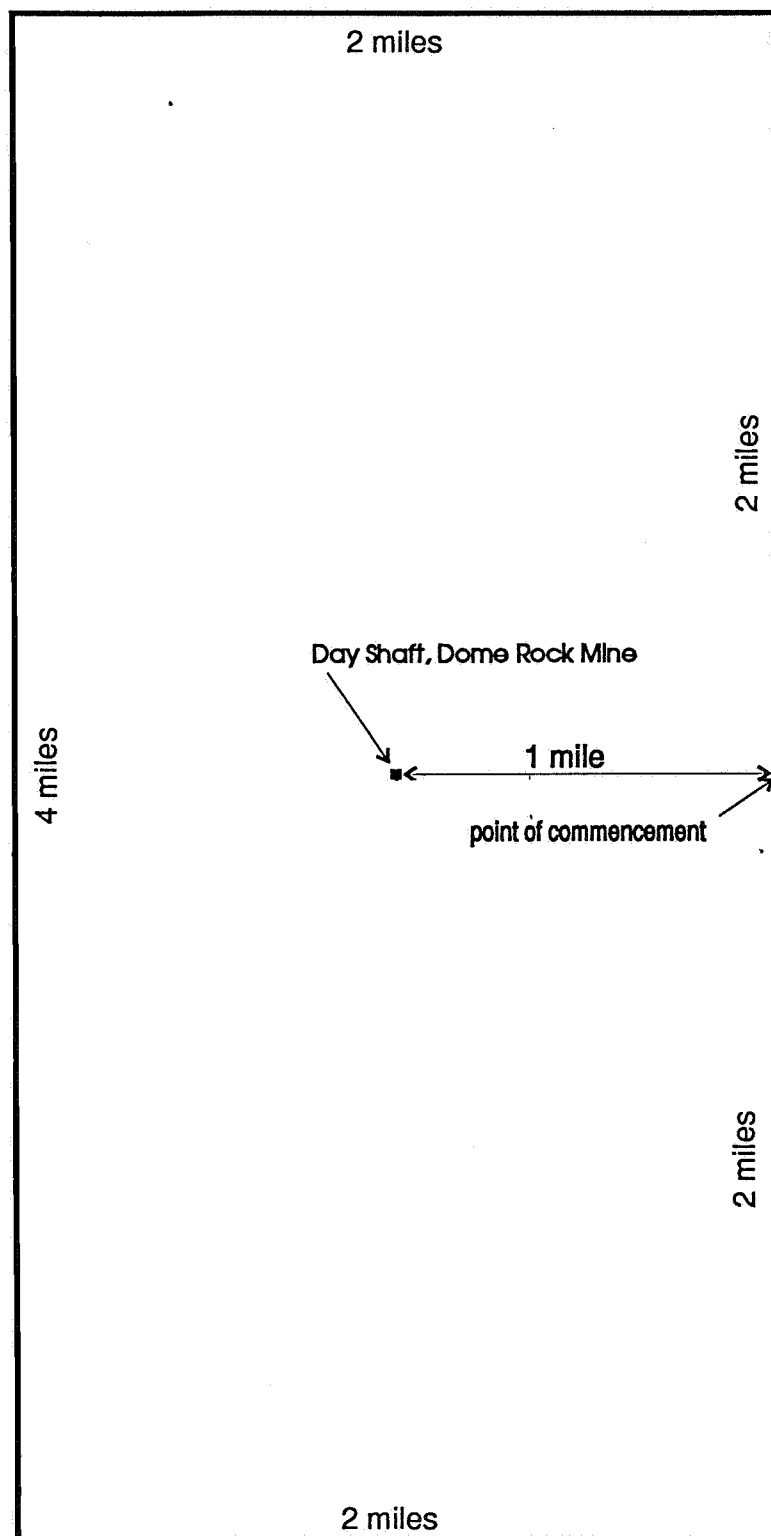


Figure 16

Applicant / Title Holder: Benjamin M'Lernon

Licence N° : SML 151

DME\_SA 93-1548



**TENEMENT:** SML 172 (formerly SML 151, followed by SMLs 269, 562, 677, MLs 3371, 3557 to 3562, ELs 47, 132, 259, 423, 794, 1119, 1497, 1864)

**AREA:** 20.7 sq km

**COMMENCEMENT DATE:** 1/2/68

**EXPIRY DATE:** 29/1/69

**COMPANY:** DOME ROCK PTY LTD

**ENVELOPE:** 950

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Dome Rock Mine

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934

**TARGETS:** Copper

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** Excavation of nine costeans totalling 59 metres in length. All but three were to the south and south east of Day Shaft. The longest (22.9 metres) was the combination of Nos 2 and 3 costeans about 1600 metres south of Day Shaft. Some of the costeans were sampled and assayed for Cu, Co, Ni. There is no accurate recording of sample lengths nor any formal assay results.

**MINERALISATION/PROSPECTS:** The best result from sampling was 7.54% Cu, 0.52% Co, 0.017% Ni from costean No 1 (3.7 metres) about 1500 metres south-south-west of Day Shaft. The next highest was 1.18% Cu from costean No 2 about 1600 metres south of Day Shaft.

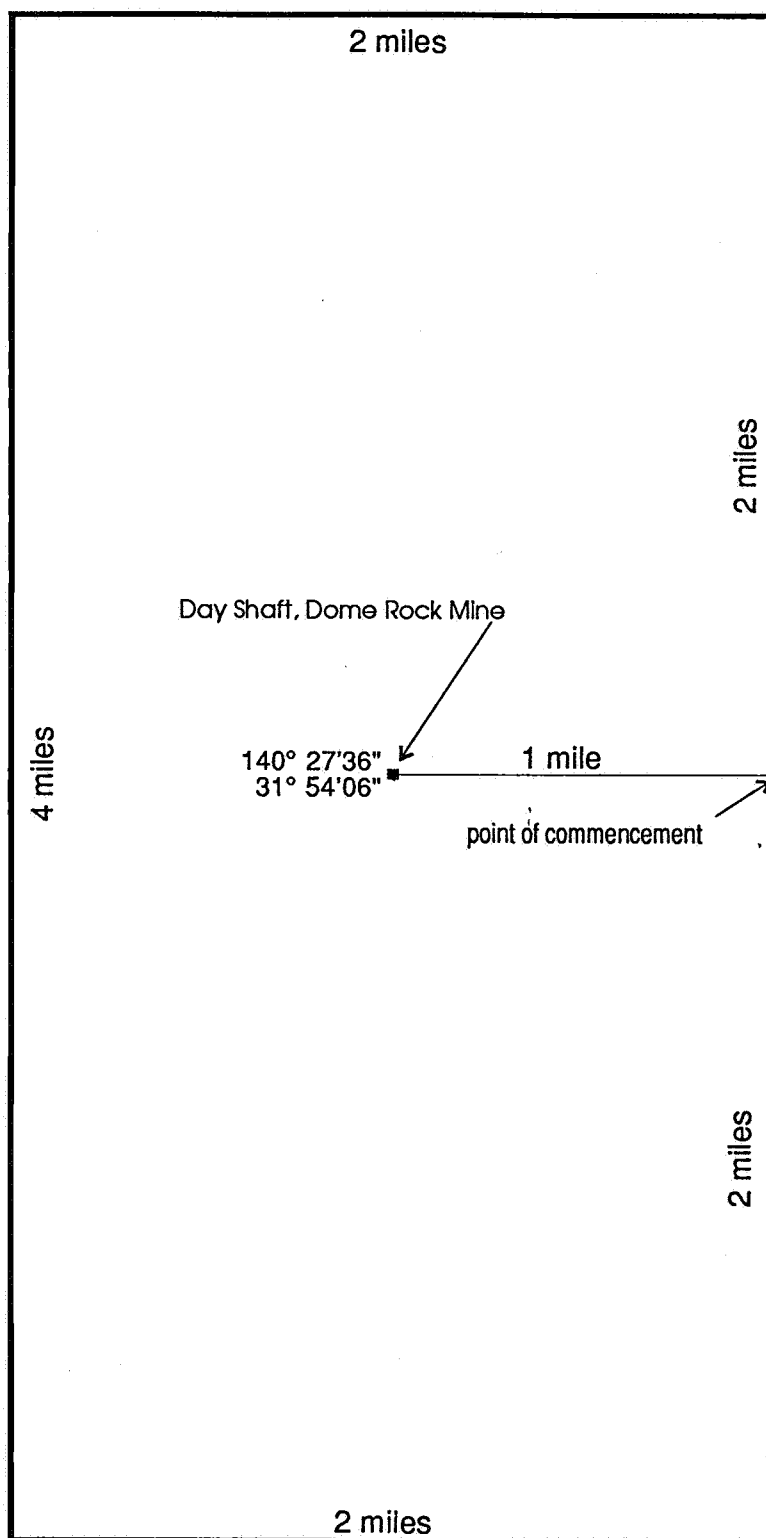


Figure 17

**Applicant / Title Holder:** Dome Rock Pty. Ltd.

**Licence N° :** SML 172

DME\_SA 93-1549

**TENEMENT:** SML 209/209A (formerly SML 118; followed by SMLs 534, 672, ELs 62, 132, 376, 629, 1308, 1480, 1591, 1864)

**AREA:** 816 sq. km

**COMMENCEMENT DATE:** 1/7/68

**EXPIRY DATE:** 22/7/71

**COMPANY:** ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED AND NEWMONT PROPRIETARY LIMITED

**ENVELOPE:** 977 (1050 for C.G.G. Report and maps of airborne survey 1969), 1560 (SML 209A)

**REFERENCES:** Maniw, I.G., 1970. Maniw, I.G. and Maynard, C.C., 1970; Schmidt, B.L. and Tulp, T., 1969; Fabre, N., 1970: Airborne Radiometric and Magnetometric Survey SML 209 (Boolcoomata) and SML 210 (Plumbago) August 1969 Campagnie Generale de Geophysique (Env. 1050/6).

**LOCATION:** Boolcoomata - Kalabity area.

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** OLARY 6933, KALABITY 6934.

**TARGETS:** Uranium

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** Two airborne surveys were conducted:

- i) By Geophoto Resource Consultants in two parts - a southern Outalpa Block and northern Kalabity Block in December 1968 on 800 metre line spacing by spectrometer only.
- ii) By C.G.G. over entire SML in August 1969 on 400 metre line spacing and 107 metre terrain clearance, both spectrometer and magnetometer.

Ground and helicopter radiometric traverses in Old Boolcoomata area and geological mapping (1:12000) located eleven anomalies for follow up including minor occurrences of brannerite near Mt Mulga barite mine. Detailed mapping (1:1200) and radiometrics over these anomalous areas showed no economic significance including Mt Mulga where three percussion holes BEZ 1-3 (total 91.5m) yielded no encouragement. Follow-up of Geophoto anomalies GK 1 to 13 in Kalabity area lead to discovery that most were due to mass effect from granitic rocks however GK1 and GK4 were examined in detail by mapping (1:480) and radiometrics with two diamond drillholes GK1A (90m) and GK1B (198.2m) at GK1, 8.8km NW Kalabity H.S. GK4 is 1200m WSW of Kalabity H.S. Mapping of a selected area near Kalabity at 1:12 000.

**MINERALISATION/PROSPECTS:** Most airborne anomalies proved to be caused by a mass effect from granitic rocks including the largest in Outalpa survey which proved to be granite at Binberrie Hill. Also many small occurrences of radioactive pegmatites in the southern part, which was mapped at 1:12000 in good quality (Env. 977-4). Ground follow-up (SML 209A) at 40 anomalies from the C.G.G. airborne survey in the Outalpa area (southern section) did not reveal the presence of any radioactive minerals although five areas showed significant ground radiometric anomalies (BB 1, BB 4, BB 25, BT 11 and BT 12) BB 25 is near Mount Bull Mine and BT 11 and BT 12 in the general Putt Well Mine area.

GK1 was mapped at 1:480 and 1:1200 and tested by two diamond drillholes GK1A and GK1B on same section. Only GK1A intersected radioactive mineralisation in the form of coarse monazite in two coarse mica veins up to 15cm thick within silica-pyrite alteration zone in andalusite schist. Other mica veins barren of monazite - no economic interest. GK4 after mapping and sampling showed no significant concentrations of uranium.

**DRILLING:** Percussion drillholes BEZ 1-3 at Mt Mulga (total 91.5m) (OLARY).

Diamond drillholes GK1A and GK1B at GK1 radiometric anomaly (total 288.2m) (CURNAMONA).

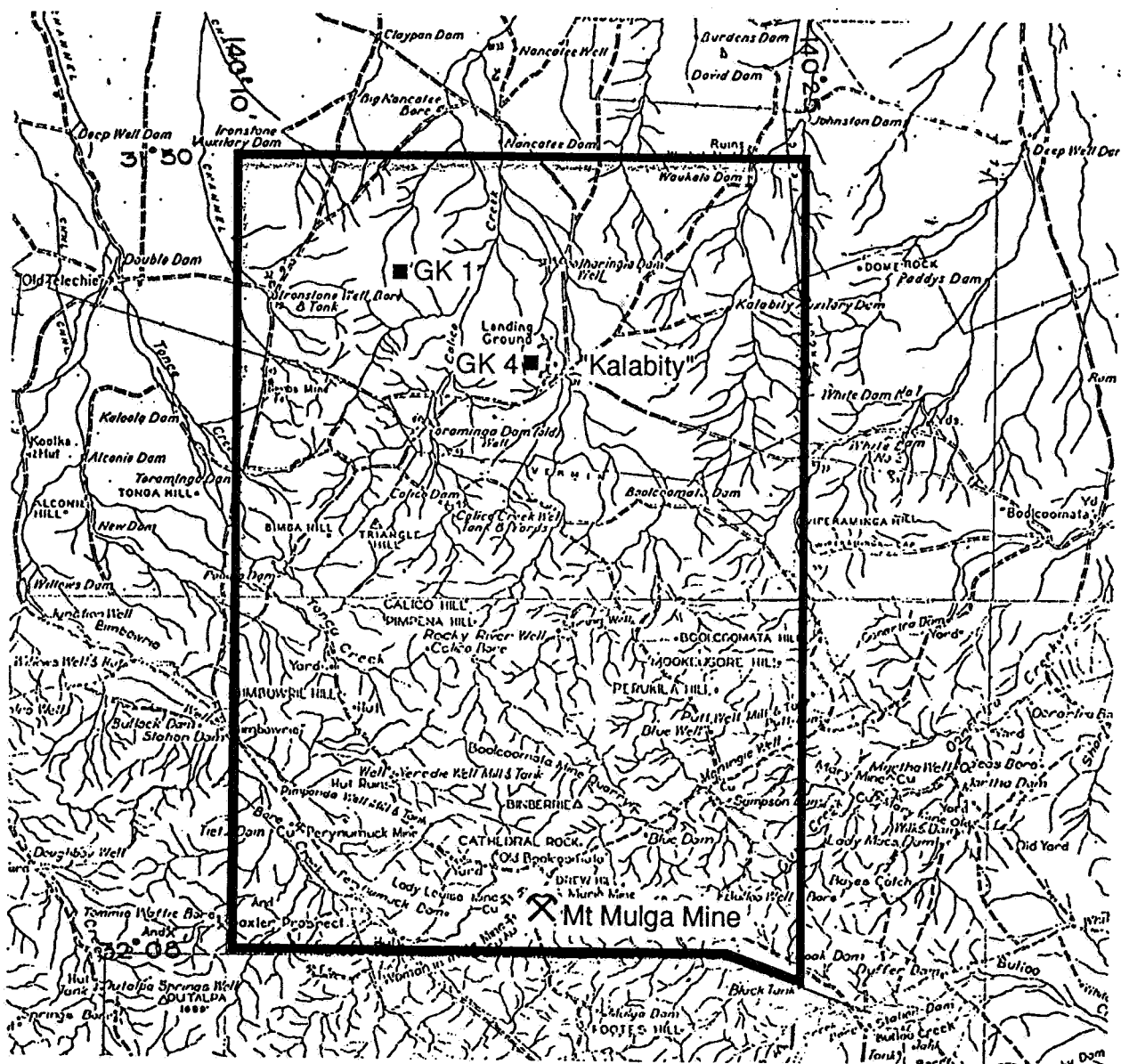


Figure 18

Applicant / Title Holder: Electrolytic Zinc Co. Aust. / Asia Ltd.  
and Newmont Pty. Ltd.

Licence N° : SML 209

DME\_SA 93-1550

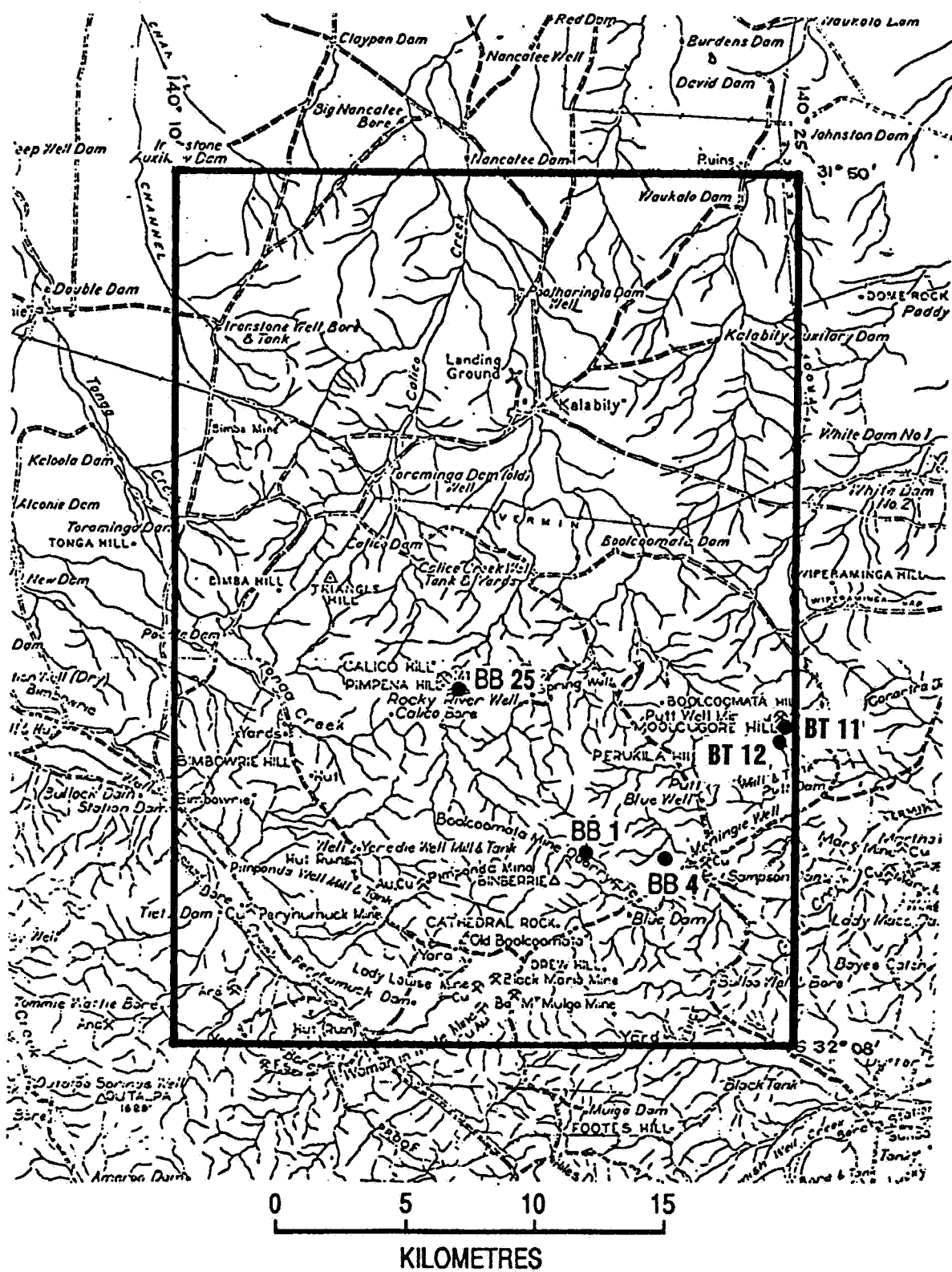


Figure 19

Applicant / Title Holder: Electrolytic Zinc Company of Aust/Asia Ltd.  
and Newmont Pty. Ltd.

Licence N° : SML 209A

DME\_SA 93-1572



TENEMENT: SML 210, 210 A (formerly SML 118; followed by SMLs 535, 673, ELs 62, 132, 259, 423, 794, 1119, 1497, 1864)

AREA: 880 sq. km

COMMENCEMENT DATE: 1/7/68

EXPIRY DATE: 30/6/71

COMPANY: ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED AND NEWMONT PROPRIETARY LIMITED

ENVELOPE: 1050, 1530

REFERENCES: Hayton, J.D., 1970: Crocker Well Feasibility Study. Amdel Report No. 705

LOCATION: Plumbago (Crocker Well)

1:250 000 SHEET: OLARY, CURNAMONA

1:100 000 SHEET: WINNININNIE 6833, CURNAMONA 6834

TARGETS: Uranium

AGE/ROCK UNITS: Palaeoproterozoic Willyama Supergroup.

EXPLORATION SUMMARY: The start of this intensive uranium exploration programme was receipt of results of a helicopter radiometric survey in the Crocker Well area in 1968 (see SML 118). A more comprehensive airborne magnetic and radiometric survey was flown by CGG in August 1969 at 400m line spacing and 100 m average terrain clearance covering the entire SML area. Much regional & local geological mapping had previously been completed under SML 118. Regional appraisal also included borewater sampling and the drilling of 189 wagon holes totalling 1858.2 m through alluvium covered area between Crocker Original and Crocker East. Following the CGG airborne survey 16 individual anomalies were followed-up in 1970 on the ground and one, GC 3, was covered by 457 m x 305 m grid radiometrics. In addition 14 areas were examined. Work on individual prospects involved:

Crocker Original: Radiometrics and magnetics, re-interpretation of Mines Dept drilling, ore reserve estimation, and drilling of 6 percussion holes (315.4 m) to test rocks in hanging wall of pre-delineated mineralized breccia.

Original Crocker Extended: 1:1 200 geology, magnetics, and drilling of 7 percussion holes totalling 207 m over helicopter radiometric anomaly.

Crocker East: Drilling of 3 percussion holes totalling 67.4 m as fill-in of hole pattern by Mines Dept and EZ (SML 118). Ore reserve estimation (also at Central & Southwestern).

East Crocker Extended: Grid radiometrics.

Crocker South-East: Grid radiometrics.

Camp South: (800 m southeast of Crocker Well). Follow-up of helicopter radiometric anomalies with 1:1200 geology and drilling of 13 percussion holes (384.7 m).

Monazite Prospect: 1:1200 geology, grid radiometrics.

Mount Victoria: Percussion drilling (11 holes for 464 m) to test "buried southern lodes" on magnetite bearing zone.

Jagged Rocks: 1:1200 and 1:480 geology, grid magnetics, and drilling of 19 wagon holes totalling 432.9 m. Drill holes at each location were radiometrically logged and assayed for  $U_3O_8$  by fluorimetry at 1.5 m intervals where warranted.

Considerable difficulty was found in correlating estimates of uranium from radiometric logging with assays of percussion cuttings. Assays appear more reliable. Probe may overestimate by up to 1.6 times. Amdel feasibility study on Crocker and Mount Victoria was apparently not encouraging (report missing from envelope).

MINERALISATION/PROSPECTS: Airborne radiometric survey did not discover any new areas of mineralisation but two zones in vicinity of previously located uranium 1.6 km west Jagged Rocks and at Talbot Gum Creek were selected for further investigation (no work recorded).

Wagon drilling of 2700 m wide alluvium cover in Crocker Well area showed disappointing results. Best and most extensive anomaly was Area "E" 600 m southeast of Crocker Original with highest value 350 ppm U in CEZ 226, next best 200 ppm - no follow-up.

Crocker Original: Holes showed uranium mineralisation but relatively low grade intervals were encountered in the hanging wall to south of "breccia". Best 30.5 m at 0.88 lbs/ton  $U_3O_8$  (0.04%) and 61 m at 0.81 lbs/ton  $U_3O_8$  (0.036%) in CEZ 56, 57. Further south 0.5 lbs/ton (0.025%).

Original Crocker Extended: Drilling showed a mean value to 30 m depth of about 0.2 to 0.3 lbs/ton  $U_3O_8$  (0.009%-0.013%) with best interval 1.5 m at 0.09%  $U_3O_8$  in CEZ 23.

Crocker East: Infill drilling cast doubt on the continuity of the very high grade intervals ( $>2.2\%$   $U_3O_8$ ) from Mines Dept diamond coring. Best value was 1.5 m at 0.8%  $U_3O_8$  (see also check drilling under SML 118). Correlation difficulties between probe & chemical analyses of SADME core.

Camp South: Low grade values were intersected in all holes - best 29.2 m at 0.35 lbs/ton  $U_3O_8$  (0.016%) at Area B South. Most holes 0.1 lbs/ton (0.004%) or less.

Mount Victoria:

Drilling showed two subeconomic grade lenses of low grade davidite maximum 61 m long in the position of the "buried southern lodes". Assay results disappointing with best 7.6 m at 0.86 lbs/ton  $U_3O_8$  (0.038%) in VEZ 1 (probably oblique intersection). Thirty core holes previously drilled by SADME.

Jagged Rocks:

Uranium is in discontinuous small lenses which did not persist in depth in Eastern area - maximum 650 tonnes per vertical metre at about 11b/ton  $U_3O_8$  (0.04%) - average thickness 2.4 to 3 m. Best 6.1 m at 1.25 lbs/ton  $U_3O_8$  (0.055%) in JEZ12. In Western area best intersection 10.7 m at 0.9 lbs/ton  $U_3O_8$  (0.04%) in JEZ 11.

Ore Reserves:

A range of estimates were made of individual prospects using radiometric probe and assay results and by applying a cut to probe assays. These included:

Crocker Original (breccia body)	366 000 tonnes at between 0.63 and 1.05 lbs/ton (0.03-0.05%) $U_3O_8$ .
Crocker Main	1.29 million tonnes at 0.58 lbs/ton (0.02%) $U_3O_8$ .
Eastern	2.28 million tonnes at 0.45-0.68 lbs/ton (0.02-0.03%) $U_3O_8$ .

Estimates were also made for Central & Southwestern. Tonnages differed markedly from SADME estimates. Overall the erratic distribution of uranium minerals and associated grade estimation problems were recognized.

Anomaly Follow-up: No large surface expressions of uranium mineralisation were found and none were believed to have high potential although GC 3 and Talbot Gum Creek Prospect were considered worthy of further attention. Uranium or more anomalous radioactivity was also found at Area H, GT-11, GT-25, GT-43, GC-3, GD-4, PT-5 with 3.6% U at GT-11.

DRILLING:Percussion

Prospect	No Holes	Metres	Sheet
Crocker Original	6	CEZ 53-58 315.4	OLARY
Original Crocker Extended	7	CEZ 22-28 207.0	OLARY
Crocker East	3	CEZ 34-36 67.4	OLARY
Camp South			
Area A	3	CEZ 30,31,33 111.3	OLARY
Area B	7	CEZ 37-39,41-43,51 221.3	OLARY
Area C	3	CEZ 45,46,52 52.1	OLARY
Mount Victoria	11	VEZ 1-5,7,11-15 464.0	CURNAMONA
Total	40	holes for 1438.5 metres	
<u>Wagon</u>			
Jagged Rocks	19	JEZ 1-19 432.9	CURNAMONA
Crocker Well Alluvium	189	CEZ 59-248 1858.2	OLARY
Total	208	holes for 2291.1 metres	

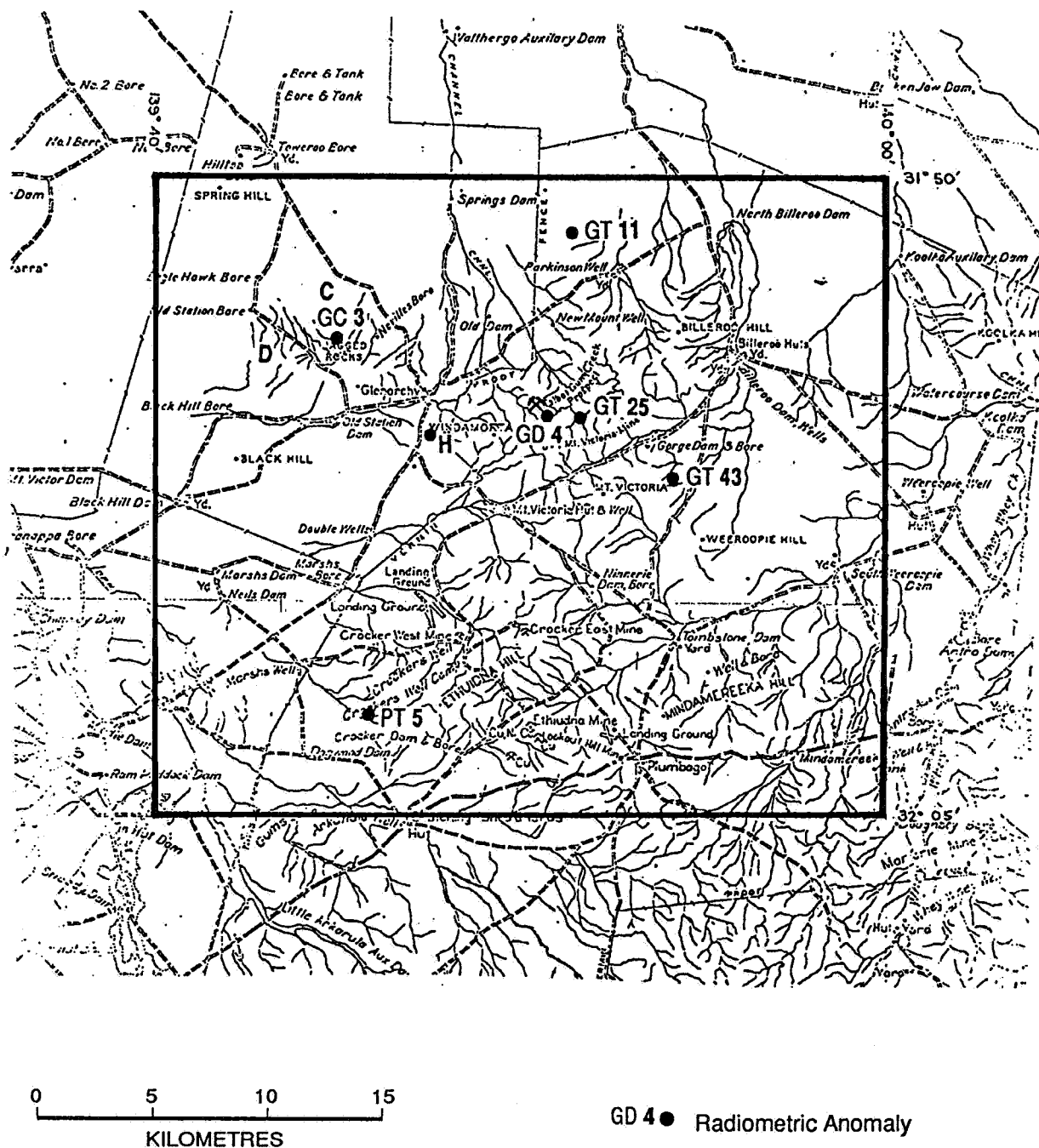


Figure 20

Applicant / Title Holder: Electrolytic Zinc Company of Aust/Asia Ltd.  
and Newmont Pty. Ltd.

Licence N° : SML 210 / 210A

DME\_SA 93-1573

**TENEMENT:** SML 222 followed by SMLs 440, 562, 595, 677, 714, ELs 85, 132, 259, 377, 423, 597, 794, 1004, 1119, 1412, 1497, 1786, 1864)

**AREA:** 2590 sq. km

**COMMENCEMENT DATE:** 22/7/68

**EXPIRY DATE:** 21/7/70

**COMPANY:** MOUNT ISA MINES LIMITED

**ENVELOPE:** 999, 1111, 1372

**REFERENCES:** Binks, P.G., 1969, 1970; Shalley, M.J., 1969.

**LOCATION:** Cockburn - Boolcoomata - Kalkaroo

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** MINGARY, 7033, OLARY 6933, KALABITY 6934, MULYUNGARIE 7034.

**TARGETS:** Uranium, sedimentary uranium copper

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup and Quaternary cover rocks.

**EXPLORATION SUMMARY:** Airborne spectrometer survey by Geophoto Resources Consultants in December 1968 on 800 metre line spacing. Ground follow-up of airborne anomalies. Sampling of 14 water bores through SML and gamma ray logging of water bores. Geobotanical orientation survey from trees on creeks. Twenty one scout holes totalling 1128 metres were drilled in Cainozoic sediments to explore for sedimentary uranium along Oonarttra Creek drainage system. Drilling at KN/6 hard rock radiometric anomaly, 1.6 km north of Waukaloo Mine of 5 holes totalling 73.2 metres (K22 abcde) One hole (K22a) averaged 0.4 lb/ton  $U_3O_8$  over 3 metres. Soil sampling, 245 samples analysed for Cu at Waukaloo Mine, and some soil sampling for Cu, Pb, Zn 9.5 km south-west of Boolcoomata H.S.

Southern part of SML relinquished in favour of the northern portion as SML 440.

**MINERALISATION/PROSPECTS:** Analysis of water bore samples especially in the headwaters of Oonarttra Creek south of Boolcoomata H.S. prompted recognition of the large quantities of uranium being mobilised for potential deposition in Cainozoic basins further north. Gamma ray logging of water bores yielded one anomalous result in bore approximately 10 km NNE Boolcoomata H.S. Later drilling of 21 scout holes show no economic uranium but interesting anomalous gamma ray logs in thick sands and gravel in K2 also in vicinity of anomalous water bore (above).

Drilling at KN/6 showed 3 metres at 175 ppm  $U_3O_8$  (0.4 lbs/ton  $U_3O_8$ ) in one hole.

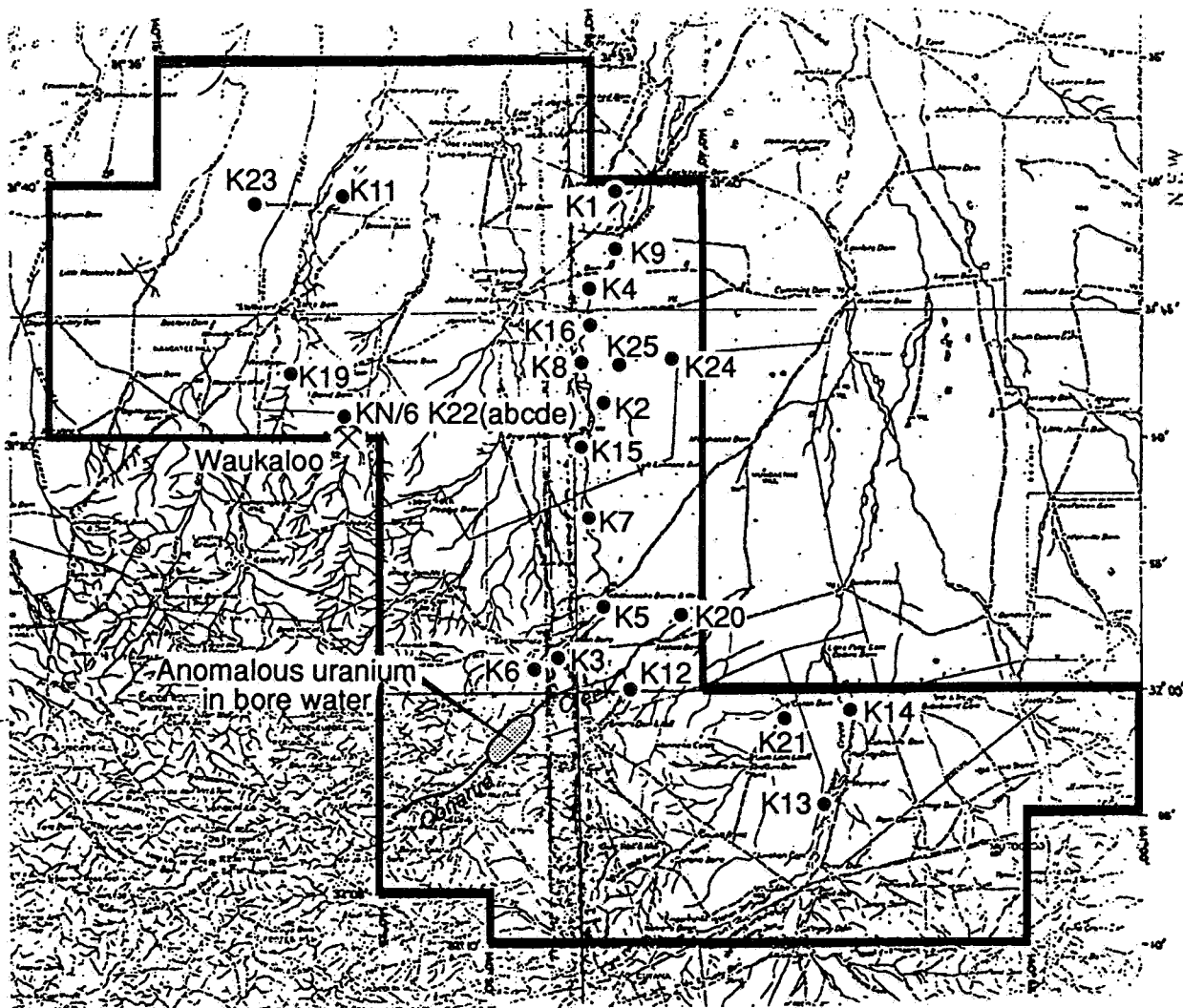
Proposal for drilling at Waukaloo Mine and further holes at KN/6.

**DRILLING:**

21 scout rotary percussion holes totalling 1128 metres.

5 percussion holes totalling 73.2 metres at KN/6.

Note 3 holes (K 13, K 14, K 21) drilled on OLARY (77.7 metres).



0 4 8 12 16 20  
KILOMETRES

Figure 21

Applicant / Title Holder: Mount Isa Mines Limited

Licence N° : SML 222

DME\_SA 93-1551



TENEMENT: SML 241

AREA: 259 sq km

COMMENCEMENT DATE: 30/9/68

EXPIRY DATE: 29/9/70

COMPANY: M.A.T. EXPLORATION PTY LIMITED

ENVELOPE: 1176

REFERENCES:

LOCATION: Kalkaroo

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: KALABITY 6934

TARGETS: Uranium

AGE/ROCK UNITS: Palaeoproterozoic Willyama Supergroup and younger cover

EXPLORATION SUMMARY: An airborne gamma ray spectrometer and magnetic survey (1350 line km) was flown in 1969 by Geophysical Resources Development at 200 metre line spacing on north-south lines.

Interpretation of the data showed no significant radiometric anomalies.

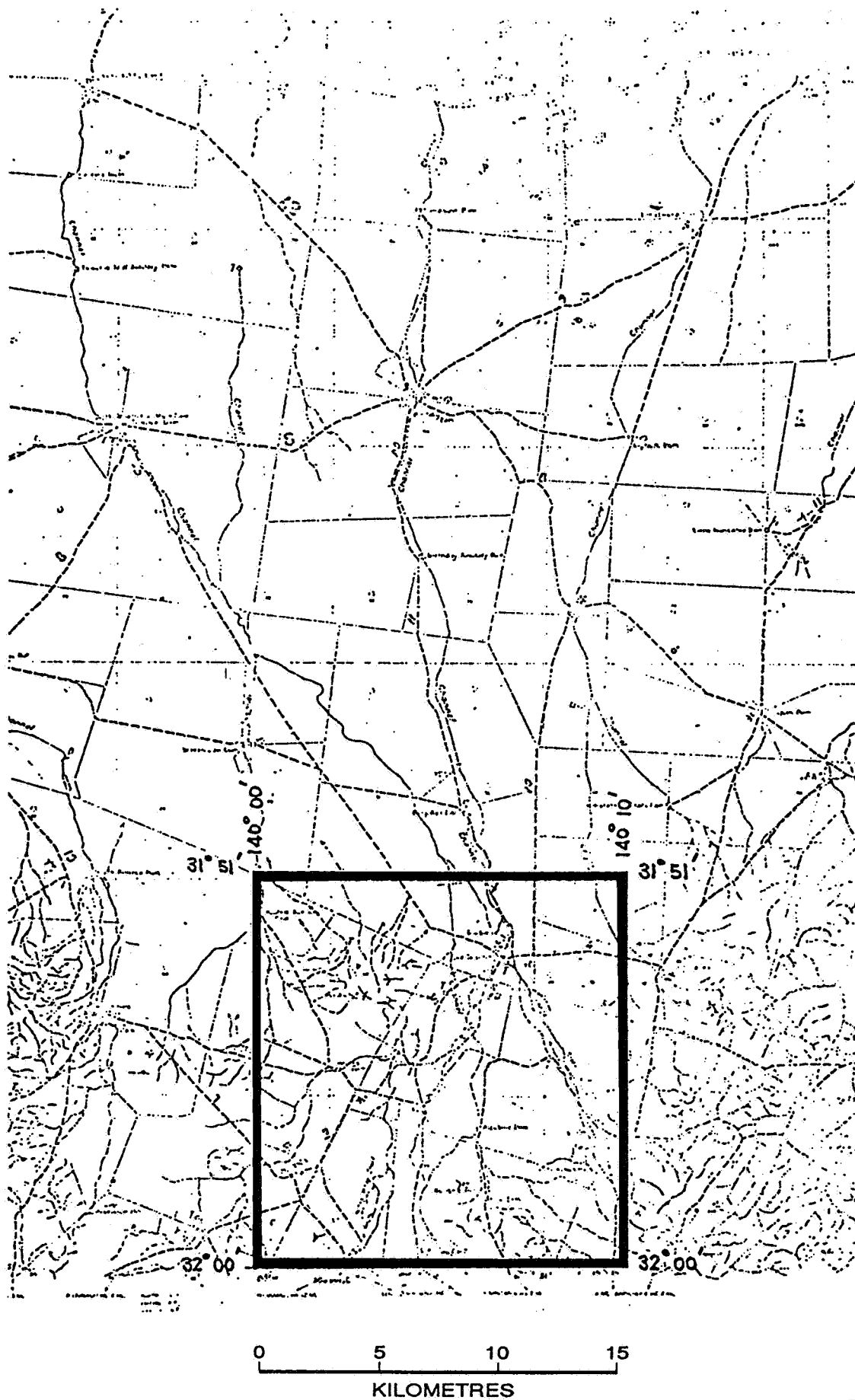


Figure 23

Applicant / Title Holder: M.A.T. Exploration Pty. Ltd.

Licence N° : SML 241

DME\_SA 93-1552

TENEMENT: SML 242

AREA: 11.4 sq km

COMMENCEMENT DATE: 30/9/68

EXPIRY DATE: 29/9/70

COMPANY: M.A.T. EXPLORATION PTY LIMITED

ENVELOPE: 1176, 1177

REFERENCES:

LOCATION: Tooweroo Bore/Spring Hill

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: CURNAMONA 6834

TARGETS: Uranium

AGE/ROCK UNITS: Palaeoproterozoic Willyama Supergroup

EXPLORATION SUMMARY: An airborne gamma ray spectrometer/magnetic survey (128 line km) by Geophysical Resources Development was flown in 1969 at 200 metre line spacing on both north-south and east-west lines over the small licence area containing the Spring Hill uranium occurrence (leases held by Mrs M E J Talbot). This occurrence was tested by 4 diamond drill holes by SADME in 1954 and two holes (Nos 3 and 4) intersected 5.2 metres at 0.116%  $U_3O_8$  and 2.5 metres at 0.6%  $U_3O_8$  respectively.

A grid was laid out over about 3.9 sq km with 61 and 122 metre spaced lines. The grid geology was mapped at 1:2400, soils were sampled and analysed for Cu, Pb, Mo, Au and ground radiometric and magnetic surveys were conducted.

MINERALISATION/PROSPECTS: Geological mapping showed small isolated davidite occurrences especially in lateritic soils. The good quality mapping shows complex geology, which is predominantly gneissic granites, schists and pegmatites. Two zones of uranium mineralisation (davidite) with associated sericite alteration trend roughly 35° in gneiss or biotite granite.

The radiometric survey showed 100 cps over a large area with spot highs to 2100 cps. Several new radioactive occurrences were found on the Talbot leases.

Mo soil values were low (<150 ppm) and there were isolated spot highs in Cu and Pb. Au was below the level of detection in almost all instances.

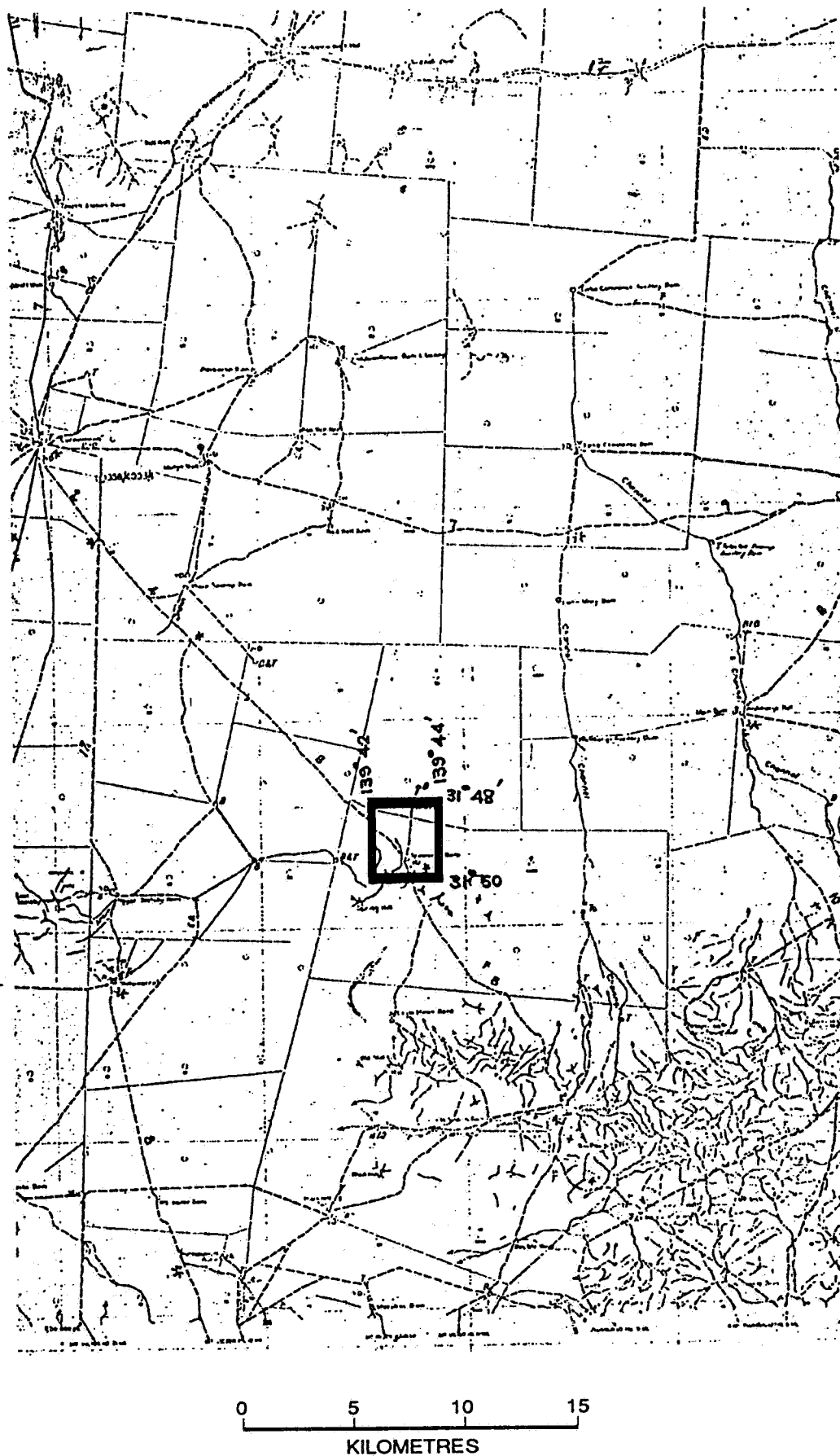


Figure 22

Applicant / Title Holder: M.A.T. Exploration Pty. Ltd.

Licence N° : SML 242

DME\_SA 93-1553

TENEMENT: SML 244 (followed SML 589; ELs 430, 463, 559, 1471)

AREA: 1502 sq km

COMMENCEMENT DATE: 8/10/68

EXPIRY DATE: 7/10/70

COMPANY: PETROMIN NL, TRANSOIL NL, EXOIL NL

ENVELOPE: 1041

LOCATION: Lake Frome South

1:250 000 SHEET: CURNAMONA, FROME

1:100 000 SHEET: PASMORE 6835, FROME 6836

TARGETS: Sedimentary uranium

AGE/ROCK UNITS: Quaternary and Tertiary sediments of Tarkarooloo Sub-basin possibly some Cretaceous.

EXPLORATION SUMMARY: Exploration involved the rotary drilling and downhole gamma logging of 35 rotary holes (244-1 to 244-38) totalling 5137.8 metres in the south-western sector of the SML near the southern shore of Lake Frome. Hole depths ranged between 93 metres and 175 metres and averaged 147 metres.

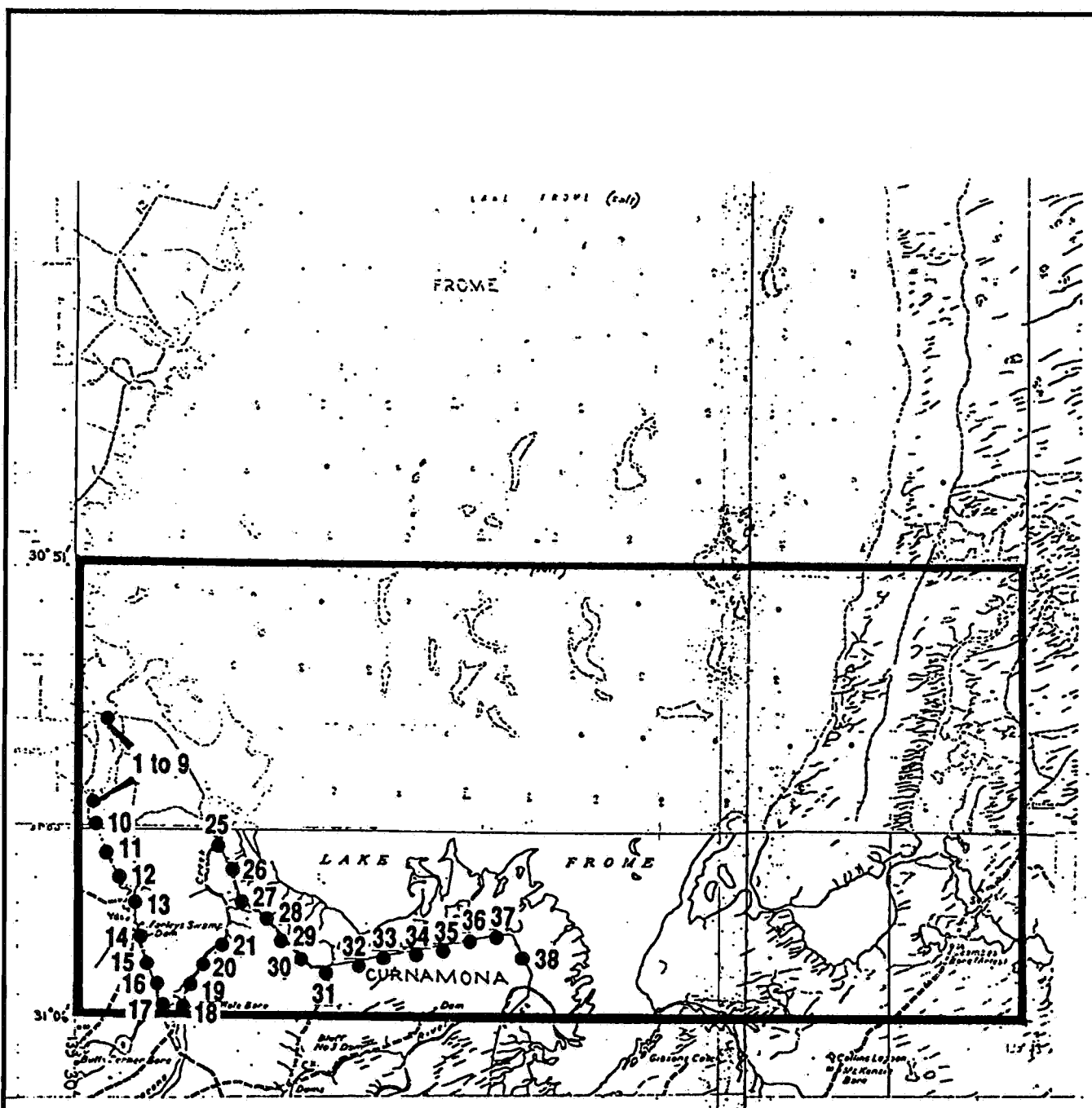
MINERALISATION/PROSPECTS:

The Cainozoic sediments were dominantly clays with some silt and occasional sandy horizons. They occur from surface to 137 metres in the western portion of the SML and to less than 61 metres in the eastern part where there is apparently a structural high of Cretaceous sediments.

No significant gamma-ray responses were intersected in the drilling.

DRILLING: Thirty-five rotary holes (244-1 to 244-38 with 3 not drilled) totalling 5137.8 metres.

Note Holes 244-1 to 244-10 drilled on FROME (1595.6 metres).



0 4 8 12 16 20  
KILOMETRES

38 ● Rotary drill hole location and number (prefix 244)

Figure 24

Applicant / Title Holder: Exoil N.L., Transoil N.L., & Petromin N.L.

Licence N° : SML 244

DME\_SA 93-1576

TENEMENT: SML 266

AREA: 1761 sq km

COMMENCEMENT DATE: 2/12/68

EXPIRY DATE: 1/12/70

COMPANY: PLANET MINING COMPANY PTY LTD

ENVELOPE: 1081

REFERENCES: Shipway, C H and Baird, J, 1970: Special Mining Lease 266, Frome Downs, South Australia, Final Report. Planet Mining Company Pty Ltd (unpublished).

LOCATION: Lake Charles, (Mulyungarie)

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: LAKE CHARLES 7035

TARGETS: Gypsum (for sulphur supply)

AGE/ROCK UNITS: Quaternary/Callabonna Basin

EXPLORATION SUMMARY: Exploration for gypsum which could be converted to sulphur using nearby natural gas involved review of water bore records, inspection and collection of sediments in dam walls, and some very shallow auger drilling, soil sampling, and several chemical analyses.

MINERALISATION/PROSPECTS: An extensive gypsum bearing clay sequence was located in 11 water bores and 16 dams over an area of 650 sq km. This sequence which was up to 15 metres thick beneath up to 5 metres of sand/clay overburden occurred in the south-east quadrant of the SML adjacent to the NSW border. Earthy lower grade gypsum was found in outcrop near Birksgate Dam. It was concluded that there was a large tonnage of gypsum in the SML but that the supply/demand outlook for sulphur produced by this means had changed for the worse as a result of large scale production of sulphur from sour gas in Canada.





**TENEMENT:** SML 267 (followed by SML 544 and ELs 42, 109, 227, 411, 722 Pacminex; ELs 254, 297, 523 Minad-Teton, EL 1065 AAR and EL 1487 Placer)

**AREA:** 2564 sq km

**COMMENCEMENT DATE:** 1/1/69

**EXPIRY DATE:** 31/12/70

**COMPANY:** ERIC A RUDD PTY LTD

**ENVELOPE:** 1109

**REFERENCES:** Rudd, E A, 1970. Report of Investigations. Lake Frome Embayment, South Australia. SMLs 267 and 268, 1969 and 1970. Eric A Rudd Pty Ltd. (unpublished)

**LOCATION:** Curnamona

**1:250 000 SHEET:** CURNAMONA, PARACHILNA

**1:100 000 SHEET:** WILLIPPA 6734, CURNAMONA 6834, KALABITY 6934

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Quaternary and Tertiary sediments of Tarkarooloo sub-basin principally Eyre and Namba Formations, overlying Cretaceous, Cambrian and Proterozoic basement.

**EXPLORATION SUMMARY:** The objective was to explore for roll front sedimentary uranium deposits in Tertiary and Mesozoic sediments of the unexplored Lake Frome Embayment. The programme was conducted on SMLs 267 and 268 combined. After a review of water well and geophysical data a core drilling programme in 1969 of 10 holes (EAR 1 to 9 plus 7A) totalling 1408.8 metres was completed on three sections within SML 267 and 268. Water samples were also collected and the holes were logged by SADME for gamma, resistivity and spontaneous potential. In the first half of 1970, rotary drilling was of EAR 10 (adjacent to EAR 9, the most radioactive hole in the first phase) and EAR 11 to 21 (total 1286.6 metres). In the latter part of 1970 a further 7 holes (EAR 22-28, total 745.7 metres) were drilled to close up around EAR 11 and to provide more reconnaissance coverage.

The logging for 1970 drilling was as for 1969 except for the addition of a neutron probe. Water samples were again collected.

The total metreage drilled was 3441 in 29 holes of which 19 holes totalling 2648 metres were drilled in EL 267. (EAR 1, 2, 3, 7, 7A were cored). Hole depths ranged from 88 to 162.5 metres.

**MINERALISATION/PROSPECTS:** The early core drilling was not suitable for the more prospective sand sections. The sediments intersected were unconsolidated clays and predominantly thin sands with a partly oolitic limestone maker horizon (3 to 10 m thick) especially in the north. Above the limestone the section is oxidized while below it is unoxidized with more prospective thicker sands towards the base of the section. Carbonaceous material was noted below the limestone but no well defined lignitic horizons. Basement was deeply weathered Precambrian in the south and definite Cambrian in the north (EAR 7).

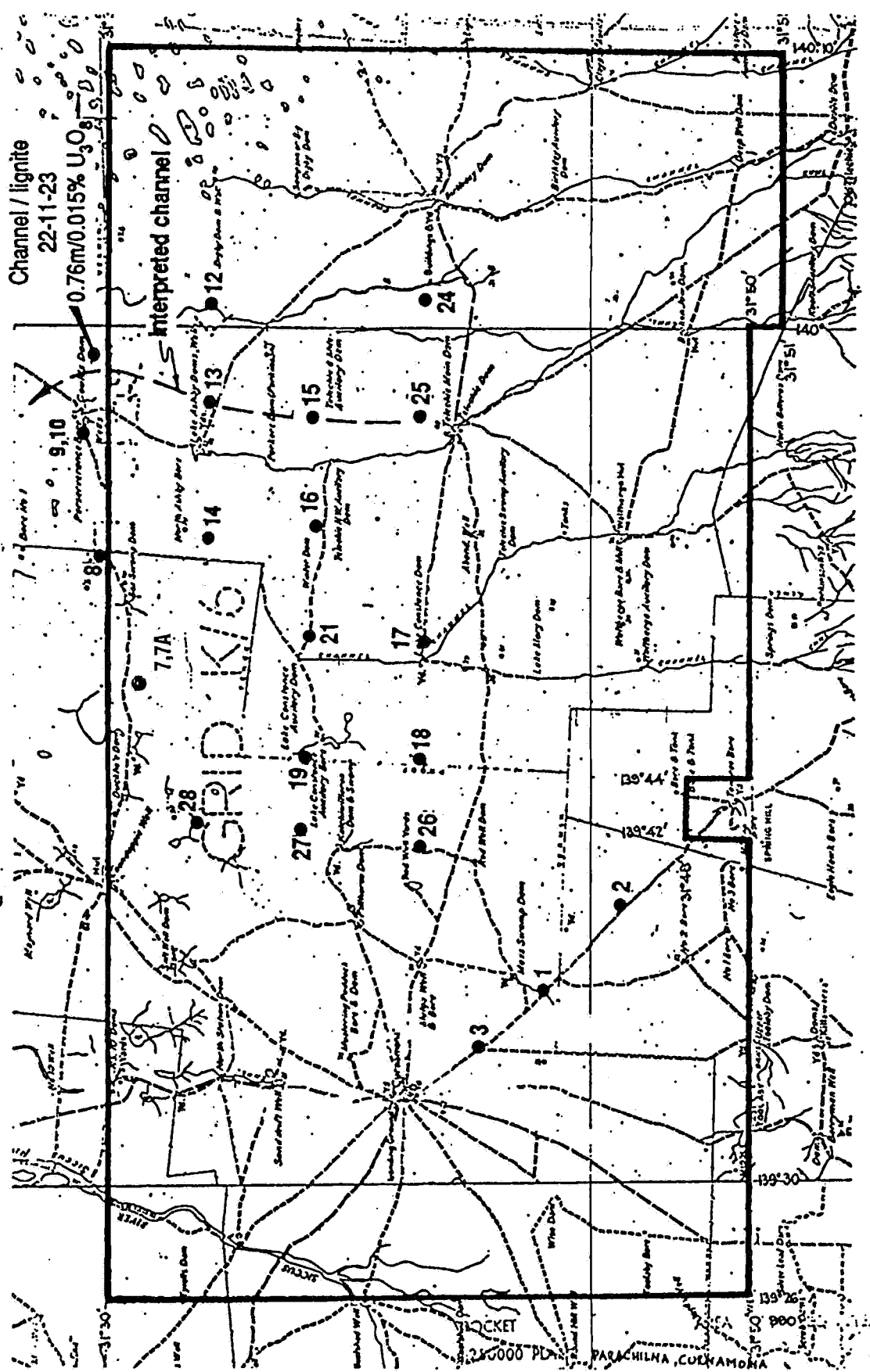
Water samples showed values up to 170 ppb uranium in EAR 20 and 150 ppb in EAR 3 (a total of 10 holes were sampled).

Radiometric logging gave the most encouraging results in the vicinity of Goulds Dam in the south-east corner of SML 268 and north-east section of SML 267 with the interpretation of a sand palaeo channel through the general EAR 15, 13, 9, 10, 11, 20, 22, 23 area. The Lower Tertiary sand interval was up to 27 metres thick in EAR 11. EAR 9 the first hole in this channel showed anomalous radioactivity from 85.4 to 109.8 metres. (Note Pacminex later defined a uranium resource in this area). Coring of most radioactive section in EAR 22 from 90.5 to 100.9 metres intersected uranium mineralization with best interval 0.02%  $U_3O_8$  from 92.5 to 93.3 metres. A lignitic horizon was detected in EAR 11, 22 and 23 but it proved to be of limited extent.

A channel was also suspected to be present in the vicinity of EAR 7.

In EAR 19, a 5 cm piece of clay containing a black mineral from a depth of 100 metres showed 1.48% U. No further holes were drilled to follow-up.

DRILLING: Nineteen rotary holes (EAR 1-3, 7, 7A, 12-19, 21, 24-29) totalling 2648 metres of which 5 holes for 702.4 metres (EAR 1, 2, 3, 7, 7A) were cored.



● 9 Rotary drill hole location and number (prefix EAR)



Figure 26

Applicant / Title Holder: E.A. Rudd Pty. Ltd.

Licence N° : SML 267

TENEMENT: SML 268 (followed by SML 543, EL 45, 109, 227, 337, 411, 722, 1065 CSR, 1487 Placer, 1698, 1738)

AREA: 2396 sq km

COMMENCEMENT DATE: 1/1/69

EXPIRY DATE: 31/12/70

COMPANY: ERIC A RUDD PTY LTD

ENVELOPE: 1110

REFERENCES: Rudd, E A, 1970. Report of Investigations Lake Frome Embayment, South Australia. SMLs 267 and 268, 1969 and 1970. Eric A Rudd Pty Ltd. (unpublished)

LOCATION: Frome Downs

1:250 000 SHEET: CURNAMONA, PARACHILNA

1:100 000 SHEET: PASMORE 6835, REAPHOOK 6735

TARGETS: Sedimentary uranium

AGE/ROCK UNITS: Quaternary and Tertiary sediments of Tarkalooloo Sub-basin principally Eyre and Namba Formations.

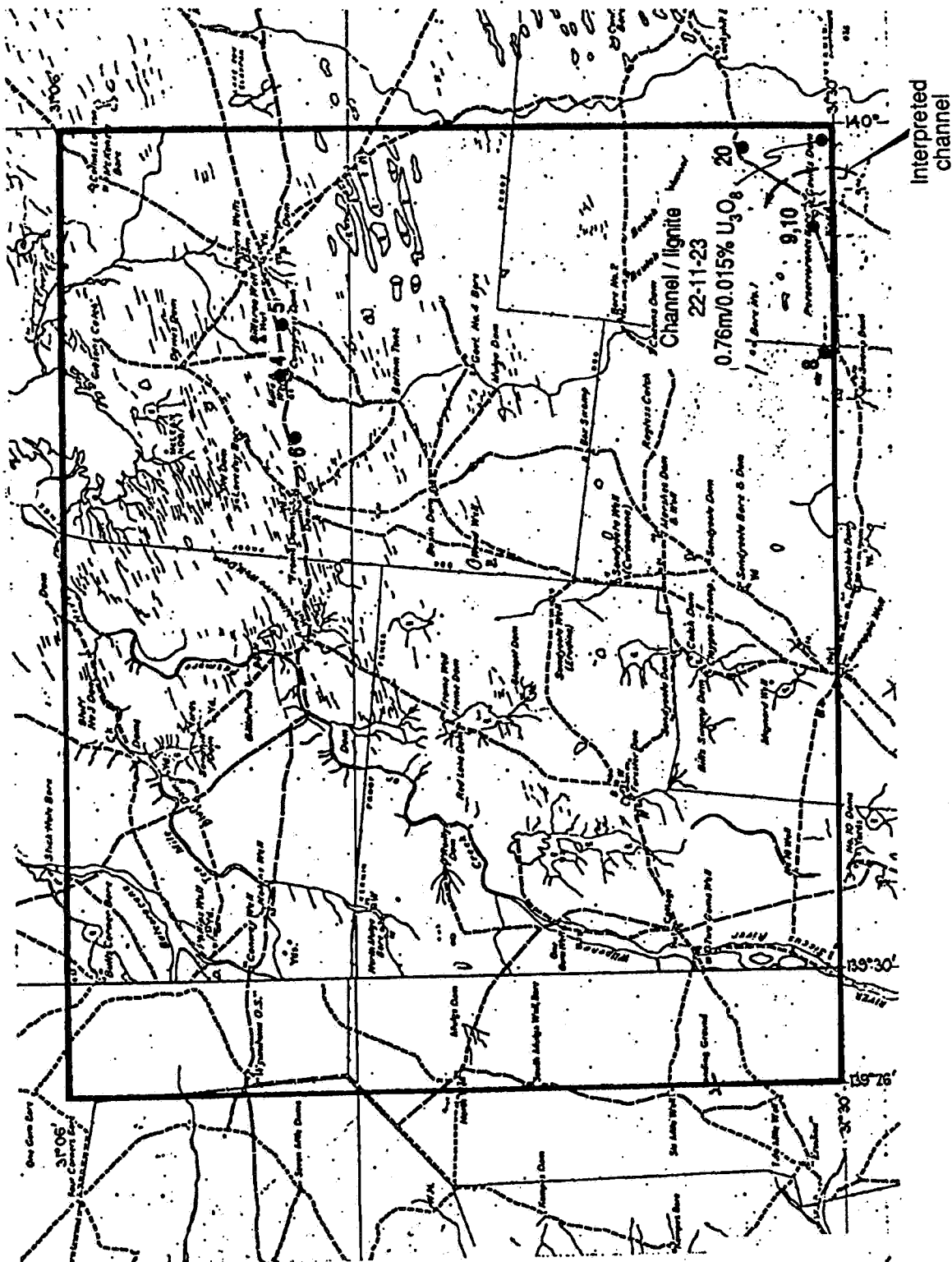
EXPLORATION SUMMARY: The objective was to explore for roll front sedimentary uranium deposits in Tertiary in Mesozoic sediments of the unexplored Lake Frome Embayment. The programme was conducted on SMLs 267 and 268 combined. After a review of water well data and geophysical data a core drilling programme in 1969 of 10 holes (EAR 1 to 9 plus 7A) totalling 1408.8 metres was completed on three sections within SML 267 and 268. Water samples were also collected and the holes were logged by SADME for gamma, resistivity and spontaneous potential. In the first half of 1970, rotary drilling was of EAR 10 (adjacent to EAR 9, the most radioactive hole in the first phase) and EAR 11 to 21 (total 1286.6 metres). In the latter part of 1970 a further 7 holes (EAR 22-28, total 745.7 metres) were drilled to close up around EAR 11 and to provide more reconnaissance coverage.

The logging for 1970 drilling was as for 1969 except for the addition of a neutron probe. Water samples were again collected.

The total metreage drilled was 3441 in 29 holes of which 19 holes totalling 2648 metres were drilled in EL 267. (EAR 1, 2, 3, 7, 7A were cored). Hole depths ranged from 88 to 162.5 metres.

MINERALISATION/PROSPECTS: The early core drilling was not suitable for the more prospective sand sections. The sediments intersected were unconsolidated clays and predominantly this stands with a partly oolitic limestone maker horizon (3 to 10 m thick) especially in the north. Above the limestone the section is oxidized while below it is unoxidized with more prospective thicker sands towards the base of the section. Carbonaceous material was noted below the limestone but no well defined lignitic horizons. Basement was largely Cambrian sediments.

Water samples showed values up to 170 ppb uranium in EAR 20 and 150 ppb in EAR 3 (a total of 10 holes were sampled).



● Rotary drill hole location and number (prefix EAR)

0 5 10 15  
KILOMETRES

Figure 27

Applicant / Title Holder: E.A. Rudd Pty. Ltd.

Licence N° : SML 268

DME\_SA 93-1579

Radiometric logging gave the most encouraging results in the vicinity of Goulds Dam in the south-east corner of SML 268 and north-east section of SML 267 with the interpretation of a sand palaeochannel through the general EAR 15, 13, 9, 10, 11, 20, 22, 23 area. The Lower Tertiary sand interval was up to 27 metres thick in EAR 11. EAR 9 the first hole in this channel showed anomalous radioactivity from 85.4 to 109.8 metres. (Note Pacminex later defined a uranium resource in this area). Coring of the most radioactive section in EAR 22 from 90.5 to 100.9 metres intersected uranium mineralization with best interval 0.02%  $U_3O_8$  from 92.5 to 93.3 metres. A lignitic horizon was detected in EAR 11, 22 and 23 but it proved to be of limited extent.

A channel was also suspected to be present in the vicinity of EAR 7.

In EAR 19, a 5 cm piece of clay containing a black mineral from a depth of 100 metres showed 1.48% U. No further holes were drilled to follow-up.

DRILLING: Ten rotary holes totalling 793 metres (EAR 4-6, 8-11, 20, 22, 23) of which 5 holes (EAR 4-6, 8, 9) for 690.5 metres were cored.



TENEMENT: SML 269 (formerly SMLs 151, 172; followed by SMLs 562, 677, MLS 3371, 3557, to 3562 ELs 47, 132, 259, 423, 794, 1119, 1497, 1864).

AREA: 20.7 sq km

COMMENCEMENT DATE: 16/1/69

EXPIRY DATE: 15/1/71

COMPANY: TRANS AUSTRALIAN EXPLORATIONS PTY LTD AND DOME ROCK PTY LTD

ENVELOPE: 1085

REFERENCES: Horn, C.M. and Duncan, N., 1969. Dome Rock Copper Prospect, South Australia. Summary Stages I, II and III Results. Trans Australian Explorations Pty Ltd (unpublished).

Horn, C.M., 1969: Report on Diamond Drilling Programme at Dome Rock Copper Prospect, South Australia. Trans Australian Explorations Pty Ltd (unpublished)

LOCATION: Dome Rock Mine

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: KALABITY 6934

TARGETS: Copper

AGE/ROCK UNITS: Palaeoproterozoic Willyama Supergroup.

EXPLORATION SUMMARY: The entire SML was gridded on lines spaced 122 metres apart and the gridded area was mapped in detail at 1:4 800 scale. An auger drilling programme involving 787 holes at mainly 30.5 m intervals and totalling 2310 metres was completed largely on the 122 metre spaced grid lines over a northeast-southwest interval of 854 metres. Bottom hole samples were analysed for copper by AAS and some were analysed by emission spectrograph for a wide range of elements. An IP survey was conducted by McPhar Geophysics in March-April 1969 on nine southeast-northwest lines covering a northeast-southwest interval of 2561 metres for a total of 33 line km at predominantly 61 metre electrode spreads. 800 soil samples were collected and analysed and 1024 metres of costean within a 732 metre strike interval were excavated and channel sampled. Rock samples were geochemically analysed and petrographically examined. Magnetic and scintillometer surveys were undertaken on 17 lines spaced 366 metres apart and a reconnaissance EM survey trial was run to check I.P. results. Three westerly inclined diamond drill holes (DDH 1/69, DDH 2/69, DDH 3/69) totalling 628.4 metres were completed in December 1969 on three lines over a strike of 610 metres to test the more intense copper geochemical and I P anomalies under Day and Meehan Shafts and in the vicinity of an outcropping ironstone gossan horizon. Core was sampled at about 1.5 metre intervals and analysed for copper throughout with a large majority for cobalt. Early samples from DDH1 were analysed for Pb and Zn with selected samples, notably ironstone, for Ag and As.

**MINERALISATION/PROSPECTS:** Ground surveys showed a zone of coincident strong copper geochemistry (>500 ppm) and IP anomalies and weak magnetic response over a strike length of at least 730 metres over a width of 91 to 122 metres near the baseline OOE. DDH 2 and DDH 3 were drilled under zones which showed auger geochemistry with maxima of 8500 ppm and 9800 ppm Cu respectively. The eastern edge of the anomaly is an ironstone gossan. The trench on OON at Meehan Shaft showed 0.68% Cu over 25.8 metres. DDH 1 was drilled beneath Meehan Shaft and DDH 2 near Day Shaft which is about 260 metres further to the south-west.

Sulphide mineralisation at Dome Rock is largely confined to a thick section (over 100 metres) of 60° south-east dipping dark grey siliceous hornfels which is bounded to the east by a cellular ironstone gossan and a sandstone, and to the west by a black micaceous, graphitic and pyritic schist containing several chistolite horizons and calc-silicate rocks. Sulphides which average about 5% in the better mineralized low grade copper intervals are pyrite, arsenopyrite and chalcopyrite occurring as stringers, blebs and disseminations in the hornfels over wide intervals eg about 90 metres down hole width in DDH 1 containing intercepts such as 9 metres at 0.44% Cu, 7.2 metres at 0.26% Cu and 7.2 metres at 0.24% Cu. Gold analyses on selected samples were all low. Mineralisation in DDH 2 was somewhat weaker and DDH 3 weaker still. IP anomalies were explained by sulphide and graphite. Consequently it was concluded that although there were wide intervals of copper mineralisation, grades were too low to be economic. Further drilling could not be justified especially since the three holes were drilled into the most promising locations defined by geology and geophysics.

The origin of the massive, ferruginous gossan-like band up to 10 metres thick which is folded into a synform in the eastern section of the drilled stratigraphy was not explained although it was considered it was probably a leached high sulphide zone probably with a low copper content. (12.5 metres at 0.19% Cu in DDH 1, 5.8 metres at 0.2% Cu in DDH 2, and an even thicker interval (50 metres) in DDH 3 near fold a nose). Silver content of ironstones was up to 12 ppm.

**DRILLING:** Three diamond drill holes (DDH 1, 2,3/69) totalling 628.4 metres. 787 auger holes totalling 2310 metres.

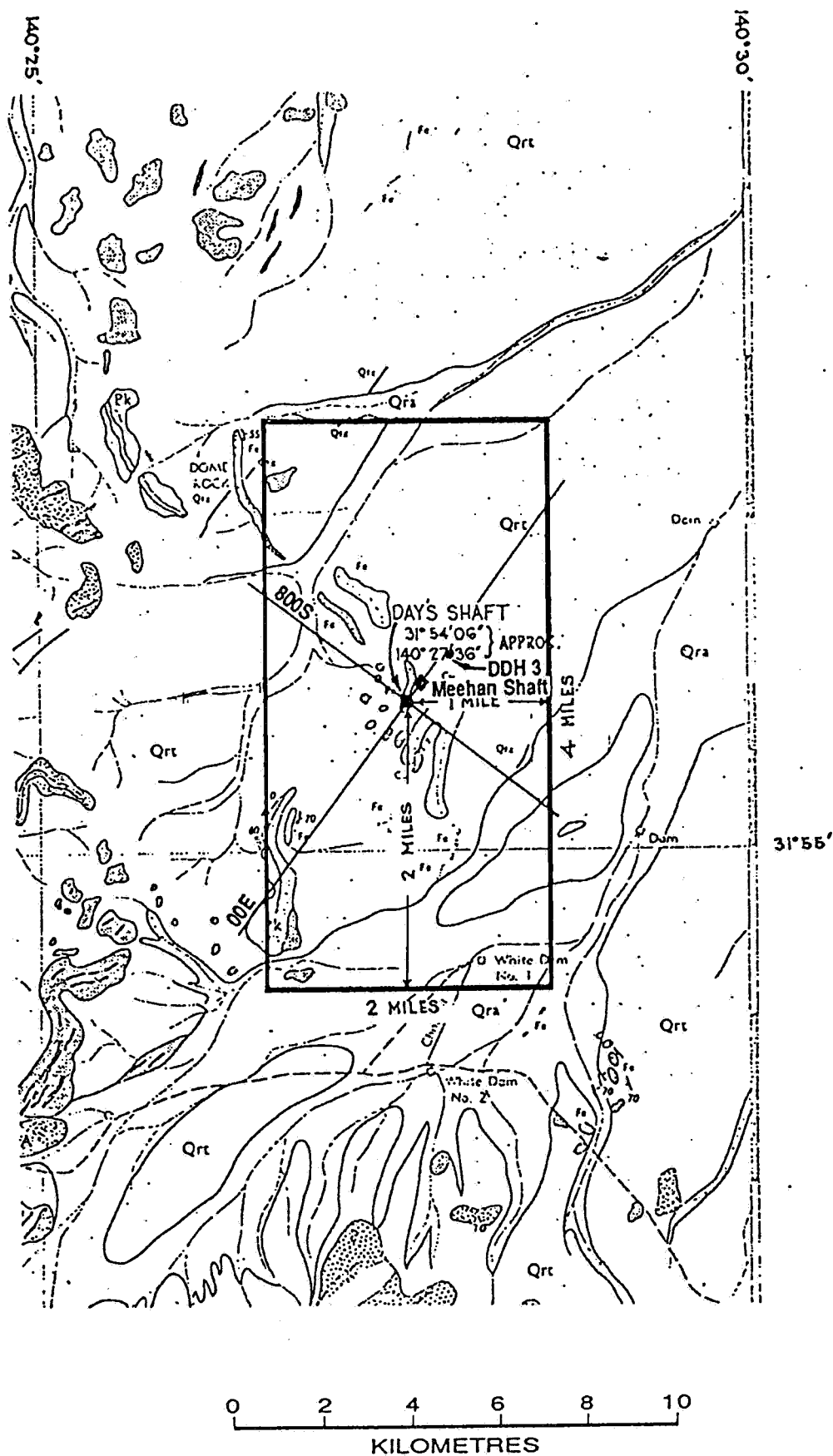


Figure 28

Applicant / Title Holder: Trans Australian Explorations Pty. Ltd.  
and Dome Rock Pty. Ltd.

Licence N° : SML 269

DME\_SA 93-1554

**TENEMENT:** SML 273

**AREA:** 259 sq km

**COMMENCEMENT DATE:** 24/2/69

**EXPIRY DATE:** 23/11/69

**COMPANY:** CRA EXPLORATION PTY LIMITED

**ENVELOPE:** 1250

**LOCATION:** Toolaby

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Cainozoic sediments of the Tarkarooloo Sub-basin & Callabonna Basin principally Willawortina Formation overlying Adelaidean sediments.

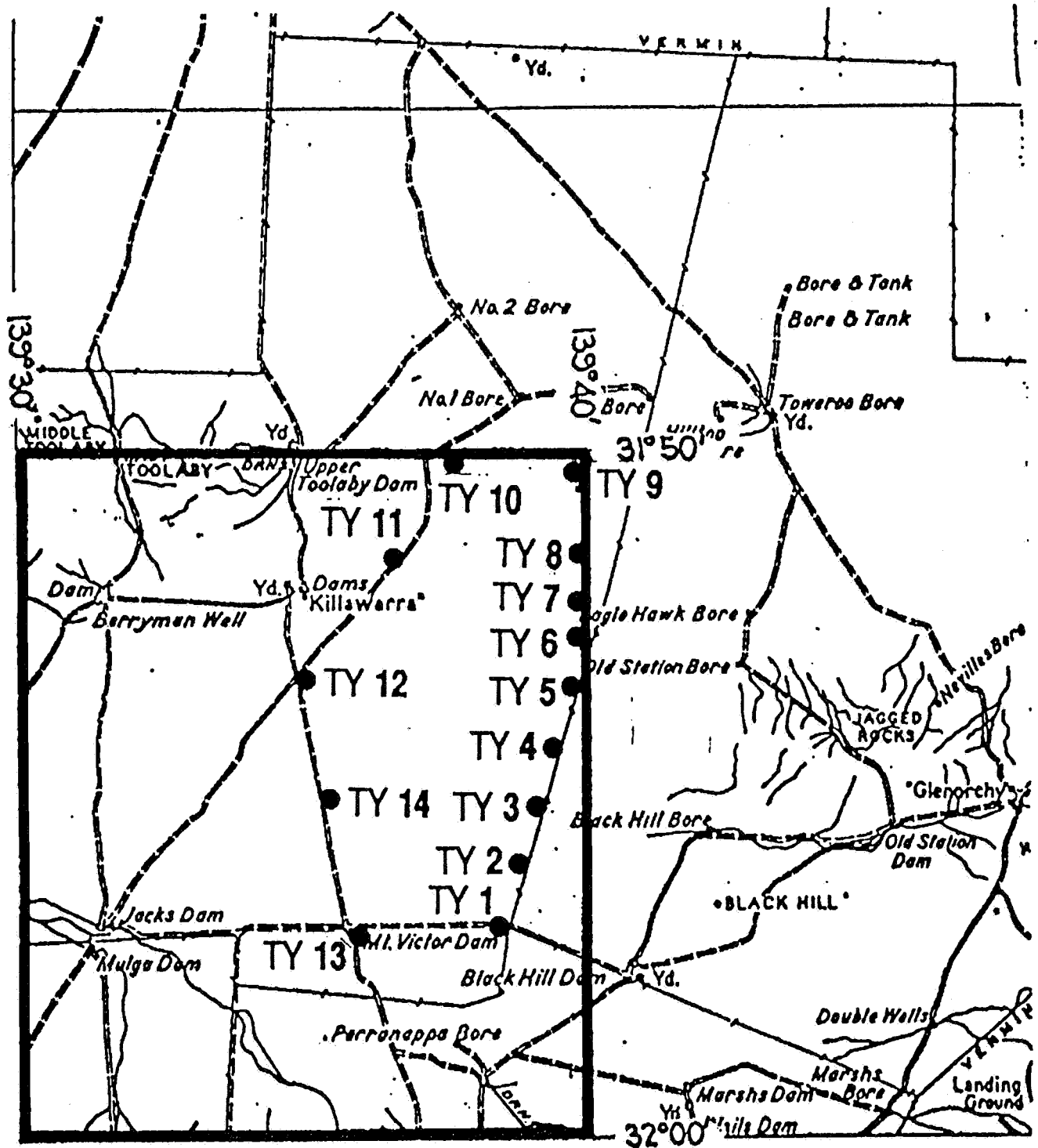
**EXPLORATION SUMMARY:** The SML was acquired after water bore sampling showed anomalous uranium in underground water in the southern Frome Embayment. Eleven rotary holes totalling 491 metres were drilled on two lines. The holes were logged for gamma, resistivity and spontaneous potential and samples were scanned with a scintillometer.

**MINERALISATION/PROSPECTS:**

The holes intersected a thin sequence of Quaternary silt, sand and clay overlying deeply weathered Adelaidean pelitic rocks. The thickest section of younger sediments was 43 metres in TY13 interpreted as a river channel cut into the basement.

No anomalous radioactivity was detected in the drill holes.

**DRILLING:** Eleven rotary holes (TY1, 2, 4, 6, 7, 8, 10 to 14) totalling 491 metres.



0 2 4 6 8 10  
KILOMETRES

TY 8 ● Rotary drill hole location and number

Figure 29

Applicant / Title Holder: C.R.A. Exploration Pty. Ltd.

Licence N° : SML 273

DME\_SA 93-1580

TENEMENT: SML 279

AREA: 2486 sq km

COMMENCEMENT DATE: 1/4/69

EXPIRY DATE: 31/3/70

COMPANY: ELCOR AUST PTY LTD

ENVELOPE: -

REFERENCES: -

LOCATION: Mulyungarie

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: MULYUNGARIE 7034, LAKE CHARLES 7035

TARGETS: -

AGE/ROCK UNITS: -

EXPLORATION SUMMARY: No report on file

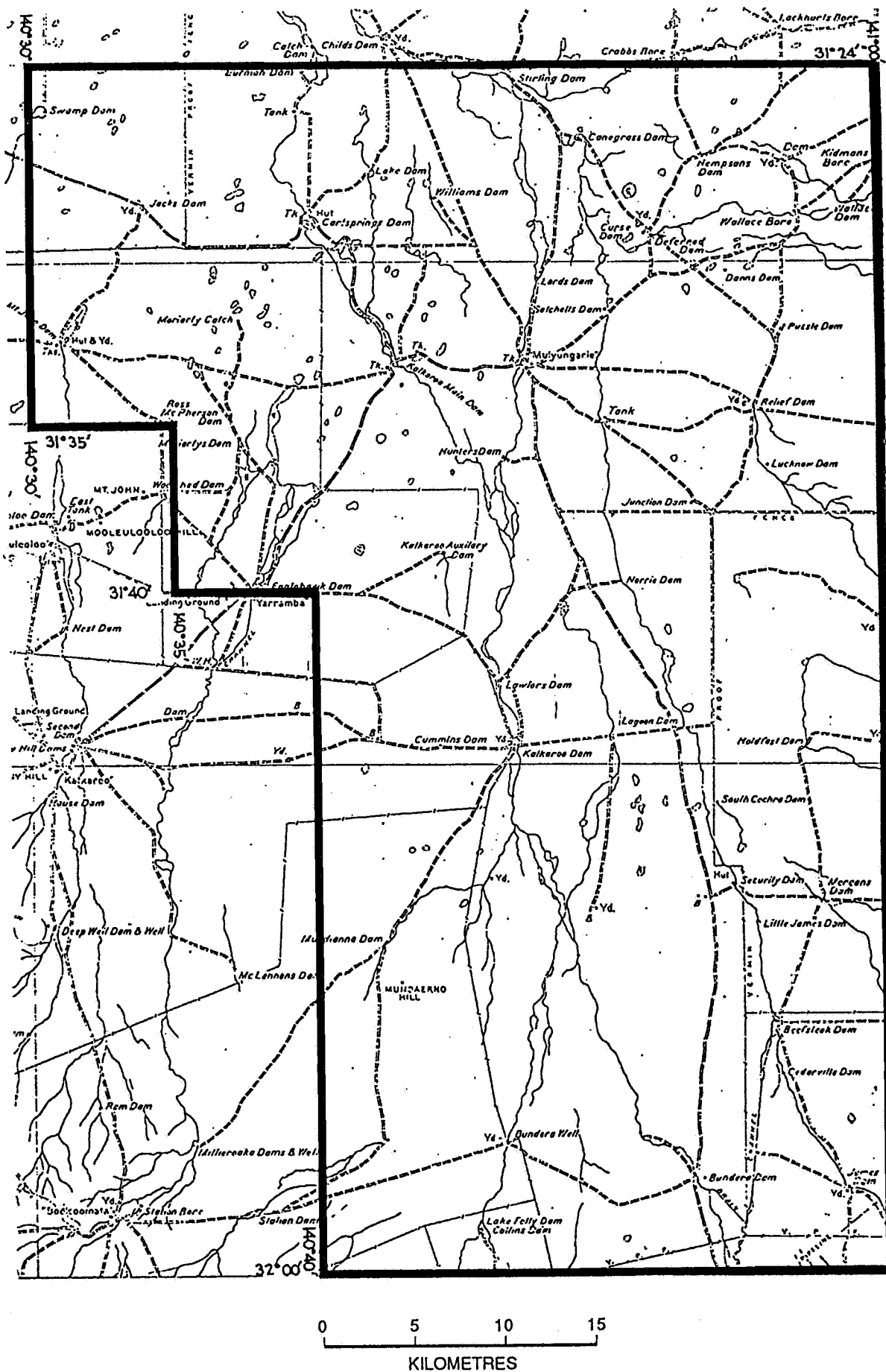


Figure 30

Applicant / Title Holder: Elcor Aust. Pty. Ltd.

Licence N° : SML 279

DME\_SA 93-1555

TENEMENT: SML 280

AREA: 880 sq km

COMMENCEMENT DATE: 1/4/69

EXPIRY DATE: 31/3/70

COMPANY: ELCOR AUST PTY LTD

ENVELOPE: -

REFERENCES: -

LOCATION: Benagerie

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: KALABITY 6934, BENAGERIE 6935

TARGETS: -

AGE/ROCK UNITS: -

EXPLORATION SUMMARY: No report on file





**TENEMENT:** SML 414 (followed by SML 697, ELs 87, 89, 296, 522, 549, 911, 957, 1203, 1391, 1487, 1608, 1684, 1693, 1698, 1751).

**AREA:** 880 sq km

**COMMENCEMENT DATE:** 30/4/70

**EXPIRY DATE:** 29/4/72

**COMPANY:** SEDIMENTARY URANIUM NL

**ENVELOPE:** 1396

**LOCATION:** Benagerie

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935, KALABITY 6934

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Cainozoic sediments of the Tarkarooloo Sub-basin overlying Cretaceous basement.

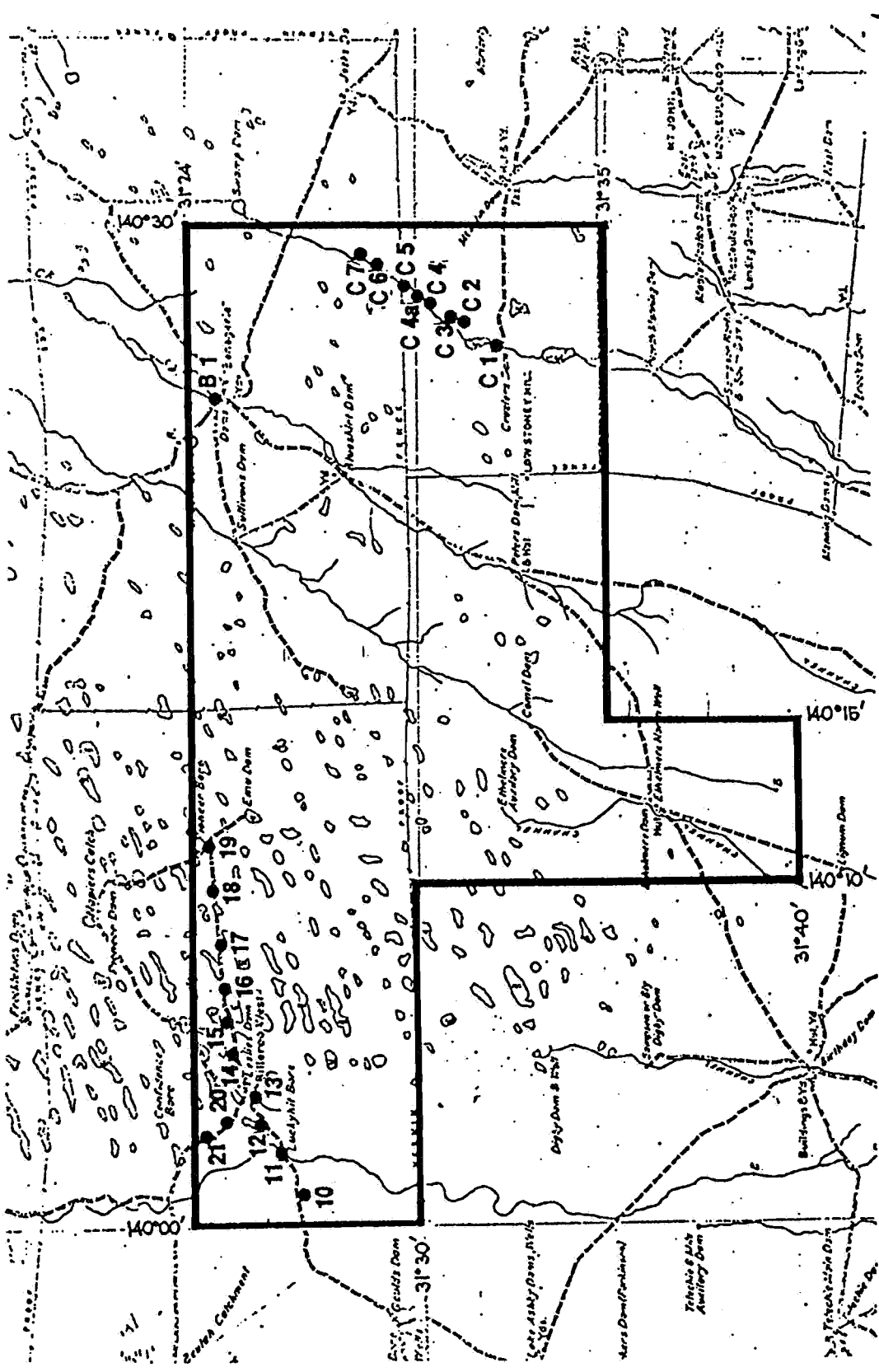
**EXPLORATION SUMMARY:** An airborne radiometric survey was flown by Canadian Aeroservices Pty Ltd in 1970 (specifications unknown) over SMLs 414 and 415. The most significant anomalies were on the adjacent SML 415 near Yarramba and Kalkaroo Dam. This was followed by two campaigns of rotary drilling with associated gamma ray logging. The first in October 1970 involved nine holes (C1-C7 with C4a in the Croziers Dam area and B1 at Benagerie) totalling 804.9 metres, and the second campaign was twelve holes in March 1972 (414-10 to 414-21) on an 18 km east-west traverse in the Billeroo West area and totalling 1012.5 metres. The hole depths generally ranged from 72 to 130 metres.

**MINERALISATION/PROSPECTS:** The Croziers Dam section encountered predominantly clay intervals above Precambrian? basement at 73 to 85 metres with only one hole, C6, intersecting 30.5 metres of sands from 78 metres. No significant radiometric anomalies were recorded in logging. It was intended to follow-up with further drilling around C6 to follow a channel sand (Yarramba), trend projected north-westwards from adjacent SML 415, but this did not eventuate.

B1 at Benagerie Dam was primarily a water bore drilled to 29 metres.

Drilling results on the Billeroo West traverse were disappointing as no north-south trending sand channels were intersected and no anomalous radioactivity was detected in gamma logs. All holes intersected basement at less than 91 metres. On the basis of these drilling results potential for sedimentary uranium in the western portion of the SML was considered to be poor.

**DRILLING:** Twenty one rotary holes totalling 1817.4 metres.



- C 5** ● Rotary drill hole location and number (Crozier's Dam)
- B 5** ● Rotary drill hole location and number (Benagerie)
- 13** ● Rotary drill hole location and number (prefix 414/Billeroo West)

Figure 32

Applicant / Title Holder: Sedimentary Uranium N.L.

Licence N° : SML 414

DME\_SA 93-1581

TENEMENT: SML 415 (followed by SMLs 580, 696, ELs 98, 238, 412, 721, 1060, 1382, 1763)

AREA: 2486 sq km

COMMENCEMENT DATE: 30/4/70

EXPIRY DATE: 29/4/71

COMPANY: SEDIMENTARY URANIUM NL

ENVELOPE:

REFERENCES:

LOCATION: East Kalkaroo (Mulyungarie)

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: MULYUNGARIE 7034, LAKE CHARLES 7035

TARGETS: Sedimentary uranium

AGE/ROCK UNITS:

EXPLORATION SUMMARY: CONFIDENTIAL ENVELOPE



TENEMENT: SML 438  
AREA: 575 sq km  
COMMENCEMENT DATE: 19/6/70  
EXPIRY DATE: 18/6/71  
COMPANY: NORTH BROKEN HILL LTD  
ENVELOPE: 1424  
REFERENCES: Quarterly reports  
LOCATION: Baratta  
1:250 000 SHEET: CURNAMONA, PARACHILNA  
1:100 000 SHEET: CURNAMONA 6834, WILLIPPA 6734  
TARGETS: Lead, zinc, silver  
AGE/ROCK UNITS: Neoproterozoic (Sturtian) Wilyerpa Formation

EXPLORATION SUMMARY: Only one quarterly report is in the envelope, the remainder were missing in 1982, consequently there are no interpretive reports on the extensive RAB? geochemistry, however the drill logs and geochemical analyses are available. The objective was to explore beneath extensive soil cover for the eastward extension of the Baratta silver-lead field where mineralisation was interpreted as stratigraphically controlled. A grid 10.7 km x 4.9 km was pegged immediately east of Tracey Bore on 183 metre spaced lines. A ground magnetic survey was completed on 366 metre spaced lines and 224 RAB? holes were drilled within an area of 6.5 km x largely 1.25 km and analysed for Cu, Pb, Zn. On a second reconnaissance grid (Baratta extension) west of Killawarra HS RAB? drilling and ground magnetics were undertaken on 1829 metre spaced lines over an area 11 km by about 5.5 km. 290 holes were drilled at 122 metres spacing and analysed for Cu, Pb, Zn at approximately 3 metre intervals. A combined total of 11947 metres was drilled in about 514 holes on the two main grid areas with approximately half being drilled on PARACHILNA. Other work included geochemistry of iron rich pebbles, orientation soil mercury and vegetation geochemical surveys.

MINERALISATION/PROSPECTS: Without interpretation of the extensive RAB? geochemistry which may have been in the later quarterly reports it is not possible to draw conclusions about the results of this exploration. There are no geochemical maps in the envelope only hole location maps. Anomalous Zn and Pb to 220 ppm are recorded 1.8 km east of Perryman Well (CURNAMONA) and 1.7 km south-west of Silver Lead Dam (PARACHILNA).

DRILLING: 201 RAB? holes totalling 5033 metres on CURNAMONA.

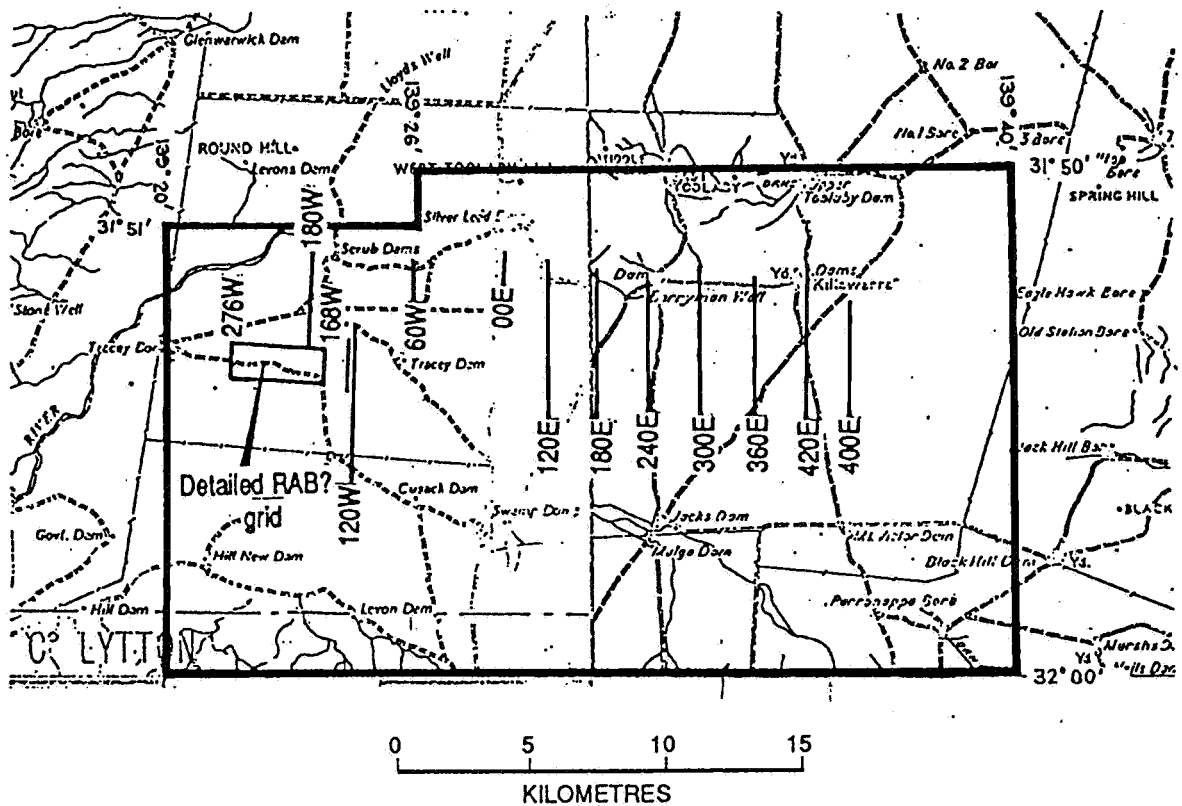


Figure 34

Applicant / Title Holder: North Broken Hill Ltd.

Licence N° : SML 438

DME\_SA 93-1582

**TENEMENT:** SML 440 (formerly SMLs 222, followed by SMLs 595, 714, ELs 85, 132, 259, 377, 423, 597, 794, 970, 1004, 1119, 1352, 1412, 1497, 1786, 1864)

**AREA:** 1585 sq km

**COMMENCEMENT DATE:** 18/6/70

**EXPIRY DATE:** 18/6/71

**COMPANY:** MOUNT ISA MINES LIMITED

**ENVELOPE:** 1462

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Kalabity

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934, MULYUNGARIE 7034

**TARGETS:** Uranium, copper

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** Following on from the drilling of the KN/6 radiometric anomaly under SML 222 in 1970 a further eight percussion holes (K 22 h, i, l, m, n, q, r, s) totalling 535 metres (deepest 94.5 metres) were drilled at KN/6 and logged with downhole spectrometer as well as portable spectrometer readings of 1.5 metre samples.

At the Waukaloo Mine a grid was laid out over 1.4 sq km for 1:2000 geological mapping and extensive rock chip sampling with AAS analyses for Cu, Co, Ni and some for additional Zn Pb and W notably from the discontinuous ironstone outcrop on the western side of the main outcrop. Three percussion holes (W1A, 1B, 3) totalling 118.9 metres were drilled in 1971 in the general vicinity of Waukaloo Mine. Samples at 1.5 metre intervals were assayed for Cu by AAS.

**MINERALISATION/PROSPECTS:** At KN/6 the uranium was found to be confined to a zone of carbonaceous schist generally averaging 0.009% U<sub>3</sub> O<sub>8</sub> with highest readings around 0.022%. Best responses were around K 22a, s, r and m. Uranium was suspected of having been absorbed onto carbon particles. The prospect was considered too small and low grade to warrant further work.

Mapping at Waukaloo showed north-east striking, steeply dipping dark grey metasilstone grading to metaquartzite in part spotted with magnetite A 540 metre long 2 to 3 metre wide discontinuous ironstone crops out on the western side of the main outcrop. 18 chip samples from this ironstone showed average 660 ppm Cu (highest 970), 73 Co, 148 Ni, 950 Zn, 536 Pb. Smaller zones of epidote - actinolite rock were also mapped.

The three holes drilled into the cupriferous metasilstone and quartzite showed maximum copper values over 1.5 metres of 0.66% (W3) and 0.45% (W1B) while averages were much less. Factors controlling copper distribution proved uncertain although the more metamorphosed sediments appear to have higher copper content.

**DRILLING** Eleven percussion holes, 8 at KN/6 radiometric anomaly (K22, h, i, l, m, n, q, r, s) and 3 at Waukaloo Mine (W1A, 1B, 3) for a total of 653.9 metres.



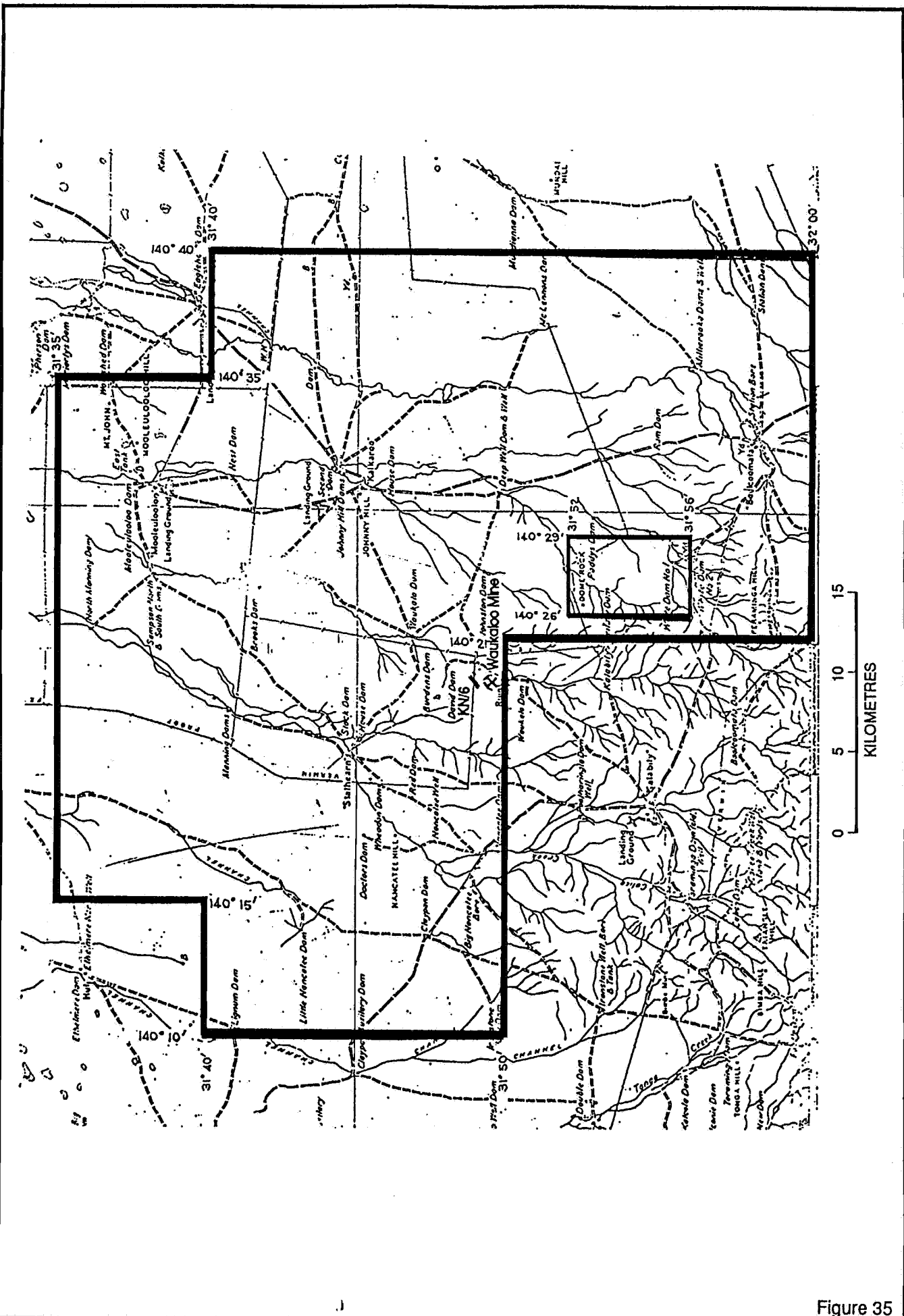


Figure 35

Applicant / Title Holder: Mt Isa Mines Limited

Licence N° : SML 440

DME\_SA 93-1558

<u>TENEMENT:</u>	SML 503
<u>AREA:</u>	2590 sq km
<u>COMMENCEMENT DATE:</u>	12/11/70
<u>EXPIRY DATE:</u>	11/11/71
<u>COMPANY:</u>	PETROMIN NL, EXOIL NL, TRANSOIL NL
<u>ENVELOPE:</u>	-
<u>REFERENCES:</u>	-
<u>LOCATION:</u>	Lake Frome
<u>1:250 000 SHEET:</u>	CURNAMONA, FROME
<u>1:100 000 SHEET:</u>	PASMORE 6835, BENAGERIE 6935, FROME 6836, COONARBINE 6936
<u>TARGETS:</u>	-
<u>AGE/ROCK UNITS:</u>	-
<u>EXPLORATION SUMMARY:</u>	No report on file

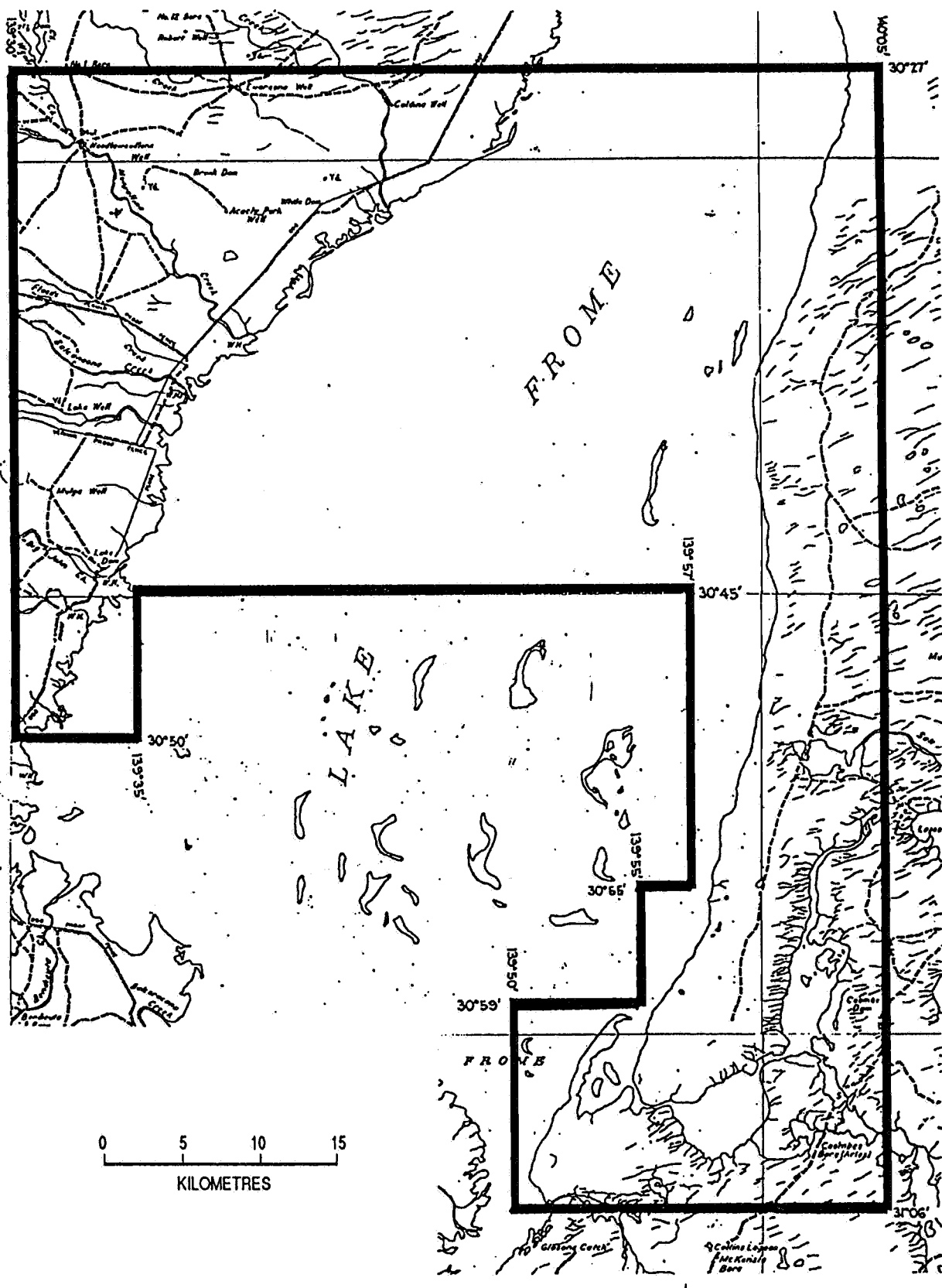


Figure 36

Applicant / Title Holder: Petromin N.L & Transoil N.L.

Licence N° : SML 503

DME\_SA 93-1559

**TENEMENT:** SML 513 (formerly SML 266 Planet; followed by ELs 43, 66, 90, 174, 178, 385, 435, 549, 679, 802, 957, 1144, 1252, 1391, 1860)

**AREA:** 2126 sq km

**COMMENCEMENT DATE:** 26/11/70

**EXPIRY DATE:** 25/11/72

**COMPANY:** SEDIMENTARY URANIUM NL

**ENVELOPE:** 1546

**REFERENCES:** Successive quarterly reports

**LOCATION:** Yantawena East, adjacent to NSW border

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** LAKE CHARLES 7035

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Tertiary Eyre and Namba Formations of Tarkarooloo Sub-basin and Callabonna Basin on Cretaceous basement.

**EXPLORATION SUMMARY:** An airborne radiometric survey by Air Research Pty Ltd was flown in December 1970 and re flown in February 1971 because initial results were spurious. Terrain clearance was 91.5 metres but line spacing not recorded. Data were examined by consultant B T Johnson who interpreted several weak trends in low order radiometric readings. Reconnaissance rotary drilling of 30 holes (513/1 to 513/30) totalling 3269.5 metres was completed in September-October 1971 and a further 34 holes (513/31 to 513/64) totalling 4196 metres were drilled in October-November 1972. All holes were gamma logged and electric logs were run on some. Six old water bores were also logged for gamma radiation. Rough spacing on all the drill holes was 3.2 km along roads.

**MINERALISATION/PROSPECTS:** The only significant radioactive response in gamma logs was from hole 513/48 to the west of Oban Bore at a depth around 87 metres in basal Tertiary sands of the Eyre Formation. Much weaker but above background responses were obtained from 513/23 (Lake Charles Bore) and 513/25 in which lignitic clays were intersected between 18 and 24 metres.

The western half of the SML is on the Benagerie Ridge. Tertiary stream incision into Precambrian rock is limited to the south-eastern sector of the SML with drainage to the north. Sands were deposited by streams draining off the Benagerie Ridge in the central and north-eastern part of the area eg 513/48. These streams drained into a lacustrine environment further to the east.

Basement in drill holes was primarily Cretaceous clays.

**DRILLING:** Sixty-four rotary holes (513/1 to 513/64) totalling 7465.5 metres.

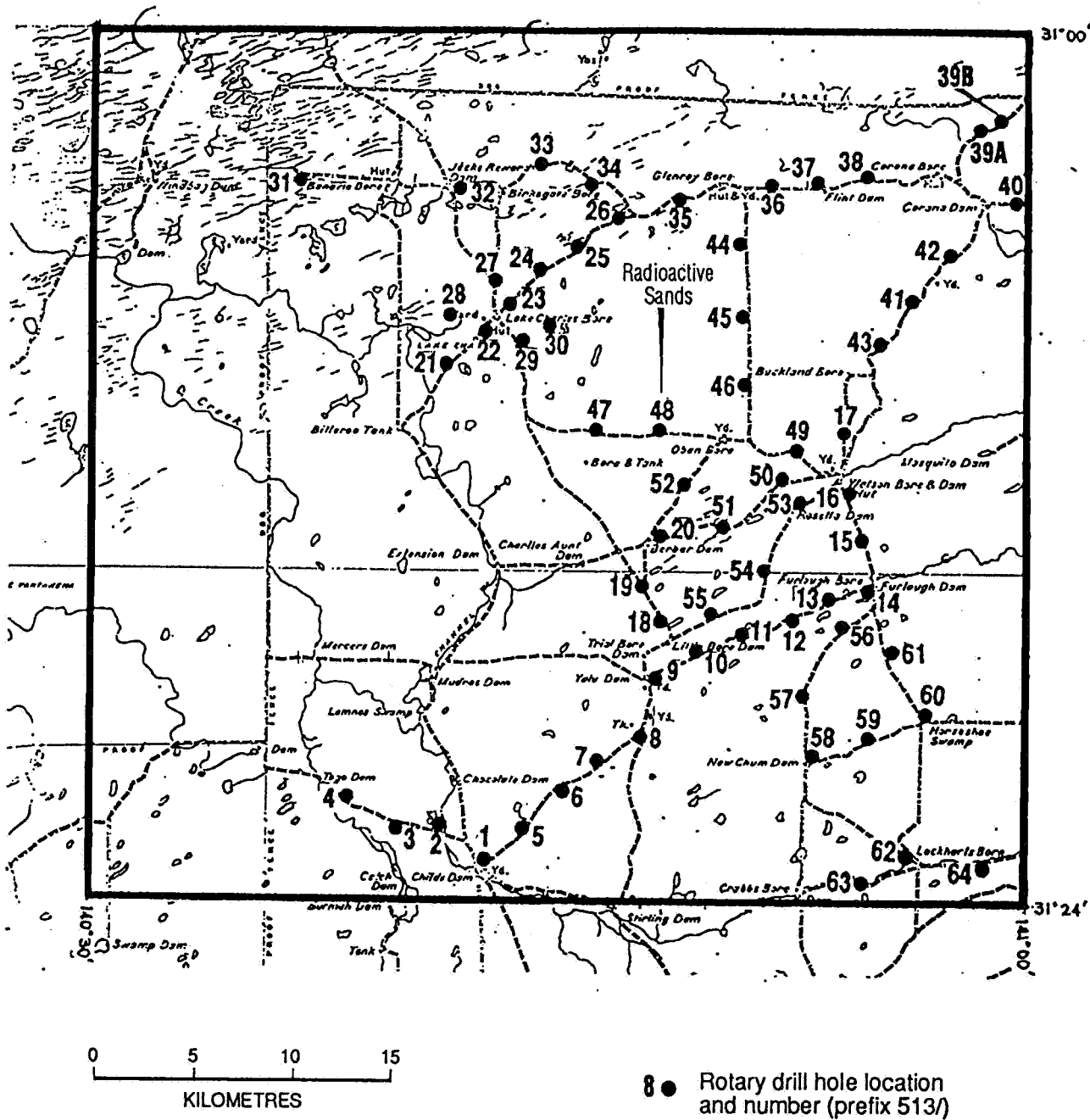


Figure 37

Applicant / Title Holder: Sedimentary Uranium N.L.

Licence N°: SML 513

DME\_SA 93-1583

**TENEMENT:** SML 514 (followed by ELs 59, 66, 69, 127, 171, 217, 385, 549, 614, 911, 1065, 1203, 1487, 1608, 1684, 1693, 1698, 1860)

**AREA:** 2038 sq km

**COMMENCEMENT DATE:** 26/11/70

**EXPIRY DATE:** 25/11/72

**COMPANY:** SEDIMENTARY URANIUM NL

**ENVELOPE:** 1543

**LOCATION:** Yantawena

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Cainozoic sediments of the Tarkarooloo Sub-basin overlying probable Cambrian and/or Adelaidean basement.

**EXPLORATION SUMMARY:** An airborne radiometric survey by Air Research Pty Ltd was flown in December 1970 and re flown in February 1971 because initial results were spurious. Terrain clearance was 91.5 metres but line spacing not recorded. Data were examined by consultant B T Johnson who interpreted three or four weak trends in low order radiometric readings. Rotary drilling of 18 holes (514/1 to 514/19, with 514/12 abandoned and 514/16 not drilled) totalling 1218.6 metres was completed in March 1972. Gamma and electric logs were run in most holes. Drilling was concentrated in a north-south traverse near Billeroo WH in the east and in the Box Swamp Dam area in the west.

**MINERALISATION/PROSPECTS:** Ground radiometric traverses failed to validate the trends interpreted by Johnson. On the Billeroo WH traverse, holes 514/1 to 5 intersected shallow basement of the Benagerie Ridge at depths from 20 to 27 metres ie basement high. Bedrock was predominantly shale.

In the Box Swamp Dam area holes ranging from 67.7 to 115.5 metres intersected Cainozoic sequences in which there was poor development of Tertiary sand. Basement was predominantly shale, pyritic in 514/17, interpreted as either Cambrian or Adelaidean.

No significant radiometric anomalies were recorded in the gamma logging of any of the holes drilled.

It was concluded that the area of SML 514 was a structural high during the deposition of Tertiary fluvial sediments.

**DRILLING:** Eighteen rotary holes (514/1 to 514/19 excluding 514/16) totalling 1218.6 metres.

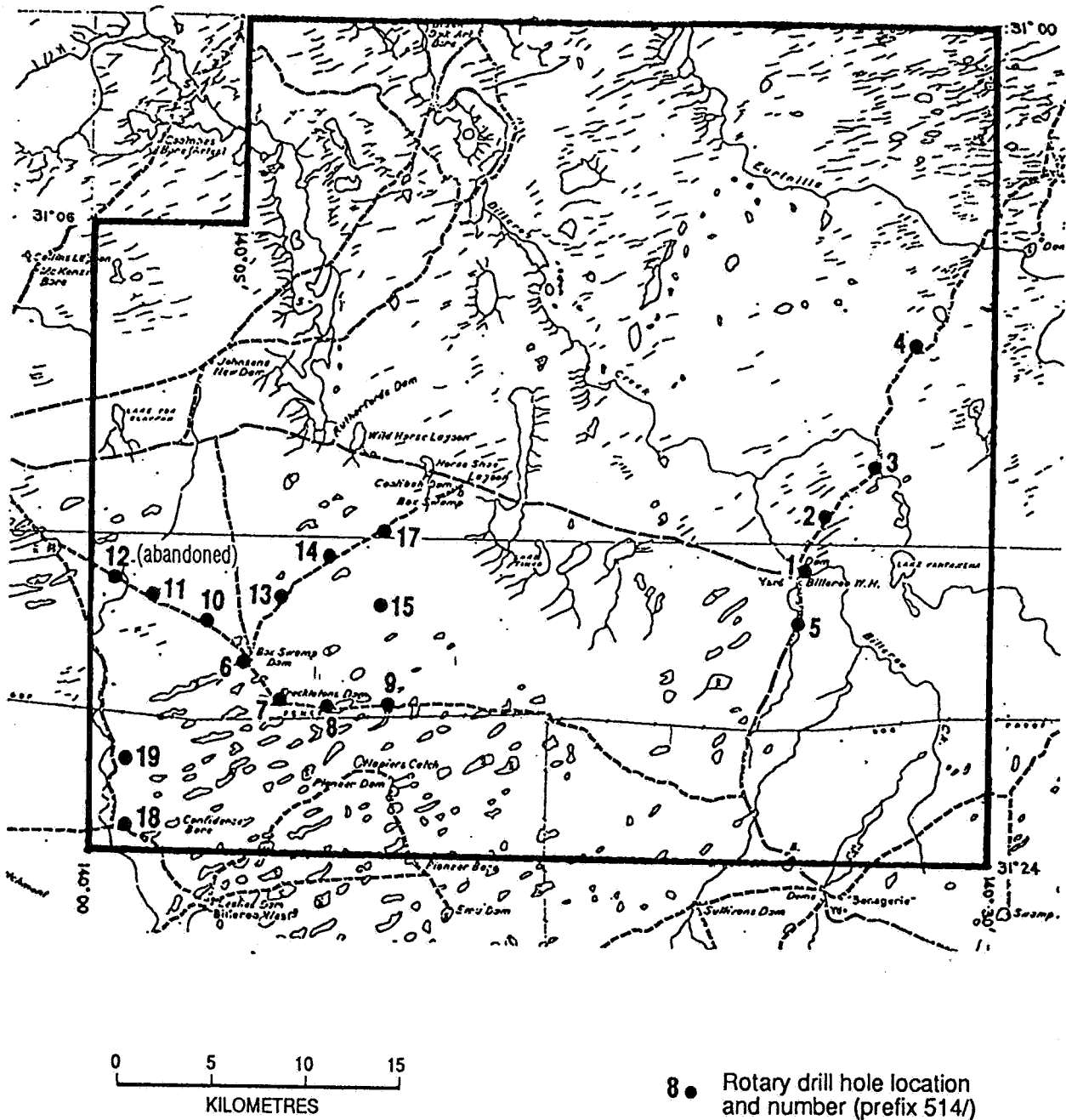


Figure 38

Applicant / Title Holder: Sedimentary Uranium N.L.

Licence N° : SML 514

DME\_SA 93-1584

**TENEMENT:** SML 531 (formerly SML 244 Exoil et al; followed by EL 430 Comalco, EL 1471 Aberfoyle)

**AREA:** 500 sq km

**COMMENCEMENT DATE:** 14/1/71

**EXPIRY DATE:** 13/1/72

**COMPANY:** MINES ADMINISTRATION PTY LIMITED

**ENVELOPE:** 1622

**REFERENCES:** Wecker, R, 1971: Final Report - SML 531 (South Lake Frome) 14/1/71 to 5/5/71. Mines Administration Pty Limited. (unpublished)

**LOCATION:** South Lake Frome

**1:250 000 SHEET:** CURNAMONA, FROME

**1:100 000 SHEET:** PASMORE 6835, FROME 6836

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Cainozoic sediments of the Tarkarooloo Sub-basin overlying Cretaceous sediments.

**EXPLORATION SUMMARY:** Due to the scarcity of bores no groundwater samples could be collected in the SML. Sampling of bores immediately to the west showed no values exceeding 10 ppb  $U_3O_8$ . In early 1971 an airborne scintillometer survey was flown by the company itself over the entire SML area at an approximate line spacing of 1610 metres at an average altitude of 64 metres. Three rotary holes totalling 457.3 metres were drilled and each was logged for SP, resistivity and gamma.

**MINERALISATION/PROSPECTS:** No significant radiometric anomalies were detected in the airborne survey although Balcoracana Creek did produce a peak reading of 1.5 times background. No anomalous radioactivity was encountered in any of the three drill holes which intersected a Cainozoic section of 61 to 92 metres consisting of impermeable clays and silts with rare, thin, fine-grained sands. The section overlies Cretaceous? marine clays. Negative drilling results were similar to those previously obtained by Exoil et al in SML 244.

**DRILLING:** Three rotary holes, F1 to F3, totalling 457.3 metres (only one hole, F1, to 152.4 metres is on CURNAMONA).





**TENEMENT:** SML 534 (formerly SMLs 118, 209, 209A; followed by SML 672, ELs 62, 132, 376, 629, 1308, 1480, 1591, 1864)

**AREA:** 803 sq. km

**COMMENCEMENT DATE:** 14/1/71

**EXPIRY DATE:** 13/1/72

**COMPANY:** PETROCARB MINERAL EXPLORATION (SA) PTY LTD

**ENVELOPE:** 1569, 1570

**REFERENCES:** Bunny, MR, 1971: Geology of Part of SML 534 Olary Province South Australia for Esso (Minerals) Australia Ltd. Earth Resources Australia Pty Ltd. ERA Report No 42.

**LOCATION:** Kalabity - Boolcoomata.

**1:250 000 SHEET:** OLARY, CURNAMONA.

**1:100 000 SHEET:** OLARY 6933, KALABITY 6934.

**TARGETS:** Uranium, copper, lead, zinc; sedimentary uranium.

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** At the initial stages prior to the entry of Esso as joint venture partner in late 1971, Petrocarb examined and sampled a number of the known mineral occurrences in the area including Old Boolcoomata Scheelite which showed "subeconomic" grade and Mt Mulga Barite where six channel/chip samples showed average 0.7% Cu over 4.6 metres width. Drilling does not appear to have followed.

Esso completed an airborne spectrometer and magnetometer survey on 244m line spacing and 61m terrain clearance, the mapping of a 92 sq. km area, extending north from the north end of the Olary 1:250 000 sheet, at a scale of 1:12 000, and the detailed mapping of a radioactively anomalous area one km south of Tonga Bore. Mapping also involved examination of outcrops with scintillometer.

Drilling and logging of 8 rotary holes totalling 166 metres in north of SML to explore for sedimentary uranium (No locality map, only latitude and longitude co-ordinates).

**MINERALISATION/PROSPECTS:** The good quality mapping and report by Earth Resources showed granitization does not present a simple zoning pattern. Locally least granitised metasediments can be adjacent to granites and gneisses. Six radioactive anomalies were located, all were weak except one south of Tonga Bore which was mapped at 1:1200 scale and sampled. The source was disseminated monazite in feldspathized quartzite and migmatite. Poor prospects for base metal mineralisation in area mapped. The quartz-magnetite rock at Mount Bull Copper showing has very limited strike extent.

None of the holes drilled for sedimentary uranium showed anomalous radioactivity. Depth to bedrock ranged from 1.5m to 38m and the sequence was oxidized in north and east parts of SML.

**DRILLING:** Eight rotary holes totalling 166 metres.

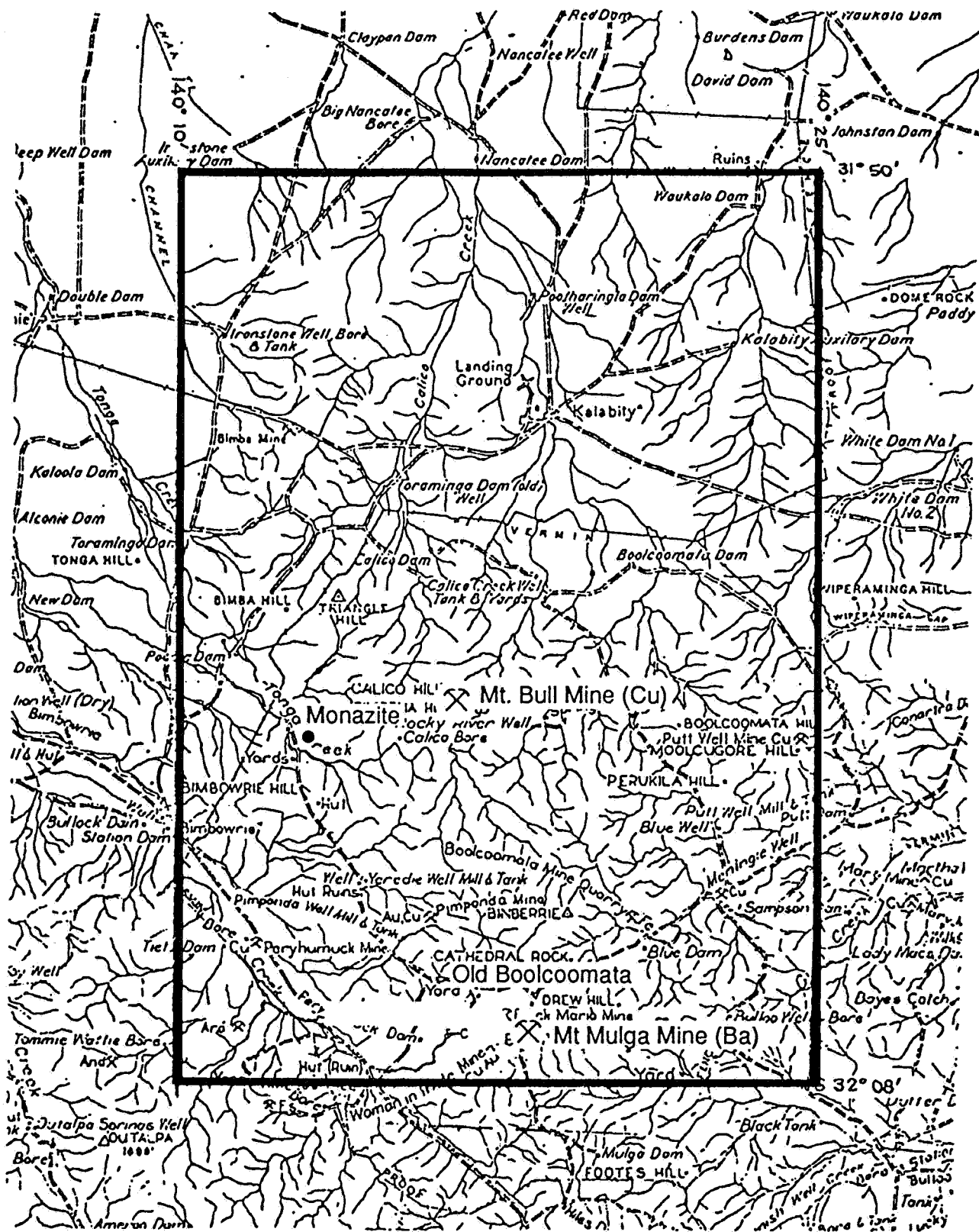


Figure 40

Applicant / Title Holder: Petrocarb Mineral Exploration (S.A.) Pty. Ltd.

Licence N° : SML 534

DME\_SA 93-1560

**TENEMENT:** SML 535 (formerly SMLs 118, 210, 210A; followed by SML 673, ELs 62, 132, 259, 423, 794, 1119, 1497, 1864)

**AREA:** 891 sq. km

**COMMENCEMENT DATE:** 14/1/71

**EXPIRY DATE:** 13/1/72

**COMPANY:** PETROCARB MINERAL EXPLORATION (SA) PTY LTD

**ENVELOPE:** 1570

**REFERENCES:**

**LOCATION:** Plumbago-Glenorchy

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** WINNININNIE 6833, CURNAMONA 6834

**TARGETS:** Uranium, sedimentary uranium

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** A joint venture with Esso commenced in mid-1971. The programme involved a detailed airborne magnetic and radiometric survey (about 2080 line km) with 244m line spacing and 60m terrain clearance completed towards the end of the term and released under SML 673. A rotary drilling programme of 19 holes (535-1 to 19) totalling about 770m was completed in late 1971 to explore the sedimentary cover in the northern and western sectors of the licence at about 1.6 km intervals and four partly cored holes (CH1 to CH4 totalling 193.3m) were drilled to the west of Crockers Well to test the basement below cover on a 3 km line. A 3 metre core was taken from the bottom of each hole and scanned for 12 elements and each hole was logged for gamma, SP and resistivity. Deepest hole was 82m. (No locality maps are available but latitude and longitude locations are provided). Geological mapping of licence area commenced in late 1971 (see SML 673).

**MINERALISATION/PROSPECTS:** Of the total 23 holes, 5 contained anomalous radioactivity and two of these holes (CW1,3) were in granitic rocks on the line west of Crocker Well, while 535-10 and 535-17 in the north-central area showed anomalous radioactivity in white clayey sand up to 3 metres thick whereas 535-9 showed 30 ppm uranium in granite near its contact with overlying sand. Depth to basement ranged from 6 to 80 metres with slight build-up of sand in near Springs Dam. Overall the Cainozoic sequence was red-brown and yellow-brown clays with interbedded silts and rare sands. No reduced zones were intersected. In the northeastern portion there was only a thin veneer on weathered bedrock.

**DRILLING:** 23 rotary holes with cored bottoms totalling about 963 metres.

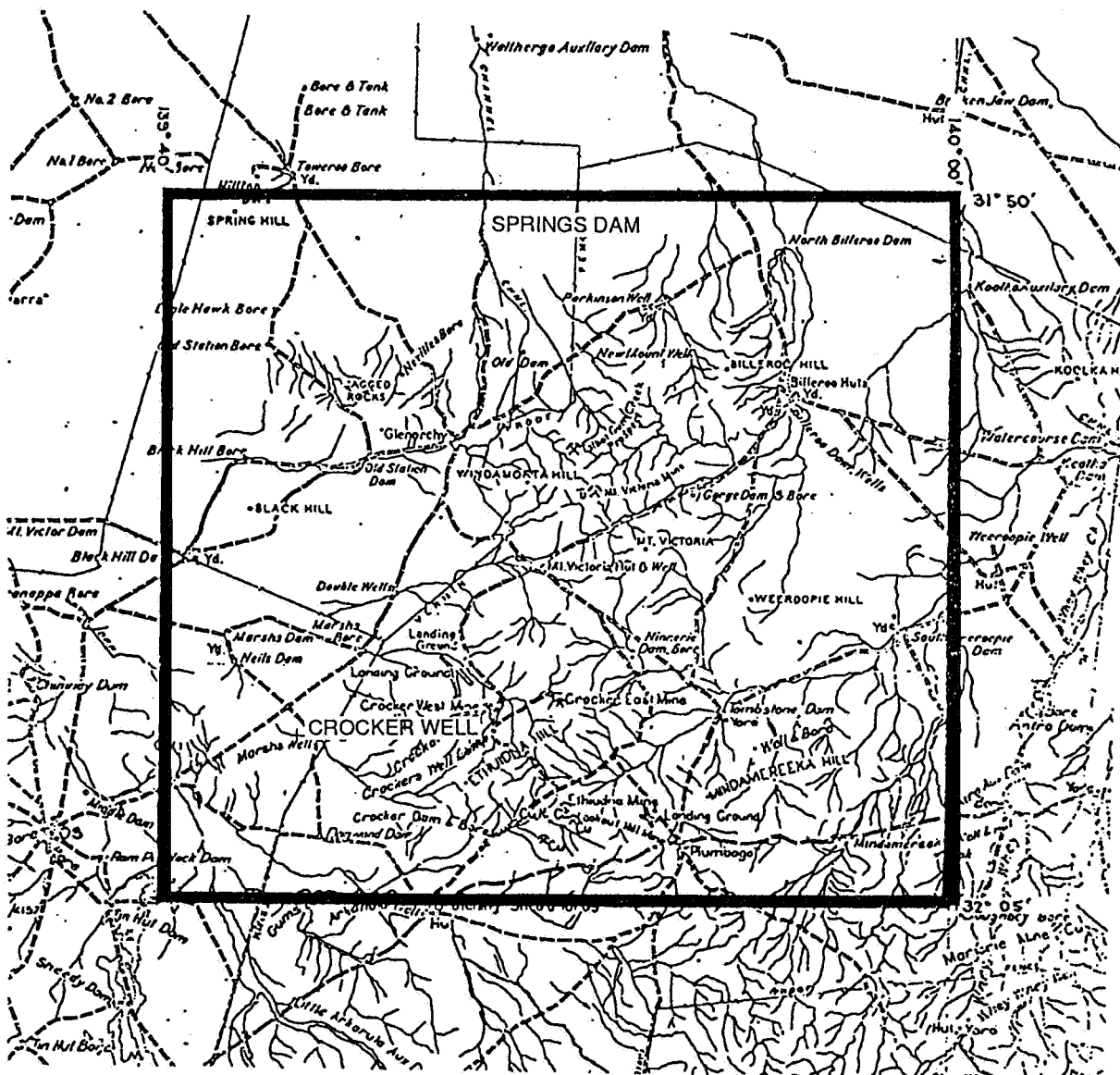


Figure 41

Applicant / Title Holder: Petrocarb Mineral Exploration (S.A.) Pty. Ltd.

Licence N° : SML 535

DME\_SA 93-1561

**TENEMENT:** SML 543 (formerly SML 268 Rudd, followed by ELs 45, 109, 227, 337, 411, 722, 1065 CSR, 1487 Placer, 1698, 1738)

**AREA:** 2383 sq km

**COMMENCEMENT DATE:** 11/2/71

**EXPIRY DATE:** 10/2/73

**COMPANY:** PACMINEX PTY LIMITED

**ENVELOPE:** 1853

**REFERENCES:** Langron, W.J., 1972: Report of Investigations Lake Frome Embayment, South Australia, SMLs 543 and 5644. Annual Report to 29th February 1972. Pacminex Pty Limited (unpublished).

Langron, W.J.; and Marshall, A.J., 1973: Annual Report SMLs 543, 544 Crocker Well Prospect 22 Lake Frome, South Australia. Pacminex Pty Limited (unpublished).

**LOCATIONS:** Frome Downs (Billeroo West, Goulds Dam).

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** PASMORE 6934

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Quaternary sediments above Tertiary Namba and Eyre Formations resting unconformably on a basement consisting of Cambrian siltstone and mudstone.

**EXPLORATION SUMMARY:** Exploration was unified over SML 543 and adjacent SML 544 after completing an agreement with E.A. Rudd. Pacminex commenced with an airborne radiometric/magnetic survey flown by Austral Air Surveys Pty Ltd in June 1971 over an area of 3600 sq km (3430 line km) with flight lines largely spaced at 800 metres at a mean terrain clearance of 91.5 metres.

In early 1971 resistivity, gravity (station spacing 61 metres) and magnetic surveys were conducted by SADME on two traverses (1 and 2, also called Curnamona and Ashby) controlled by pre-existing drilling notably in the Goulds Dam area. A further five lines of gravity (Lines 1 to 5) were completed by SADME in 1972 with station spacing of 150 metres (total of 140 km on SMLs 543, 544 during 1972). A further 64 km of gravity survey was completed in early 1973 to the north of Line 2 (for results see El 45).

Rotary drilling of gravity lows and anomalous zones in Tertiary sediments previously located by Rudd drilling was in three campaigns in 1971, 1972 and 1973. Over this period 71 holes totalling 9522 metres were drilled, including 15 holes partly cored and one water well (PMX 21). For full details see under later heading.

All holes were logged with gamma, resistivity and spontaneous potential probes and those drilled in 1972 and 1973 were also logged with neutron. Core recovery was improved in 1972. Cores were sampled at about 0.5 metre intervals and assayed for uranium radiometrically or by XRF or fluorimetry.

**EXPLORATION SUMMARY:** The entire programme resulted in the discovery of the Lower Tertiary Billeroo West palaeochannel and the location of prospective uranium mineralisation within it, and recognition of the north-east trending Curnamona channel. Holes PMX 7 to 10 drilled in October 1971 between Rudd holes EAR 9/10 and EAR 11 near Goulds Dam showed anomalous radioactivity in the Lower Tertiary sand sections of a well defined fluvial channel overlain by 100 to 110 metres of unconsolidated upper Tertiary and Quaternary sediments. The deepest part of the channel incised into Cambrian sediments was between PMX 7 and PMX 8.

Anomalous radioactivity was then found further north in most holes drilled within the confines of the palaeochannel including PMX 14A near gravity line 3 which showed up to 0.14%  $eU_3O_8$  in spot samples and 1%  $eU_3O_8$  in chips. Best results were in PMX 29a which showed 0.52%  $eU_3O_8$  over 0.5 metres at a redox interface from 125 metres with strong anomalies in PMX 14/14a, 35/35a, 53/53a and 62/62a over about 7 km of channel. In 1973 a number of closely spaced holes were drilled around PMX 62/62a between gravity Lines 2 and 3 in order to detail one to the more highly radioactive sections. Five holes intersected log calculated grades over very narrow (<0.5 metre) intervals ranging from 0.32%  $eU_3O_8$  in PMX 70 to 0.7%  $eU_3O_8$  in PMX 62. The only cored hole in this sequence, PMX 63a, showed 0.09%  $eU_3O_8$  over 0.5 metres with most radioactivity over 20 cm.

The Lower Tertiary section contained interbedded coarse and fine-grained quartzose, micaceous, clastic sediments. The finer grained sediments contain abundant dark grey silty clay matrix with lignitic debris and nodular pyrite. High gamma counts are often associated with the dark fine-grained sands near the centre of the channel where basal sands are thickest. 'Upper' and 'lower' sands were noted in this section, the lower being more uniform in its distribution with most consistent radioactivity. Arenaceous silts and muds rich in carbonaceous material and framboidal pyrite contain very fine grained disseminated uraninite near redox interfaces.

A limestone marker is present in the Upper Tertiary section.

It was concluded that the uranium occurs in thin discontinuous beds within the Billeroo West Channel and that no large scale geological front type accumulations had been discovered.

**DRILLING:** Seventy one rotary holes totalling 9522 metres (PMX 1 to PMX 71) excluding 9 holes in SML 544 and including 15 partly cored holes (PMX 1 to 6, 7a, 8a, 14a, 24a, 29a, 35a, 53a, 62a, 63a).

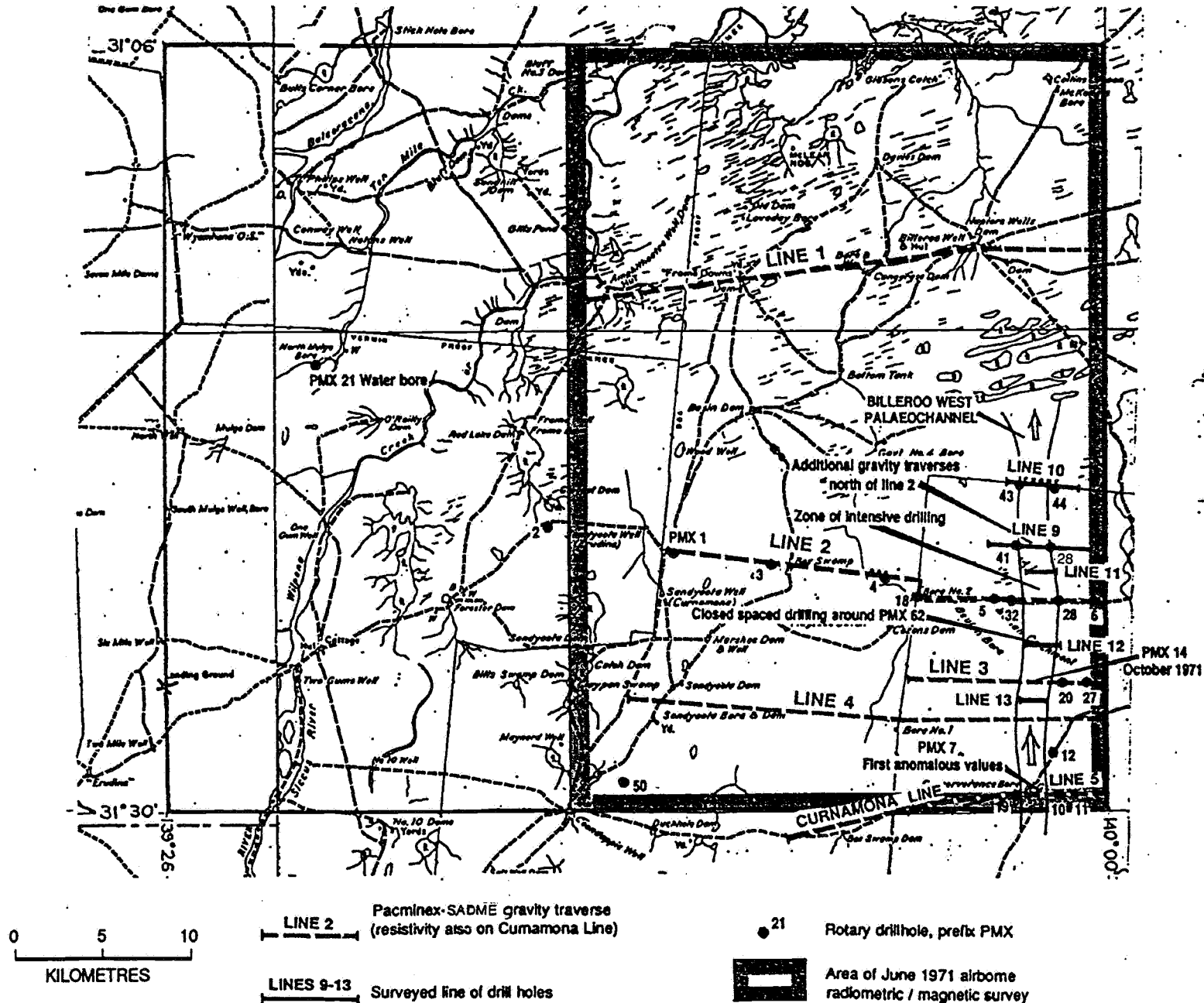
PMX 21 was a water bore in western sector of SML.

Licence N° : SML 543

Applicant / Title Holder: Pacminex Pty. Ltd.

DME SA 93-1586

Figure 42





**TENEMENT:** SML 544 (formerly SML 267, followed by ELs 42, 109, 227, 254, 297, 411, 523, 722, 911, 1065, 1023, 1487).

**AREA:** 2577 sq km

**COMMENCEMENT DATE:** 11/2/71

**EXPIRY DATE:** 10/2/73

**COMPANY:** PACMINEX PTY LIMITED

**ENVELOPE:** 1853, 2009 (confidential)

**REFERENCES:** Langron, W.J., 1972: Report of Investigations Lake Frome Embayment, South Australia, SMLs 543 and 544. Annual Report to 29th February, 1972. Pacminex Pty Limited (unpublished).

Langron, W.J. and Marshall, A.J., 1973: Annual Report SMLs 543, 544 Crockers Well Prospect 22, Lake Frome, South Australia, Pacminex Pty Limited (unpublished).

**LOCATION:** Curnamona

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934

**TARGETS:** Sedimentary uranium.

**AGE/ROCK UNITS:**

**EXPLORATION SUMMARY:** Exploration was unified over SML 544 and adjacent SML 543 after completing agreement with E.A. Rudd. Pacminex commenced with an airborne radiometric/magnetic survey flown by Austral Air surveys Pty Ltd in June 1971 over an area of 3600 sq km (3430 line km) flight lines largely spaced at 800 metres at a mean terrain clearance of 91.5 metres.

In early 1971 resistivity, gravity (station spacing 61 metres) and magnetic surveys were conducted by SADME on two traverses (1 and 2, also called Curnamona and Ashby) controlled by pre-existing drilling notably in the Goulds Dam area. A further three lines (Lines 6, 7 and 8) of gravity were completed by SADME in 1972 with station spacing of 150 metres. Three rotary holes (PMX 15, 16, 17) totalling 271.1 metres were drilled by Pacminex in 1971 and a further six (PMX 45 to 49, 51) totalling 772.2 metres were drilled in 1972. All holes were logged with gamma, resistivity and spontaneous potential probes and those drilled in 1972 were also logged with neutron. In August 1972 Pacminex farmed - out the southern two thirds of the SML (1823 sq km) to Esso Mineral Enterprises which company completed a trial reflection seismic survey and an extensive gravity survey by McPhar Geophysics involving 180 line km at 400 metre station spacing on eight lines (A, B, C, D, E, F, H, J, M). The gravity survey was followed up by an areally extensive rotary drilling programme of 53 holes (FD 1 to 56, excluding 36 to 38) totalling 6732.3 metres in late 1972. FD 35 was partly cored over 20 metres in a Lower Tertiary sand unit and FD21A over 12.2 metres in Upper Tertiary limestone.

MINERALISATION/PROSPECTS: Resistivity and gravity surveys showed reasonably good correlation with drilling results while the airborne magnetics defined deeper basement features of little benefit in sedimentary uranium exploration. Airborne radiometrics showed numerous anomalies in the range 1.25 to 2 times background but more intense anomalies of direct economic significance were not recorded. The most anomalous results were in the vicinity of the Spring Hill uranium occurrence.

The Pacminex drilling showed some weakly anomalous radioactivity in intervals of PMX 45 to 48 with best result in PMX 48 on the Ashby gravity line in the upstream section of the Billeroo West palaeochannel. The Lower Tertiary stratigraphy was recognized to have two channel sand sections (see SML 543).

The drilling by Esso largely on gravity lows showed basal Tertiary sands were well developed in four sand systems flowing in a general northerly direction from the Precambrian basement. Two of these systems (A and B) were on the eastern side of the SML and two (C and D) on the west. The sands were all oxidized and, as evidenced by weak radioactivity, uranium bearing groundwaters had moved through the sediments. Low level radioactivity was restricted to finer grained sediments such as grey carbonaceous clays and silts adjacent to or within sand sections. Low level radioactivity (FD 11, FD 21, FD 21A) up to 0.017%  $eU_3O_8$  was also to be associated with carbonaceous zones in or adjacent to Upper Tertiary limestone. Esso withdrew from the joint venture in early 1973.

DRILLING: Sixty two rotary holes totalling 7776.2 metres made up as follows:

Pacminex 1971/72:      Nine holes (PMX 15 to 17, PMX 45 to 49, 51) totalling 1043.9 metres.

Esso 1972:              Fifty three holes (FD 1 to 56, excluding 36 to 38) totalling 6732.3 metres (FD 35, 21A partly cored).

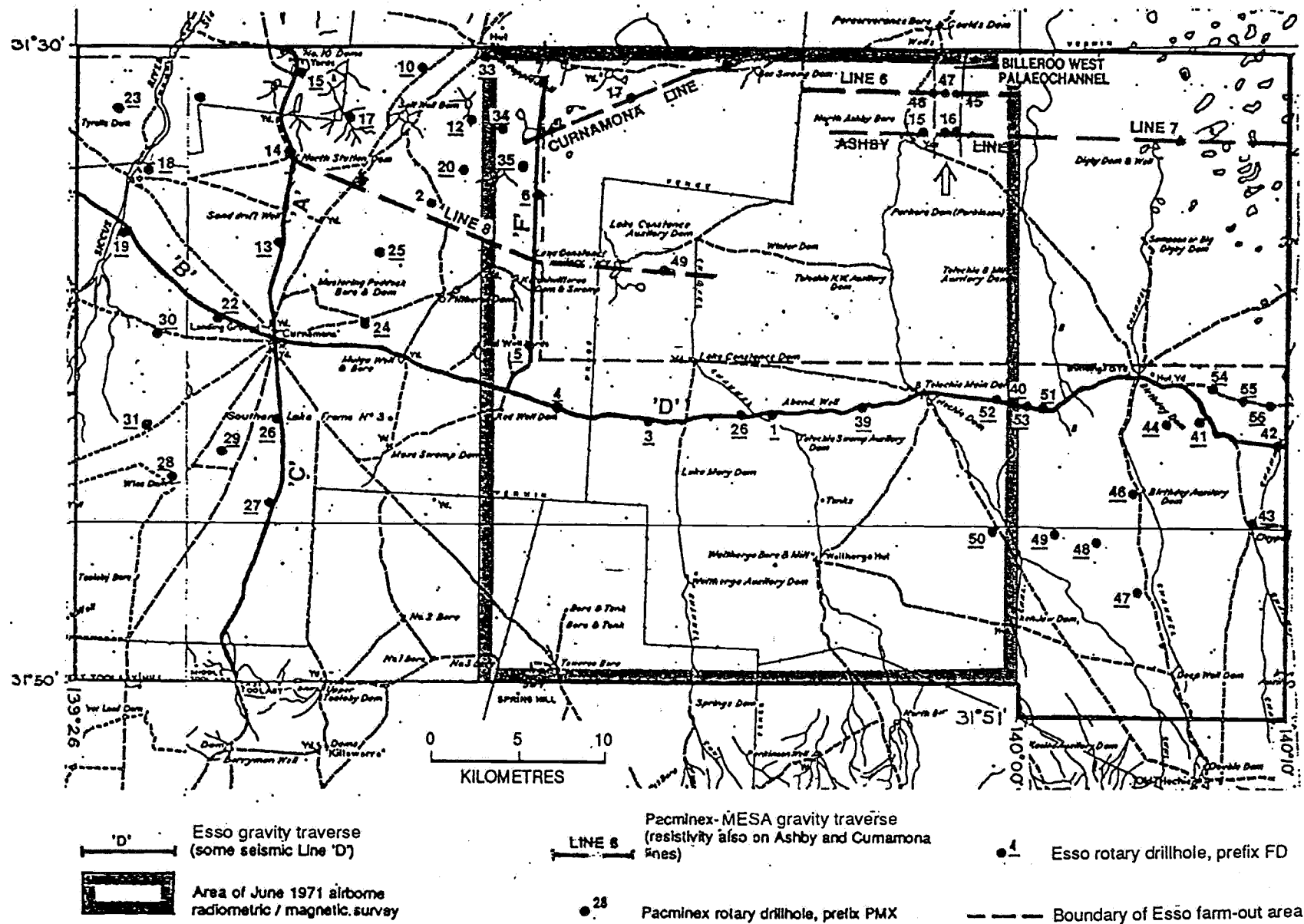


Figure 43

<u>TENEMENT:</u>	SML 562 (formerly SMLs 151, 172, 269; followed by SML 677, MLs 3371, 3557 to 3562; ELs 47, 132, 259, 423, 794, 1119, 1497, 1864)
<u>AREA:</u>	34 sq km
<u>COMMENCEMENT DATE:</u>	15/4/71
<u>EXPIRY DATE:</u>	14/4/72
<u>COMPANY:</u>	DOMEROCK PTY LTD
<u>ENVELOPE:</u>	DM 168/71
<u>REFERENCES:</u>	
<u>LOCATION:</u>	Dome Rock Mine
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	KALABITY 6934
<u>TARGETS:</u>	Copper
<u>AGE/ROCK UNITS:</u>	Palaeoproterozoic Willyama Supergroup
<u>EXPLORATION SUMMARY:</u>	No report on file.

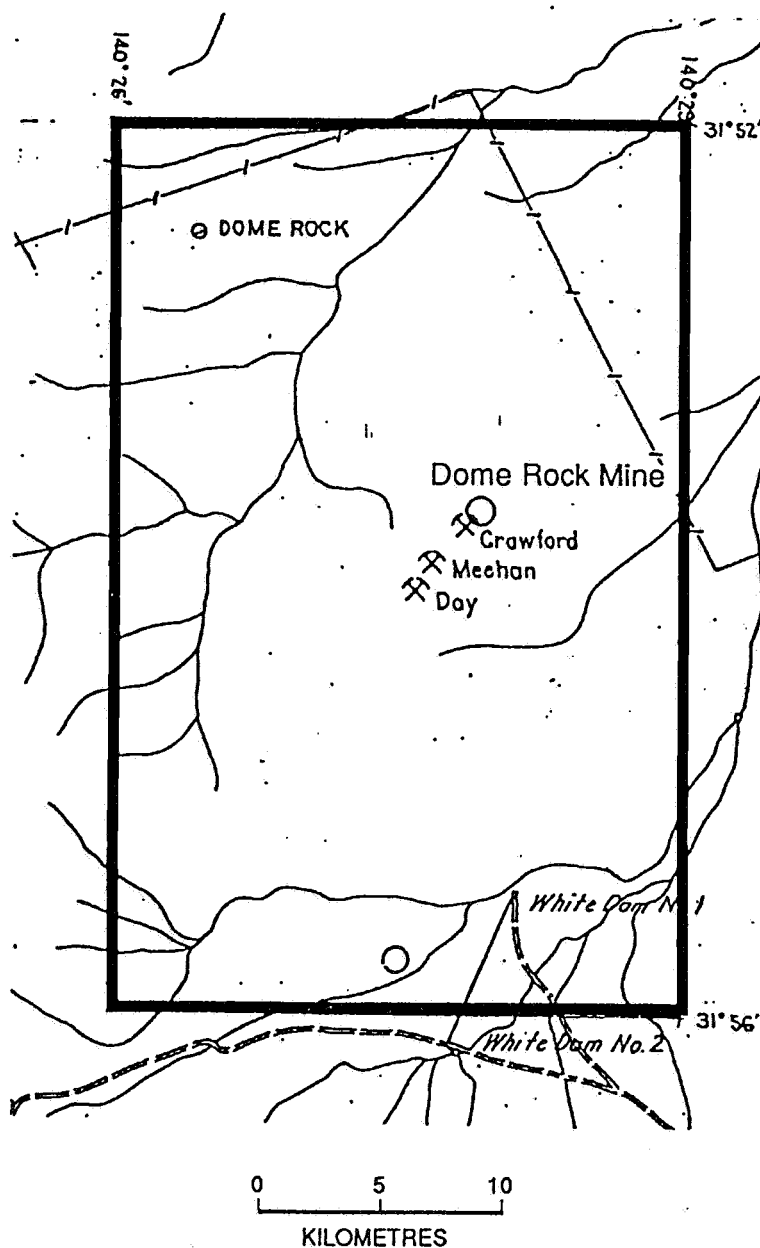
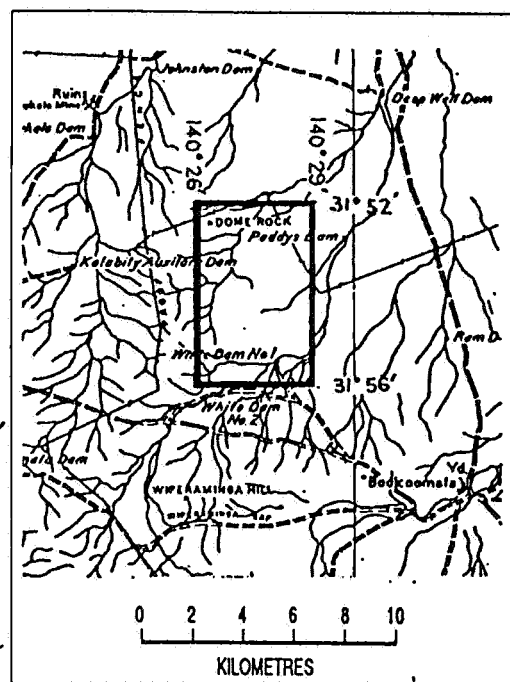


Figure 44

Applicant / Title Holder: / Dome Rock Pty. Ltd.

Licence N° : SML 562

DME\_SA 93-1562

TENEMENT: SML 580 (formerly SMLs279, 415, followed by SML 696;  
ELs 98, 238, 412, 721, 1060, 1382, 1763)

AREA: 1968 sq km

COMMENCEMENT DATE: 13/5/71

EXPIRY DATE: 12/5/72

COMPANY: SEDIMENTARY URANIUM NL

ENVELOPE:

REFERENCES:

LOCATION: East Kalkaroo (Mulyungarie)

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: MULYUNGARIE 7034, LAKE CHARLES 7035

TARGETS: Sedimentary uranium

AGE/ROCK UNITS:

EXPLORATION SUMMARY: CONFIDENTIAL ENVELOPE

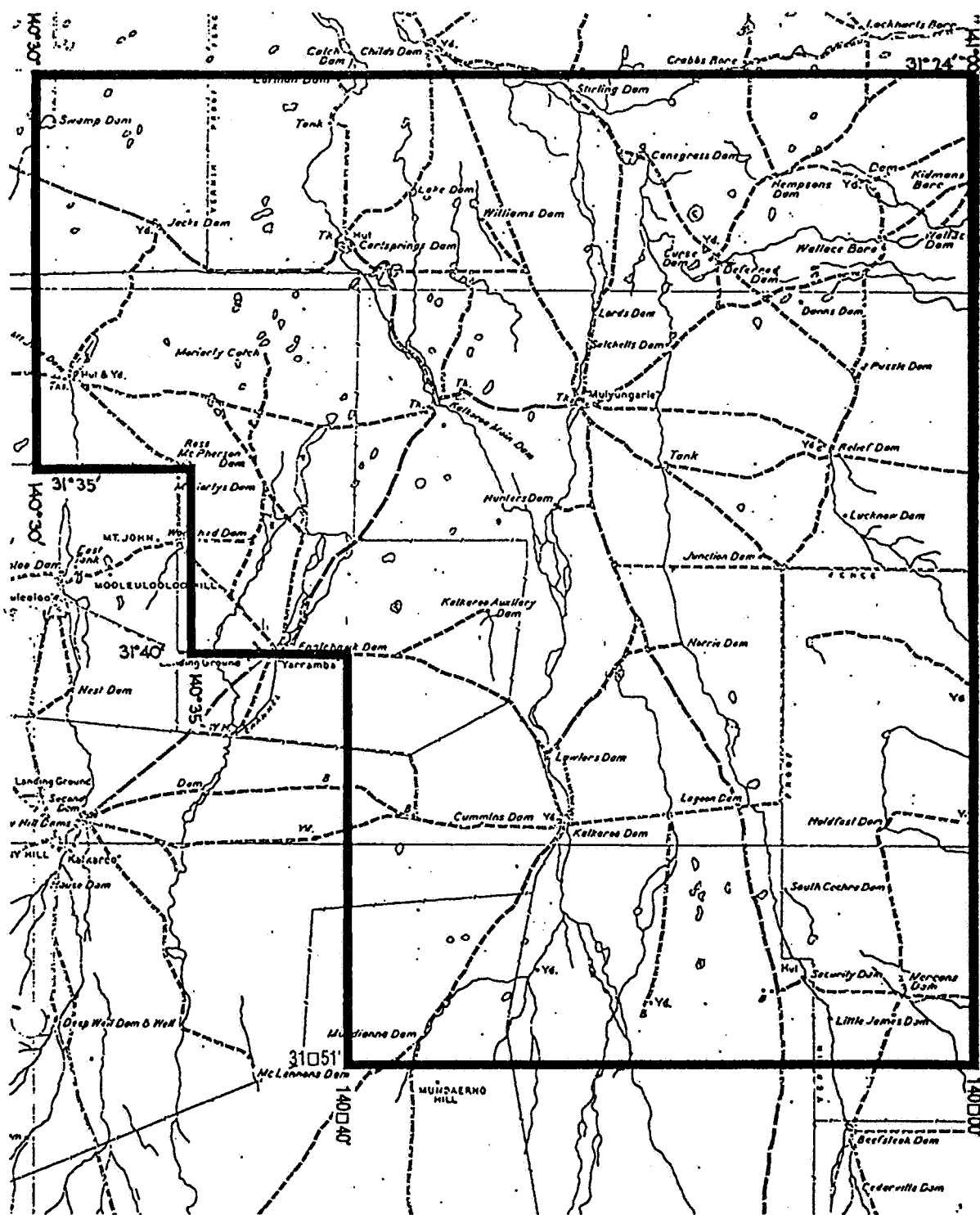


Figure 45

Applicant / Title Holder: | Sedimentary Uranium N.L.

Licence N° : SML 580

DME\_SA 93-1563

TENEMENT: SML 589 (formerly SML 244; followed by ELS 463, 559, 1471).

AREA: 2590 sq km

COMMENCEMENT DATE: 3/6/71

EXPIRY DATE: 2/6/73

COMPANY: PETROMIN NL, TRANSOIL NL, EXOIL NL

ENVELOPE: 1627

REFERENCES: Successive quarterly reports

LOCATION: Paralana Plains (Lake Frome)

1:250 000 SHEET: CURNAMONA, FROME

1:100 000 SHEET: PASMORE 6835, FROME 6836

TARGETS: Sedimentary uranium

AGE/ROCK UNITS: Cainozoic sediments, principally Tertiary Eyre and Namba Formations of the Tarkarooloo Sub-basin and Callabonna Basin.

EXPLORATION SUMMARY: Exploration was by Western Nuclear Australia Limited as manager of a joint venture. 41 rotary holes (589-1 to 589-41) totalling 6297.9 metres were drilled. All holes which ranged in depth from 111 to 212 metres were logged with gamma, resistivity and spontaneous potential equipment.

MINERALISATION/PROSPECTS: Two mineralized intersections were recorded in lithology interpreted as Cretaceous mudstone.

- (i) Hole 589-10, west of Woodlawoodlana Well, which showed a calculated grade of 0.017%  $U_3O_8$  over 0.6 metres from 157.5 metres.
- (ii) Hole 589-28, north of Woodlawoodlana Well, which showed a calculated grade of 0.019%  $U_3O_8$  over 0.3 metres from 131.8 metres.

Several other holes showed 'anomalous' radioactivity. Geological interpretation of the drilling data is not recorded. Western Nuclear withdrew from the joint venture and there is mention in quarterly reports that drilling had not intersected any host rocks favourable for sedimentary uranium concentration.

DRILLING: Forty-one rotary holes (589-1 to 589-41) totalling 6297.9 metres.  
Five holes (589-32 to 35, 41) totalling 716 metres on CURNAMONA.



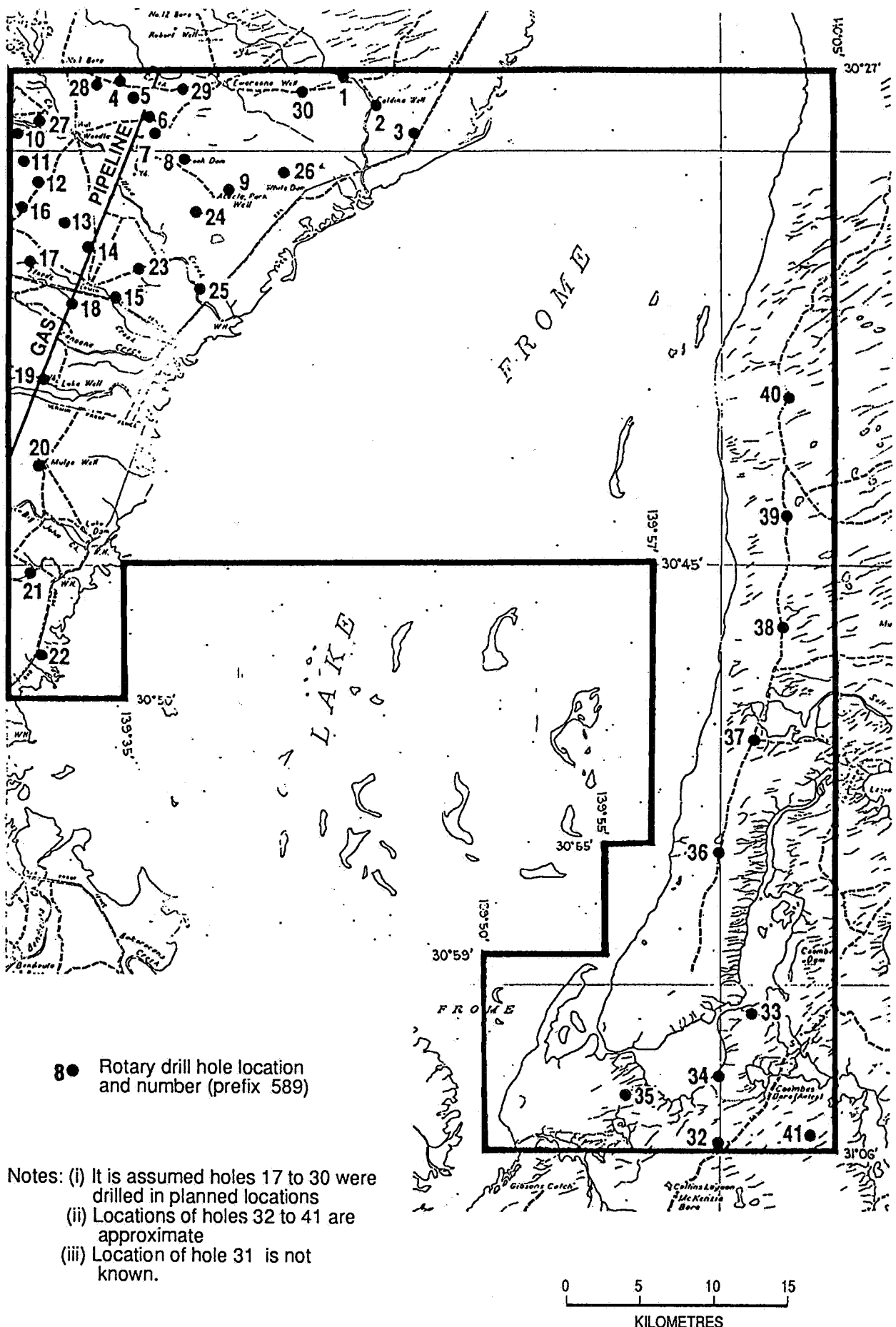


Figure 46

Applicant / Title Holder: Petromin N.L., Exoil N.L. & Transoil N.L.

Licence N° : SML 589

DME\_SA 93-1588

**TENEMENT:** SML 595 (formerly SMLs 222, 440, followed by SMLs 714, Els 85, 132, 259, 377, 423, 597, 794, 970, 1004, 1119, 352, 1412, 1497, 1786, 1864)

**AREA:** 1585 sq km

**COMMENCEMENT DATE:** 18/6/71

**EXPIRY DATE:** 17/6/72

**COMPANY:** MOUNT ISA MINES LIMITED

**ENVELOPE:** 1562

**REFERENCES:** Successive quarterly reports

**LOCATION:** Kalabity

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934, MULYUNGARIE 7034

**TARGETS:** Sedimentary uranium, copper.

**AGE/ROCK UNITS:** Quaternary sediments above. Tertiary Namba and Eyre Formations resting unconformably on basement of Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** In September - October 1971 thirty four rotary holes (K26 to K60 excluding K28) totalling 3635 metres were drilled in various sections of the SML to explore for sedimentary uranium. Anomalous radioactivity was recorded in 12 holes from gamma logging and this resulted in the naming of the South Eagle Prospect an area between 3 and 10 km south-south-east of Yarramba H.S. Coring was attempted in two holes, K 59 and K 60. A further seven holes (K 61 to K 67 totalling 808.95 metres were drilled in mid 1972 in a cluster about 4.5 km south-south-east of Yarramba. Logging was with gamma probe only. Coring was again attempted in two holes with only fair results and chemical assays for  $U_3 O_8$  were compared with probe assays. A white clay intersected in holes K 59 and 60 was tested by Amdel with the objective of establishing whether it had potential as a paper filler.

At Waukaloo Mine rock chip and limited soil sampling was extended away from the general mine area (11 rock chip lines for Cu, Pb, Zn). Petrological examination was undertaken on the cupriferous metasediments and an IP survey was planned (see SML 714). 226 stream sediment samples for Cu, Pb, Zn were collected from Wiperaminga Range.

**MINERALISATION/PROSPECTS.** Anomalous radiometric responses were detected in holes K 29, 30, 49, 50, 51, 52, 53, 54, 56, 57, 59 and 60. Core recoveries were generally poor especially in sand. In K 59 coring of the anomalous interval around 102 metres showed up to 900 ppm  $U_3 O_8$  over 2 metres in grey medium grained sand in contact with black clay, while in K 60 at about 101.3 meters there was 1100 ppm  $U_3 O_8$  over 1 metre in light grey to white clay in contact with black carbonaceous clay and a sand at 100.3 metres showed 1800 ppm  $U_3 O_8$ . A favourable environment was absent in the north-western part of the area where basement depth was average 72 metres.

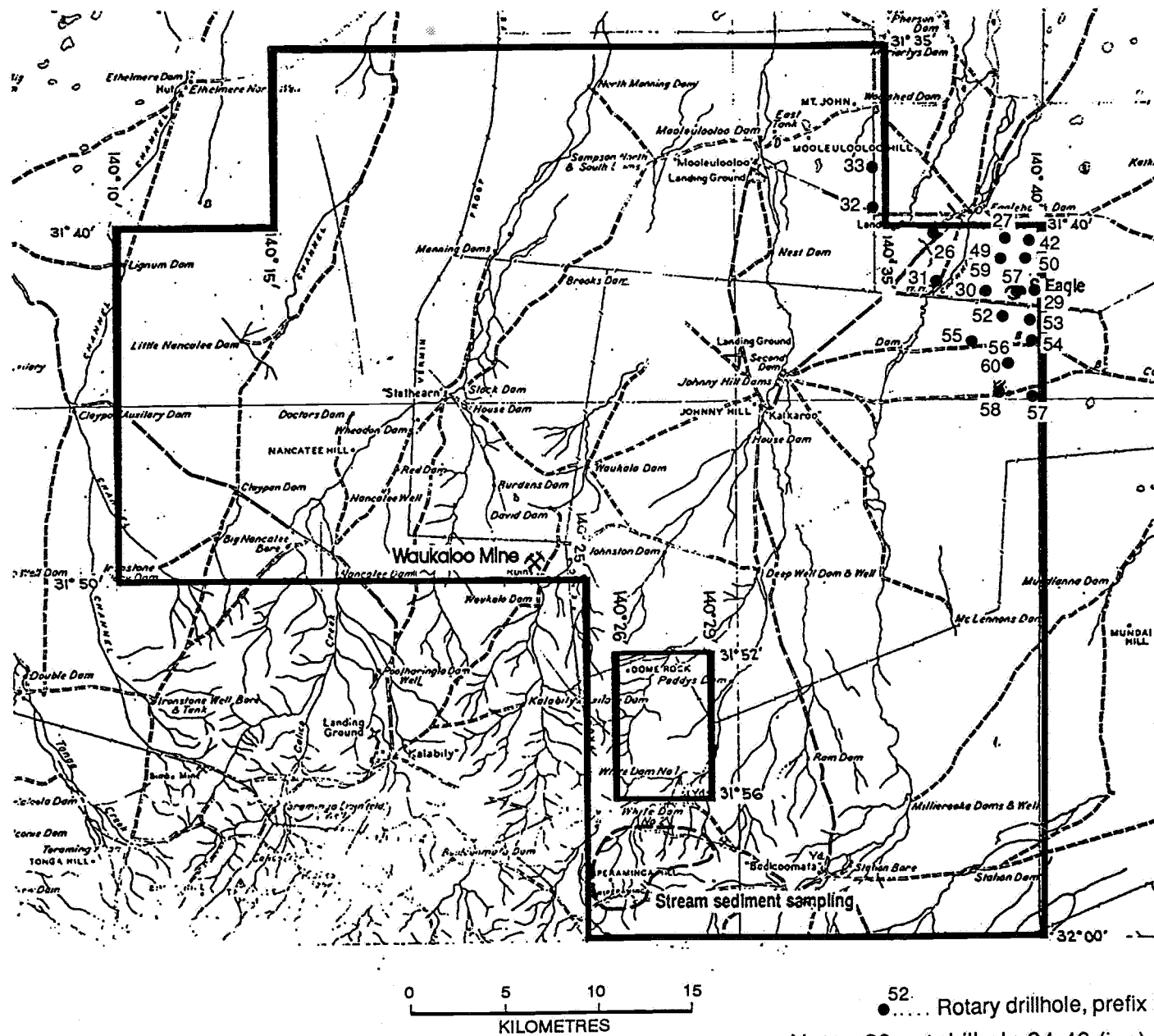
The tests on white clay showed reflectivity may be made suitable but other characteristics were likely to be below paper filler requirements.

Petrology from Waukaloo showed chalcopryite was present in quartz - albite- magnetite rocks termed 'metajaspilite' by Central Mineralogical Services. Soil and rock chip sampling showed widespread anomalous copper values plotted on 1:2000 geological mapping in a sequence defined as metaquartzite, metasilstone massive, quartzite and ironstone (see petrology above).

DRILLING Forty one rotary holes (K 26 to K 60 excluding K 28) totalling 4444 metres with partial coring in two of the holes (K 59, K 60).

**Applicant / Title Holder:** Mt. Isa Mines Limited

DME SA 93-1564



**Figure 47**

**TENEMENT:** SML 612 (formerly SML 415; followed by SML 694; ELs 121, 189, 457, 848, 1258, 1606, 1676)

**AREA:** 523 sq km

**COMMENCEMENT DATE:** 12/8/71

**EXPIRY DATE:** 9/12/72

**COMPANY:** MINES ADMINISTRATION PTY LIMITED

**ENVELOPE:** 1854

**REFERENCES:** Brunt, D, 1972: Final Report SML 612 (Mundaerno Hill). Mines Administration Pty Limited (unpublished)

**LOCATION:** Mundaerno Hill

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** MULYUNGARIE 7034

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Quaternary overlying Tertiary Namba and Eyre Formations deposited on Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** Exploration was undertaken in joint venture with Teton Exploration Co Pty Ltd. A reconnaissance scintillometer survey was flown at 61 metre terrain clearance on lines arbitrarily spaced at 1610 metres plus selected fence and road flying. Eleven rotary holes totalling 653 metres were drilled at 3 to 6 km spacing along the north and north-western boundaries of the SML. These were logged for gamma, resistivity and self-potential responses.

**MINERALISATION/PROSPECTS:** A thin Tertiary section of about 30 metres rests on basement. It consists of light to medium grey and red silts and clays often with thin sands at the base. Sands are well-sorted fine to medium grained and quartzose. The section thickens to the north.

No significant airborne radiometric anomalies were detected.

Drilling showed a thin Tertiary section in the northern (basinward) part of the area and the sands were considered to be too thin to be favourable for development of sedimentary uranium deposits. There was no significant radioactivity recorded in gamma logging.

**DRILLING:** Eleven rotary holes (MH1-11) totalling 653 metres.

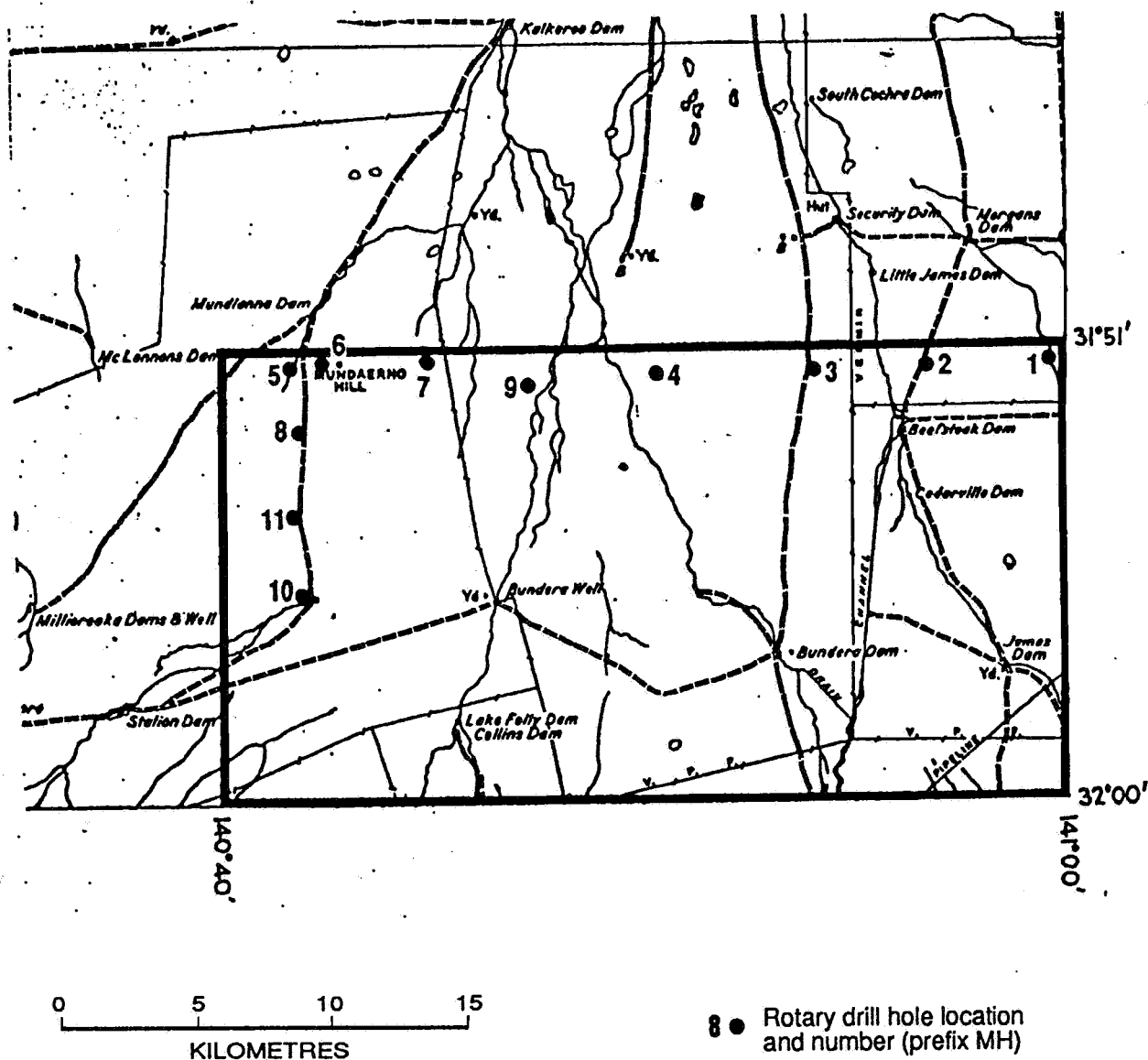


Figure 48

Applicant / Title Holder: Mines Administration Pty. Ltd.

Licence N° : SML 612

DME\_SA 93-1589

07/15/85

TENEMENT: SML 615

AREA: 259 sq km

COMMENCEMENT DATE: 5/8/71

EXPIRY DATE: 4/8/72

COMPANY: ESSO MINERAL ENTERPRISES AUSTRALIA INC

ENVELOPE: 1728

REFERENCES:

LOCATION: Whey Whey Creek (Olary "C")

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: KALABITY 6934

TARGETS: Sedimentary uranium and hydrothermal uranium in basement

AGE/ROCK UNITS: Cainozoic sediments surrounding scattered outcrop of Palaeoproterozoic Willyama Supergroup.

EXPLORATION SUMMARY: An airborne spectrometer and magnetometer survey was flown by Aero Service in 1971 (1000 line km) at 305 metre line spacing and 91 metre terrain clearance. It was anticipated that a sophisticated airborne survey might reveal minor anomalies indicating mineralisation within the sediments or slightly covered Proterozoic rocks. 37 minor or "possible" radiometric anomalies were identified for ground follow-up (No airborne geophysical or anomaly maps are in the envelope). Six rotary holes (615-1 to 6) totalling 275 metres were drilled across the northern boundary of the SML in the search for sedimentary uranium. All holes were logged with gamma, spontaneous potential and resistivity probes and bottom hole Precambrian core samples were assayed for Co, Ni, V, W, Mo, Cu, Pb, Zn, Sn, Ag, Au, Th.

MINERALISATION/PROSPECTS: The drillholes for sedimentary uranium showed a Cainozoic section of predominantly oxidized silts and clays resting on basement of schist and gneiss ranging in depth from 18 to 65 metres. Oxidized coarse sands and gravels up to 11 metres thick were intersected in the upper sections of 615-3 and 615-4 near Tonga Creek. No anomalous radioactivity was detected in the holes. Emission spectrography showed Ni to 100 ppm and V to 1000 ppm in 615-3.

Thirty five of the 37 airborne radiometric anomalies were examined on the ground. Only anomaly 25 (location not given) yielded anomalous uranium of note with initially 1500 ppm U and 270 ppm Th in calcareous soil (calcrete?). Additional sampling gave 59, 29 and 110 ppm U. The uranium content was considered too "spotty" to justify further work.

Overall the area was considered to have "poor potential" for uranium mineralisation.

DRILLING: Six rotary holes (615-1 to 6) with bottom hole cores totalling 275 metres.

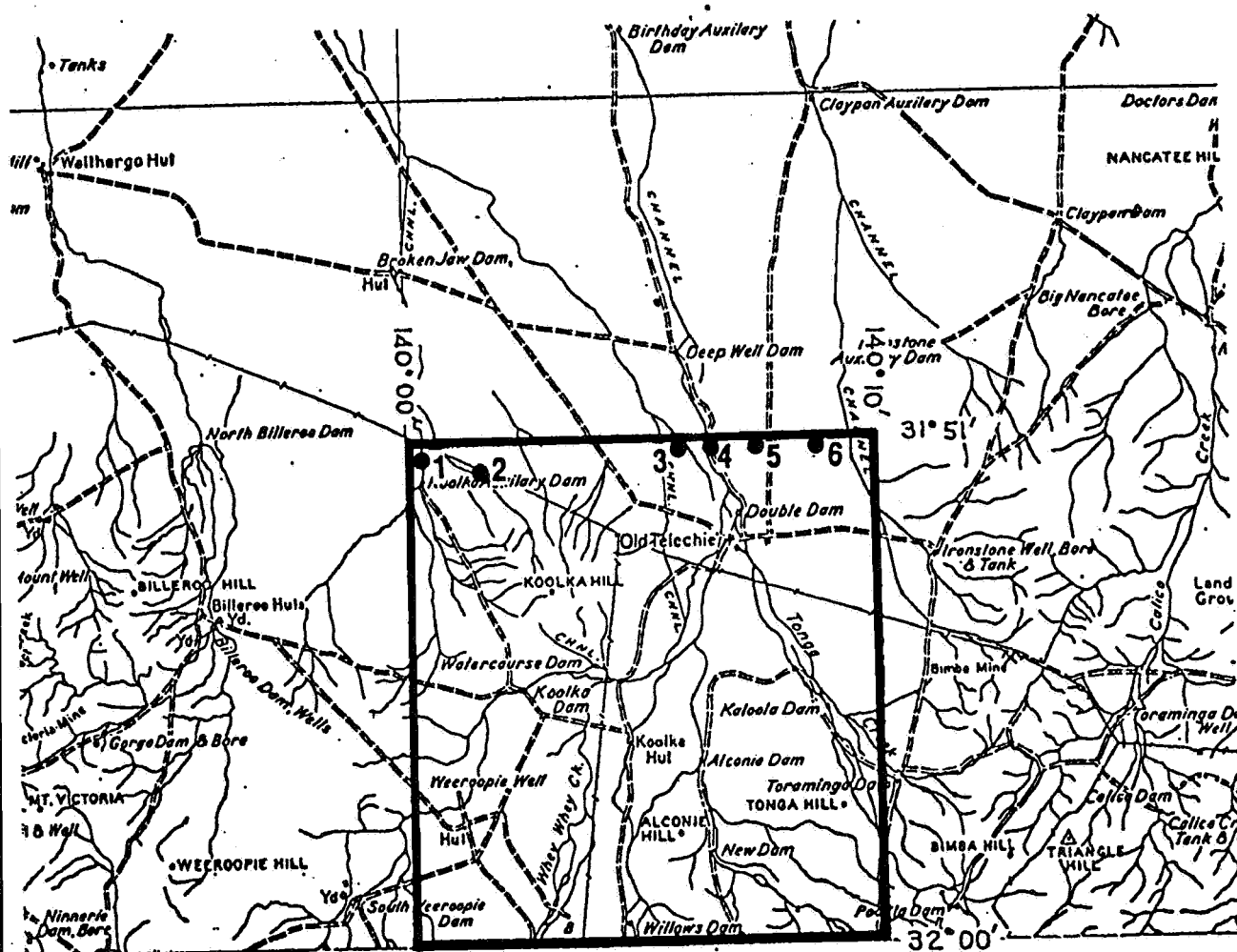


Figure 49

Applicant / Title Holder: ESSO Mineral Enterprises Australia Inc.

Licence N° : SML 615

DME\_SA 93-1590



**TENEMENT:** SML 672 (formerly SMLs 118, 209, 209A, 534; followed by ELs 62, 132, 376, 629, 1308, 1480, 1591, 1864)

**AREA:** 803 sq. km

**COMMENCEMENT DATE:** 10/2/72

**EXPIRY DATE:** 9/2/73

**COMPANY:** PETROCARB MINERAL EXPLORATION (SA) PTY LTD AND ESSO MINERAL ENTERPRISES AUSTRALIA INC.

**ENVELOPE:** 1931

**REFERENCES:**

**LOCATION:** Kalabity - Boolcoomata.

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** OLARY 6933, KALABITY 6934

**TARGETS:** Uranium, copper, zinc.

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** Ground follow-up of airborne radiometric anomalies located from survey flown over SML 534. Two anomalous zones (7 and 12) were selected for drilling, together with Lady Louise Mine, gossanous iron-oxide bearing quartzite in the Old Boolcoomata Scheelite zone, and brecciated quartzite with small brannerite occurrences at Cathedral Rock. Ten percussion holes totalling 715.1 metres were drilled. Each area drilled was mapped at scales ranging from 1:480 to 1:1 200. Holes were radiometrically logged and assayed for Cu, Zn.

**MINERALISATION/PROSPECTS:** Interpretation of airborne radiometrics failed to located any first order uranium anomalies. 43 anomalies were chosen for follow-up. Anomalous areas were generally found to be spotty associated with pegmatites, and of limited extent. Drilling yielded the following results (all on OLARY).

**Radiometric**

**Anomalies 7 and 7 South:**

Spotty radioactivity at surface largely restricted to the narrow core zone of an 18 m thick pegmatite. (Holes EHH 2-5) - best 1.5 m at 0.07% U<sub>3</sub>O<sub>8</sub> in EHH 2 in schist adjacent to pegmatite, and 10.7m at 0.14% Cu in EHH4. (7 South) together with 3 m at 1.7% Zn at contact between pyritic biotite quartzite and white quartzite also in EHH 4 EHH 5 intersected 3m at 0.6% Zn.

**Lady Louise Mine:**

(Holes EHH 9,10) - 30.5 m at 0.4% Cu in EHH10 (maximum value 1.9% Cu) in oxide zone beneath which EHH9 showed 10.7 m at 0.25% Cu in sulphides with similar Zn values - both zones bottomed in pyritic quartzite. No further holes drilled because of diminishing Cu values with depth and small pipe-like nature.

Radiometric Anomaly 12: ("Meningie Well Copper Prospect", hole EHH7) 9.1 m at 0.25% Zn, and 3 m at 0.3% Cu in schists.

Old Boolcoomata Scheelite: (Holes EHH1, 6) Best intersection 7.6 m at 0.15% Cu in EHH6 in pyritic quartzite and biotite muscovite schist. Chip sampling of calc-silicate lenses showed 0.02% to 2.3%  $\text{WO}_3$  in 9 samples (7 samples less than 0.25%  $\text{WO}_3$ ).

Cathedral Rock: (Hole EHH8) Barren hole in fine grained quartzite.

## DRILLING

Ten percussion holes (EHH1-10) totalling 715.1 metres.

Note: Mineral Occurrence Map (500-8) is missing from envelope.

Note: All holes on OLARY.

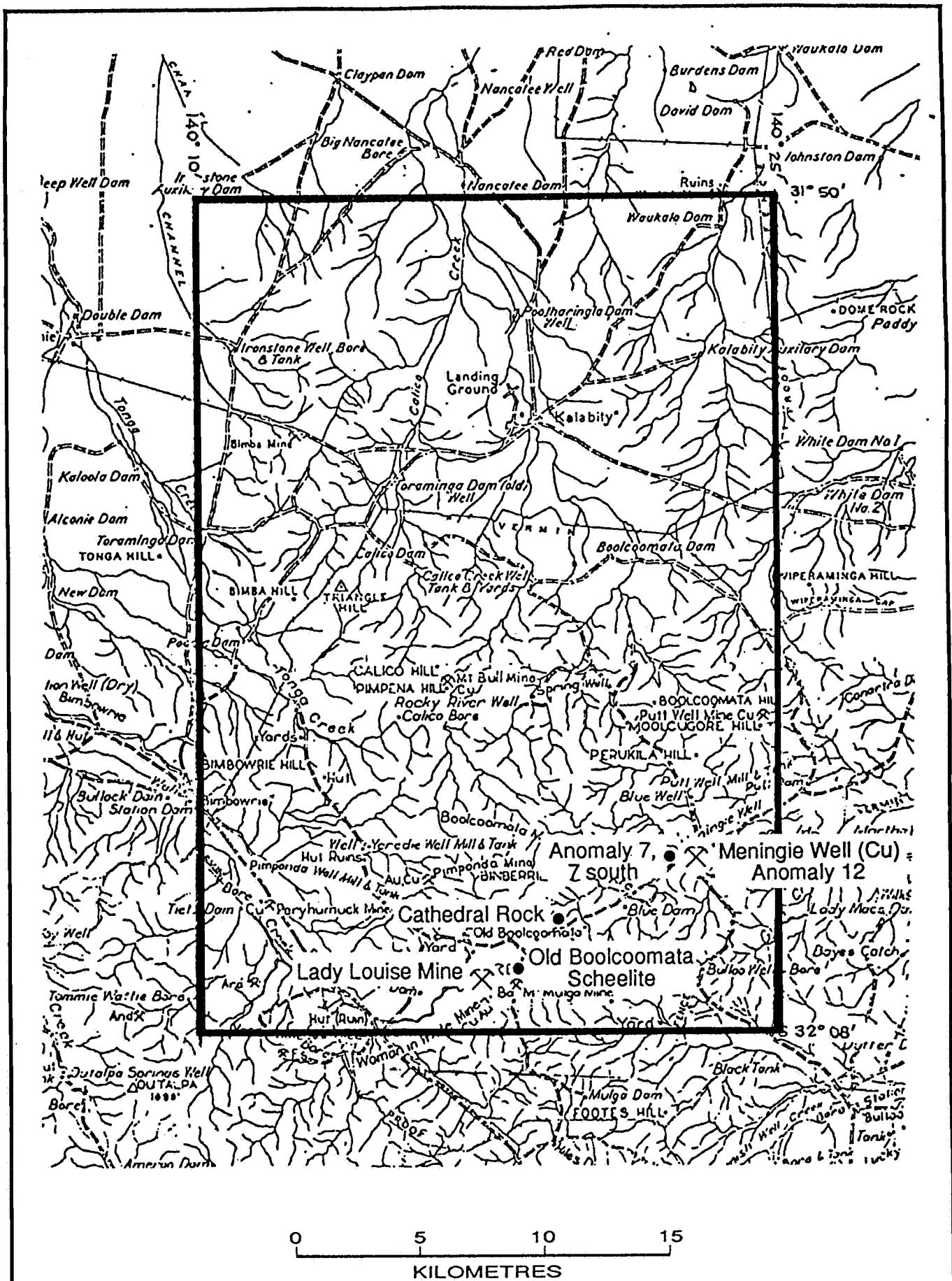


Figure 50

Applicant / Title Holder: Petrocarb Mineral Exploration (S.A.) Pty. Ltd.  
Esso Mineral Enterprises Australia Inc.

Licence N° : SML 672

DME\_SA 93-1565

**TENEMENT:** SML 673 (formerly SMLs 118, 210, 210A, 535; followed by ELs 62, 132, 259, 423, 794, 1119, 1497)

**AREA:** 891 sq. km

**COMMENCEMENT DATE:** 10/2/72

**EXPIRY DATE:** 9/2/73

**COMPANY:** PETROCARB MINERAL EXPLORATION (SA) PTY LTD AND ESSO MINERAL ENTERPRISES AUSTRALIA INC.

**ENVELOPE:** 1949

**REFERENCES:** Dickson, T.W., 1972: Geology of Part of SML 535 Olary Province South Australia for Esso (Minerals) Australia Limited Earth Resources Australia Pty Limited.

**LOCATION:** Plumbago - Glenorchy

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** WINNININNIE 6833, CURNAMONA 6834

**TARGETS:** Uranium

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** Geological mapping at 1:11850 of 72 sq.km. Glenorchy-Mount Victoria-Billeroo area (good quality). Field checking at 150 airborne radiometric anomalies from the survey completed under SML 535 resulted in detailed follow-up at the Billeroo Prospect (North and South) with 1:1200 mapping and ground radiometrics over 0.38 sq.km and 0.29 sq.km respectively and close examination of three other anomalous zones, AA130, AA55 and AA146. Jagged Rocks uranium occurrence was also appraised.

**MINERALISATION/PROSPECTS:** The area consists of a complex series of migmatites and granites formed by extensive granitization of pre-existing pelitic metasediments such that structure is dominated by draping of migmatites around granites. No new uranium deposits were found in mapping and ground radiometric prospecting.

**Billeroo North:** Davidite crystals and magnetite occur on an east-north-east trend in abundant small pegmatite lenses and quartz veins within a migmatite mass. Pegmatite lenses proved to be too scattered, small and low grade. Also between the two occurrences there is a shed of detrital davidite.

**Billeroo South:** Feldspathic quartzite in two bodies (305m x 76m and 183m x 30m) with pegmatites and grading into albitites. Contains scattered disseminated davidite with minor staurolite, biotite and apatite. Radiometric anomaly can be traced over this rock type for 600m in a north-west direction. Davidite also occurs in a restricted stockwork of narrow quartz veinlets.

AA130 Prospect:

4 km west-south-west of Mount Victoria Copper Mine was an airborne anomaly which on ground checking showed four scattered small areas of metatorbernite on granite exfoliation surfaces.

AA55 and AA146:

Davidite occurrences considered insignificant (locations not shown).

It was concluded that the uranium deposits in the area were too small and low grade to be economically attractive.

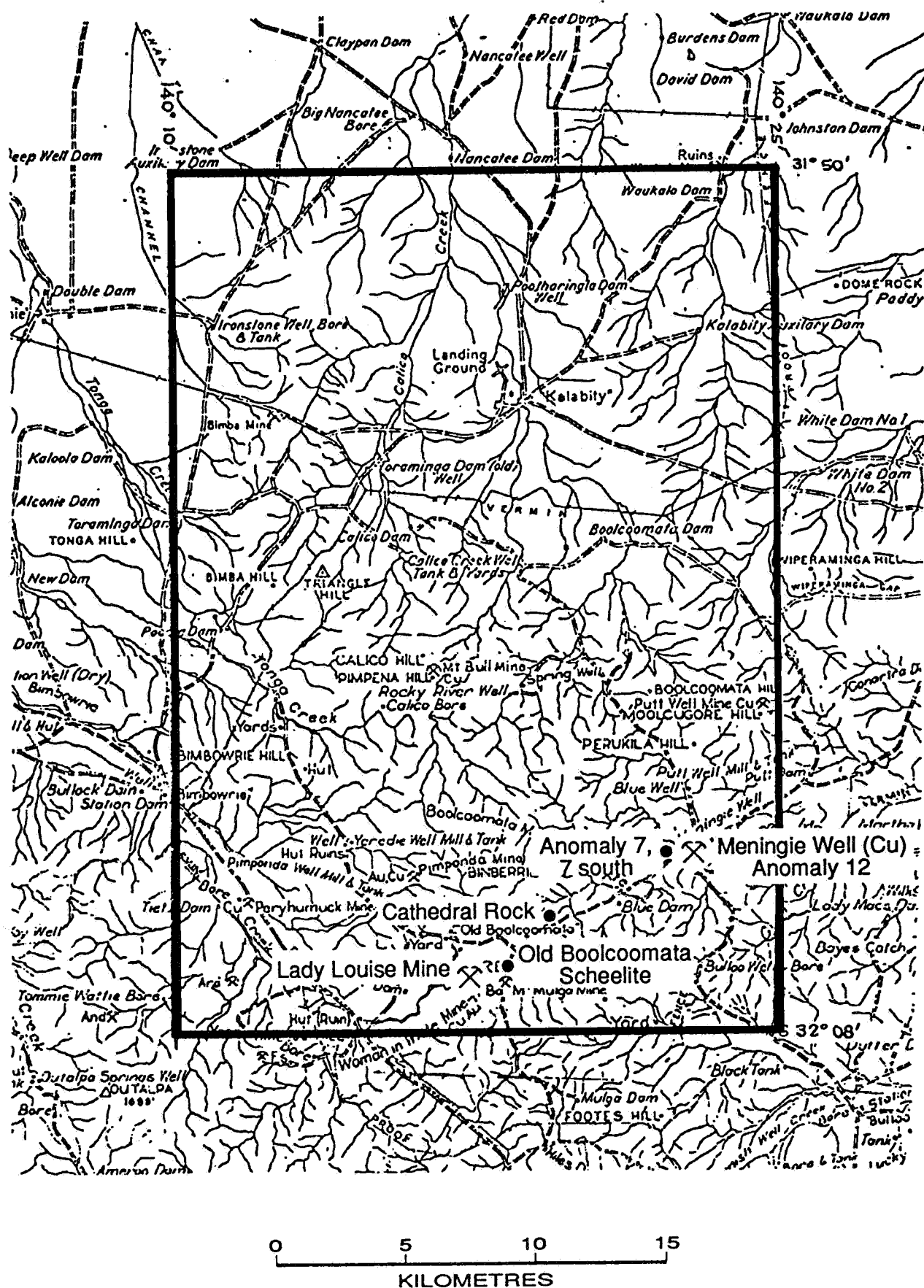


Figure 50

Applicant / Title Holder: Petrocarb Mineral Exploration (S.A.) Pty. Ltd.

Esso Mineral Enterprises Australia Inc.

Licence N° : SML 672

DME\_SA 93-1565

**TENEMENT:** SML 677 (formerly SMLs 151, 172, 269, 562; followed by MLs 3371, 3557 to 3562 ELs 47, 132, 259, 423, 794, 1119, 1497)

**AREA:** 34 sq. km

**COMMENCEMENT DATE:** 24/2/72

**EXPIRY DATE:** 23/2/73

**COMPANY:** CARPENTARIA EXPLORATION COMPANY PTY LTD

**ENVELOPE:** 1926

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Dome Rock Mine

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934

**TARGETS:** Uranium, copper.

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** Initially the target was uranium and scintillometer surveys were conducted on two grids north and north-west of the Dome Rock Mine in an attempt to locate an anomaly found in a Geophoto airborne survey in 1970 (SML 209). The northern grid was 1000 metres by 1000 metres and the north western 600 metres by 600 metres. In addition the northern part of the SML was traversed with a vehicle mounted scintillometer. Grid readings were taken at 25 metre intervals on 100 metre spaced lines.

Geological mapping at a scale of 1:20 000 was completed over the SML and the south-central part of adjacent SML 595.

121 rock chip samples were collected from metaquartzites throughout the area. 101 soil samples were collected at 30 metre intervals on two east-west lines north of the Dome Rock Mine. Both sample sets were analysed for Cu, Pb, Zn.

A 1:2 000 scale geological map was compiled for the massive limonite horizon south of Day Shaft at the Dome Rock Mine. Fourteen rock chip samples were collected across the horizon in several locations and assayed for Cu, Pb, Zn, Co.

An airborne radiometric and magnetic survey was commenced at the close of the SML term to accurately locate the Geophoto anomaly which was believed to be misplotted.

**MINERALISATION/PROSPECTS:** The scintillometer surveys failed to locate the airborne anomaly.

Rock chip samples showed maxima of 3000 and 1700 ppm Cu. Immediately adjacent to Dome Rock Mine Pb values were less than 50 ppm and two Zn values exceeded 100 ppm. Soil sample values were uniformly low. The limonite horizons showed Cu to 2500 ppm, Pb to 1100 ppm, Zn to 1100 ppm and Co to 140 ppm.

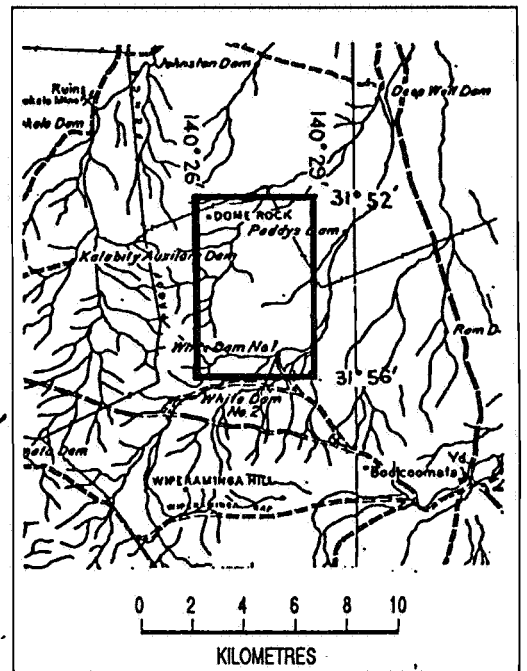
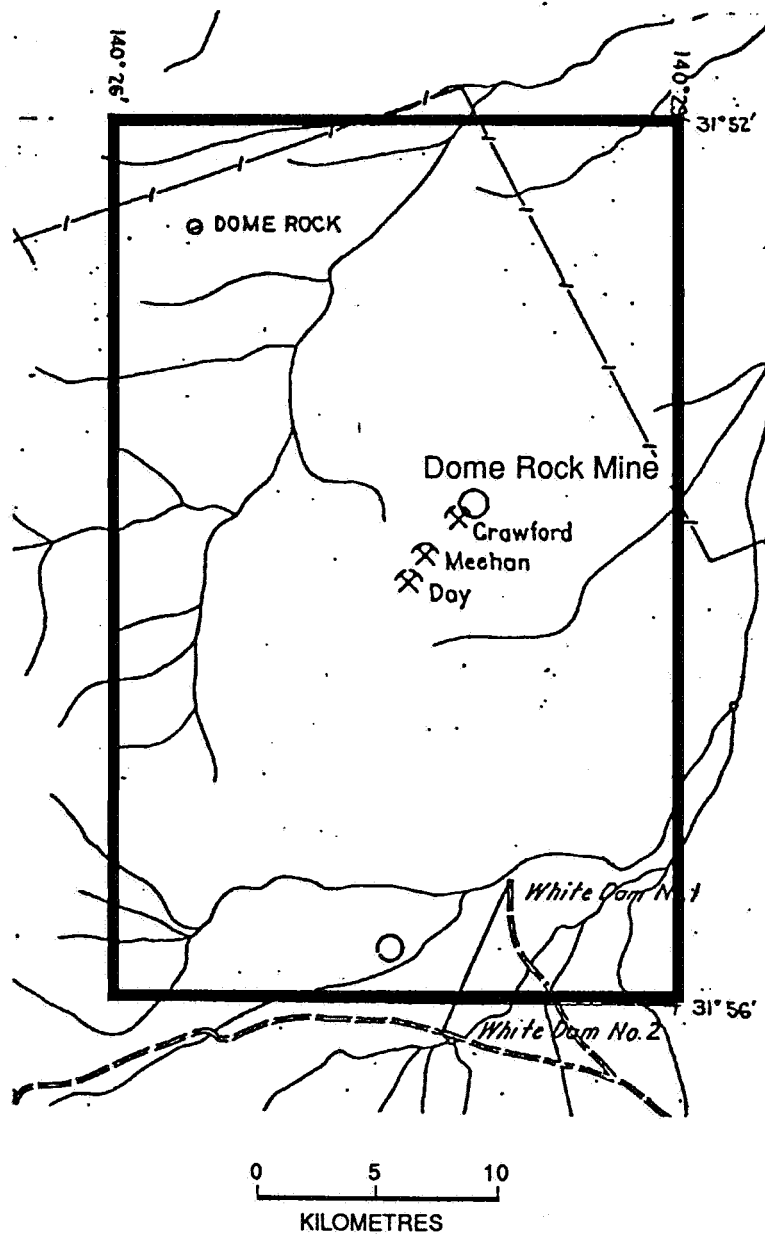


Figure 52

Applicant / Title Holder: , Carpentaria Exploration Co. Pty. Ltd.

Licence N° : SML 677

DME\_SA 93-1567



TENEMENT: SML 694 (formerly SMLs 415, 612; followed by ELs 121,189, 457, 848, 1258, 1606, 1676).

AREA: 523 sq km

COMMENCEMENT DATE: 27/4/72

EXPIRY DATE: 1/8/72

COMPANY: CARPENTARIA EXPLORATION COMPANY PTY LTD

ENVELOPE: DM 286/72

REFERENCES:

LOCATION: Mingary

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: MULYUNGARIE 7034

TARGETS: Sedimentary uranium

AGE/ROCK UNITS:

EXPLORATION SUMMARY: The SML was held for only three months during which time the holder concluded that the Mines Administration - Teton joint venture, the previous tenement holders, had adequately explored the area for sedimentary uranium (see SML 612, Env 1854).

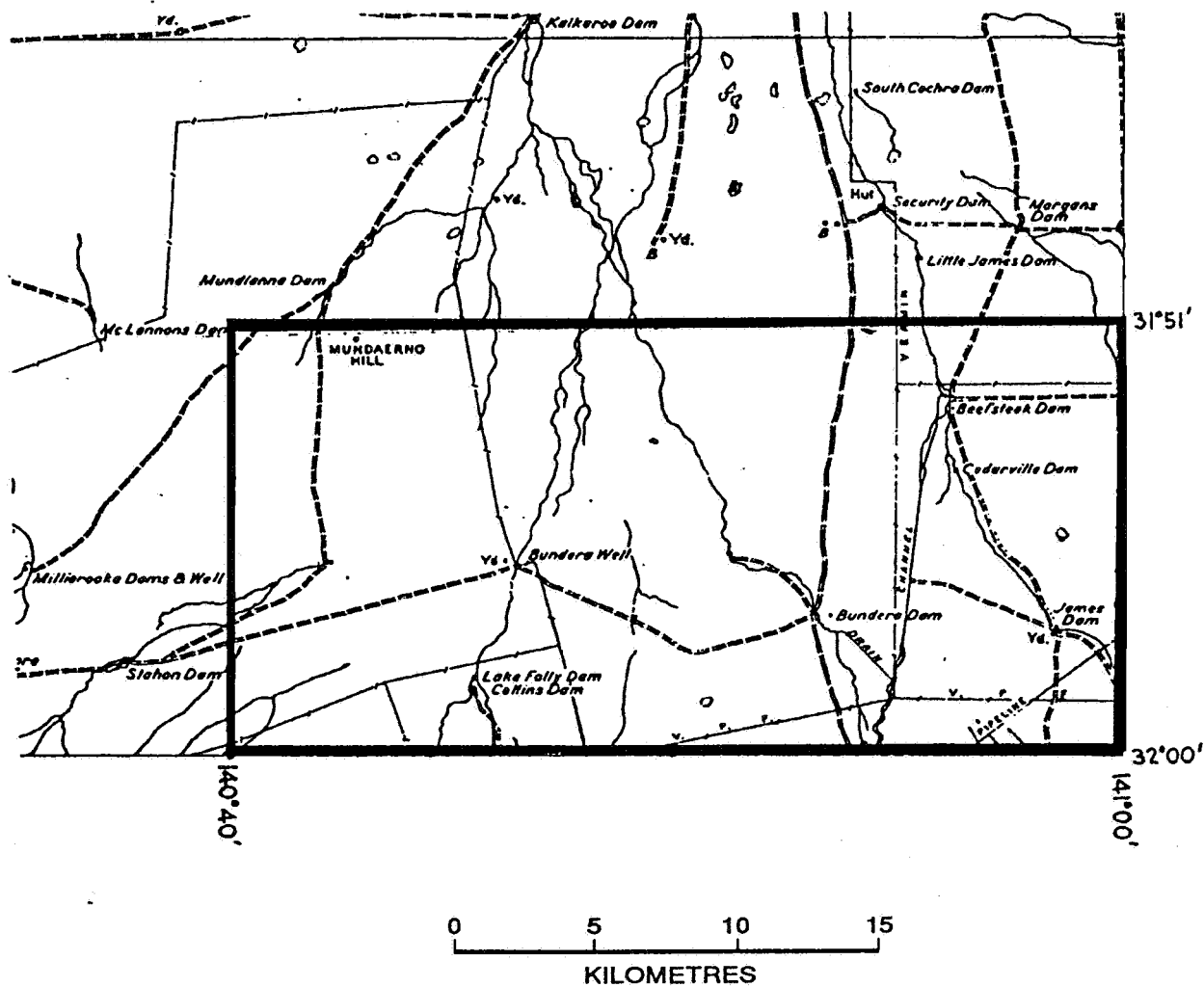


Figure 53

Applicant / Title Holder: Carpentaria Exploration Company Pty. Ltd.

Licence N° : SML 694

DME\_SA 93-1568

27/05/85

TENEMENT: SML 696 (formerly SMLs 279, 415, 580, followed by ELs 98, 238, 412, 721, 1060, 1382, 1763)

AREA: 1968 sq km

COMMENCEMENT DATE: 13/5/72

EXPIRY DATE: 12/5/73

COMPANY: SEDIMENTARY URANIUM NL

ENVELOPE:

REFERENCES:

LOCATION: East Kalkaroo (Mulgungarie)

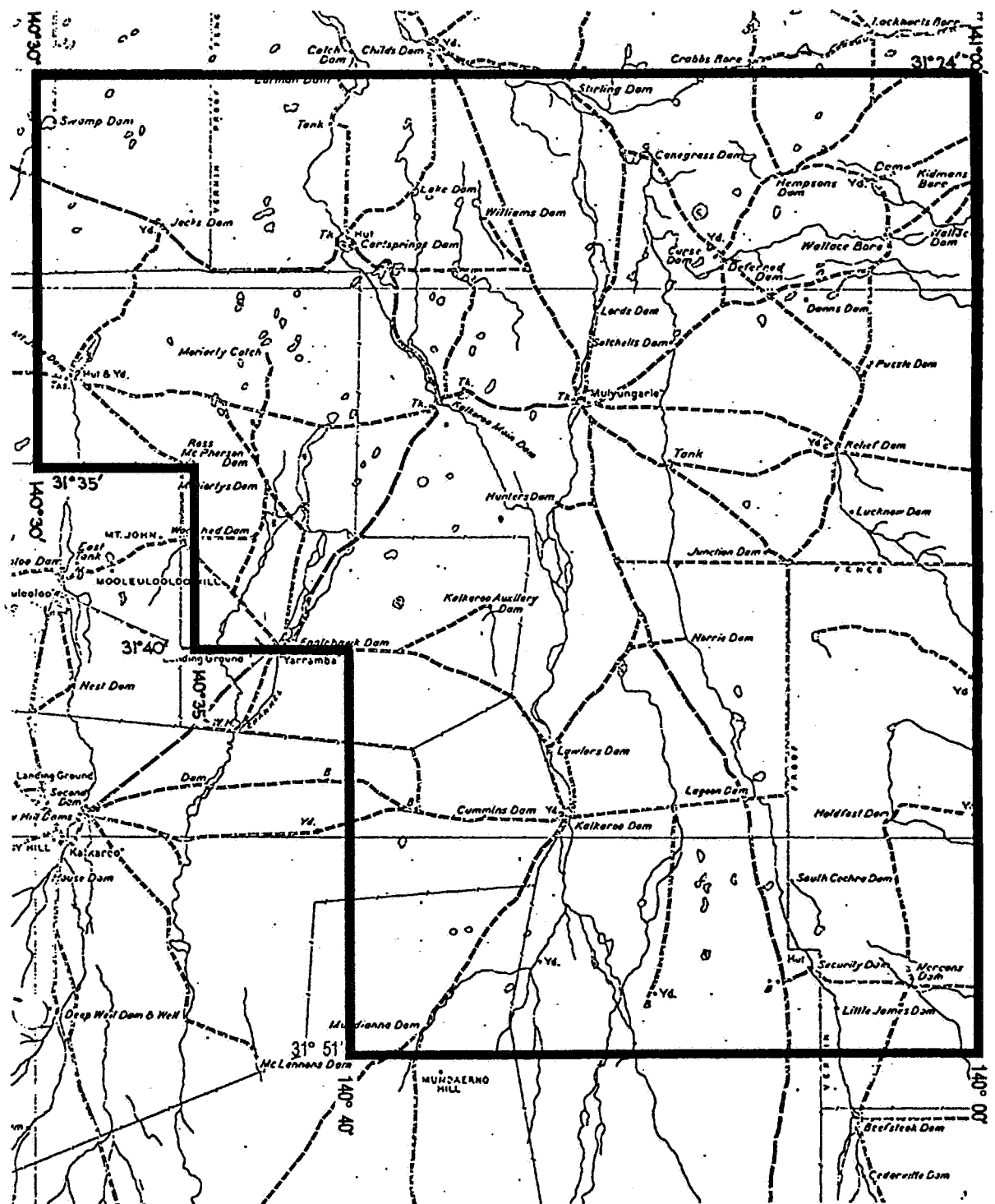
1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: MULYUNGARIE 7034, LAKE CHARLES 7035

TARGETS: Sedimentary uranium

AGE/ROCK UNITS: 1.

EXPLORATION SUMMARY: CONFIDENTIAL ENVELOPE |



0 5 10 15  
KILOMETRES

Figure 54

Applicant / Title Holder: Sedimentary Uranium N.L.

Licence N° : SML 696

DME\_SA 93-1569

07-156185

TENEMENT: SML 697 (formerly SML 414, followed by ELs 87, 89, 296, 522, 549, 911, 957, 1203, 1391, 1487, 1608, 1684, 1693, 1698, 1751)

AREA: 880 sq km

COMMENCEMENT DATE: 30/4/72

EXPIRY DATE: 29/4/73

COMPANY: SEDIMENTARY URANIUM NL

ENVELOPE: 2036

REFERENCES:

LOCATION: Benagerie

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: BENAGERIE 6935, KALABITY 6934

TARGETS: Sedimentary uranium

AGE/ROCK UNITS: Cainozoic sediments, principally Tertiary Namba and Eyre Formations of the Tarkarooloo Sub-basin.

EXPLORATION SUMMARY: No significant work was done to add to the drilling which was completed under SML 414.

MINERALISATION/PROSPECTS: There appears to be only a thin Tertiary sequence within the area of the SML with basement being previously intersected at depths from 15 to 91.5 metres. Only one of 21 holes drilled under SML 414, C6, showed any signs of a palaeochannel which extends from adjacent SML 696. No anomalous radioactivity had been found in the previous drilling.

It was concluded that the lack of a thick Tertiary sequence and prominent palaeodrainage patterns makes the area unfavourable as an environment for sedimentary uranium concentration.

**Applicant / Title Holder:** , Sedimentary Uranium N.L.

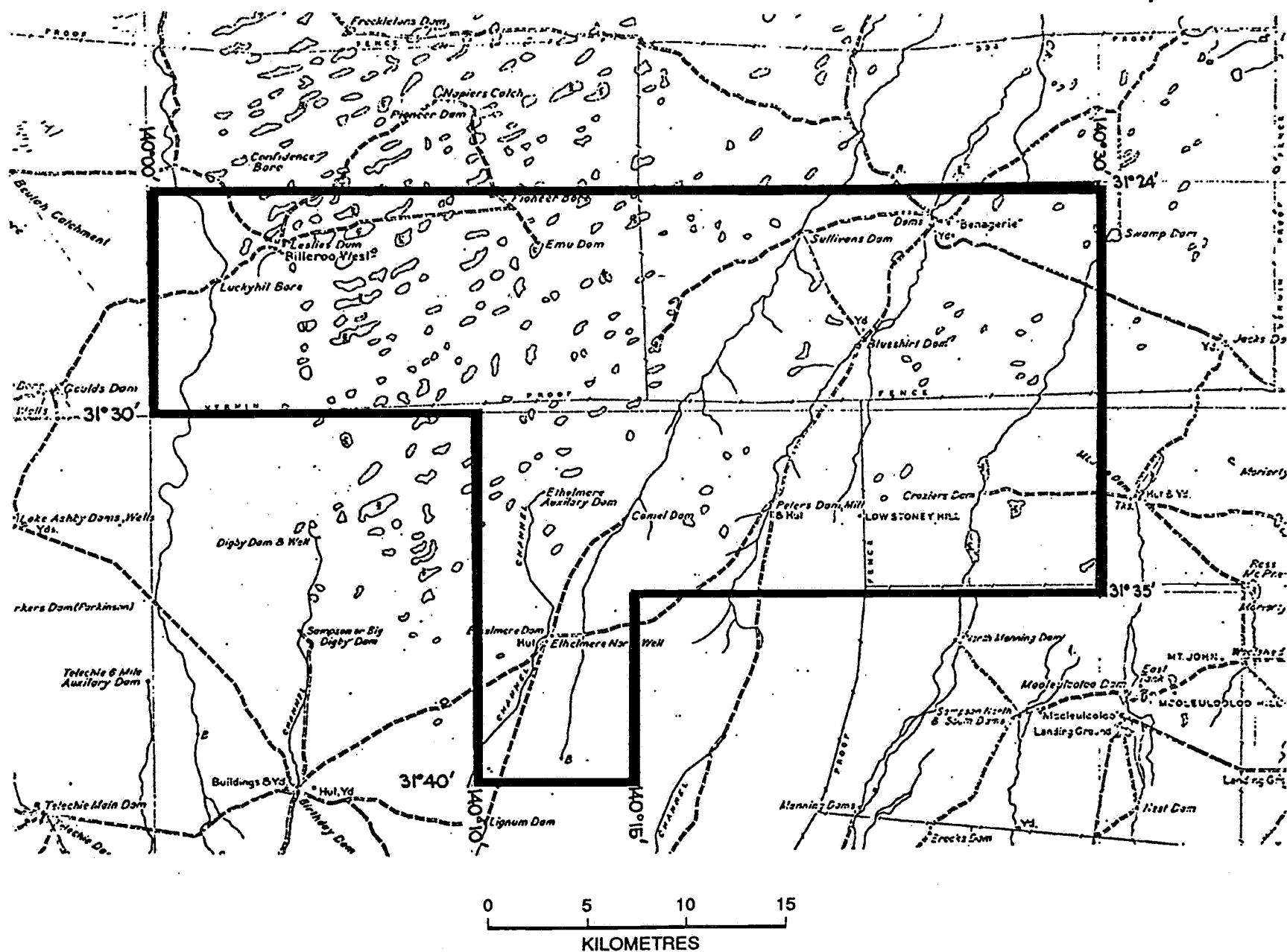


Figure 55

**TENEMENT:** SML 714 (formerly SMLs 222, 440, 595, followed by ELs 85, 132, 259, 377, 423, 597, 794, 970, 1004, 1119, 1352, 1412, 1497, 1786, 1864)

**AREA:** 1585 sq km

**COMMENCEMENT DATE:** 18/6/72

**EXPIRY DATE:** 17/6/73

**COMPANY:** MOUNT ISA MINES LIMITED

**ENVELOPE:** 1562

**REFERENCES:** Brunt, D.A. and Jarre, G.A., 1973: Summary Report SML 714 Farm-in (South Eagle Prospect) South Australia. Period 19th September 1972 to 18th June 1973 Mines Administration Pty Limited (unpublished).

**LOCATION:** Kalabity

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934, MULYUNGARIE 7034

**TARGETS:** Sedimentary uranium, copper.

**AGE/ROCK UNITS:** Quaternary sediments above Tertiary Namba and Eyre Formations resting unconformably on basement of Cretaceous clays and Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** At the South Eagle Prospect MIM drilled another two holes K 68 and K 69 (total 201.16 metres), of which the lower sections were cored with 70% recovery and assayed for  $U_3O_8$ . In September 1972 Minad-Teton farmed into the sedimentary uranium prospect and by May 1973 completed 155 rotary holes SE 1 to SE 155 totalling 18 797 metres. All holes were sampled at 1.5 metre intervals and logged with gamma, spontaneous potential and resistivity probes. The boundary between SML 714 and adjacent SML 696 to the east was accurately surveyed. In addition 19 of the holes (K series) drilled previously were washed out and relogged in October 1972. A preliminary resource estimate was made for newly named Honeymoon Deposit in the Yarramba Channel.

MIM continued exploration of the Willyama basement in the Waukaloo area after recognizing the strong association between copper and magnetite with a ground magnetic survey (100 metre spaced lines, 25 metre readings) a trial IP survey (4.5 km), downhole IP and resistivity surveys on W6 - W12, soil sampling in the central area for Cu, Pb, Zn and extension of the grid to the north and south. A further 16 percussion holes (W4 to W19) totalling 2405.2 metres were drilled at Waukaloo. Cuttings were assayed for copper. A number of samples were petrologically examined.

An airborne magnetic and radiometric survey was flown in 1973 over the southern part of the area by Austral Exploration Services at 400 metres line spacing.

A grid was surveyed over a relatively small area. In the western part of the Wiparaminga Range for mapping, rock and soil geochemistry.

1:20 000 geological mapping was completed in this and the adjacent SML 677 (Dome Rock).

**MINERALISATION/PROSPECTS:** Assays of core from K 69 showed values from 1350 to a maximum of 3850 ppm  $U_3 O_8$ .

The extensive drilling which defined the Honeymoon Uranium Deposit showed that there was a north-south channel (Yarramba Channel) parallel to and straddling the eastern boundary of SML 714 extending slightly into adjacent SML 696 from 31° 40' south for a distance of about 9 km, where the north flowing channel crosses into the SML from the east in a sharp 90 degree bend. It is on this bend that the Honeymoon prospect is located. The channel which has a maximum width of 3 000 metres is incised into a basement of Cretaceous clays although one drillhole, SE 14, intersected Precambrian rock. The top of the channel is at an average 70 metres depth and it reaches a maximum depth of 125 metres being filled with up to 55 meters of interbedded sands and clay/silts.

The Lower Tertiary consists of three upward fining sand/silt units (Upper Unit, Middle Unit, Basal Sand) separated by clay beds about 5 meters thick (Upper Clay, Lower Clay). The Basal Sand is the most important unit notably at Honeymoon. It is a fine to very coarse grained poorly sorted sand which varies from 0 to 25 meters thick and averages 14 metres and is best developed in the central and deepest part of the U shaped channel abutting the relatively steep channel bank. The channel floor at the base of this sand is virtually flat and correlation throughout the unit is excellent.

The Honeymoon deposit situated on the sharp bend is associated with a distinct redox front about 100 metres from the channel bank. Pyrite and clay content of the sand increases in the mineralised zone. The uranium mineralisation is 800 metres long by 85 metres wide by average 3.5 metres thick, within SML 714 and extends east across the tenement boundary.

Preliminary resource estimates from 48 holes intersections were 1426 tonnes  $U_3 O_8$  in 569 000 tonnes of Basal Sand at an average grade at 0.22%  $U_3 O_8$  determined radiometrically. No core holes were completed to provide calibration against chemical assays. The deposit was closed to the west but open in the east in the adjacent SML. Best holes included SE 49, 1.9 metres at 0.89%  $U_3 O_8$  and SE 96, 8.7 metres at 0.355%  $U_3 O_8$ . Mineralisation of a far more limited nature is present in the Middle and Upper Units.

At Waukaloo it was confirmed that the copper mineralisation is stratabound within a hard grey albite-magnetite rock which is strongly magnetic and contains widespread disseminated pyrite and chalcopyrite. An associated strong IP response was interpreted as largely related to magnetite. The highest assays were in W 12 which averaged >0.3% Cu from 117.3 to 152.4 metres (highest assays 0.8% Cu and 0.69% Cu). Other holes showed up tens of metres at 0.2% Cu with highest assay 1.1% Cu over 1.5 metres in W 18.

## **DRILLING**

South Eagle/Honeymoon - 157 rotary holes (K 68-69, SE 1 to SE 155) totalling 18998 metres.

Waukaloo Copper Mine - 16 percussion holes totalling 2405.2 metres.



**Applicant / Title Holder:** Mt. Isa Mines Limited

DME\_SA 93-1571

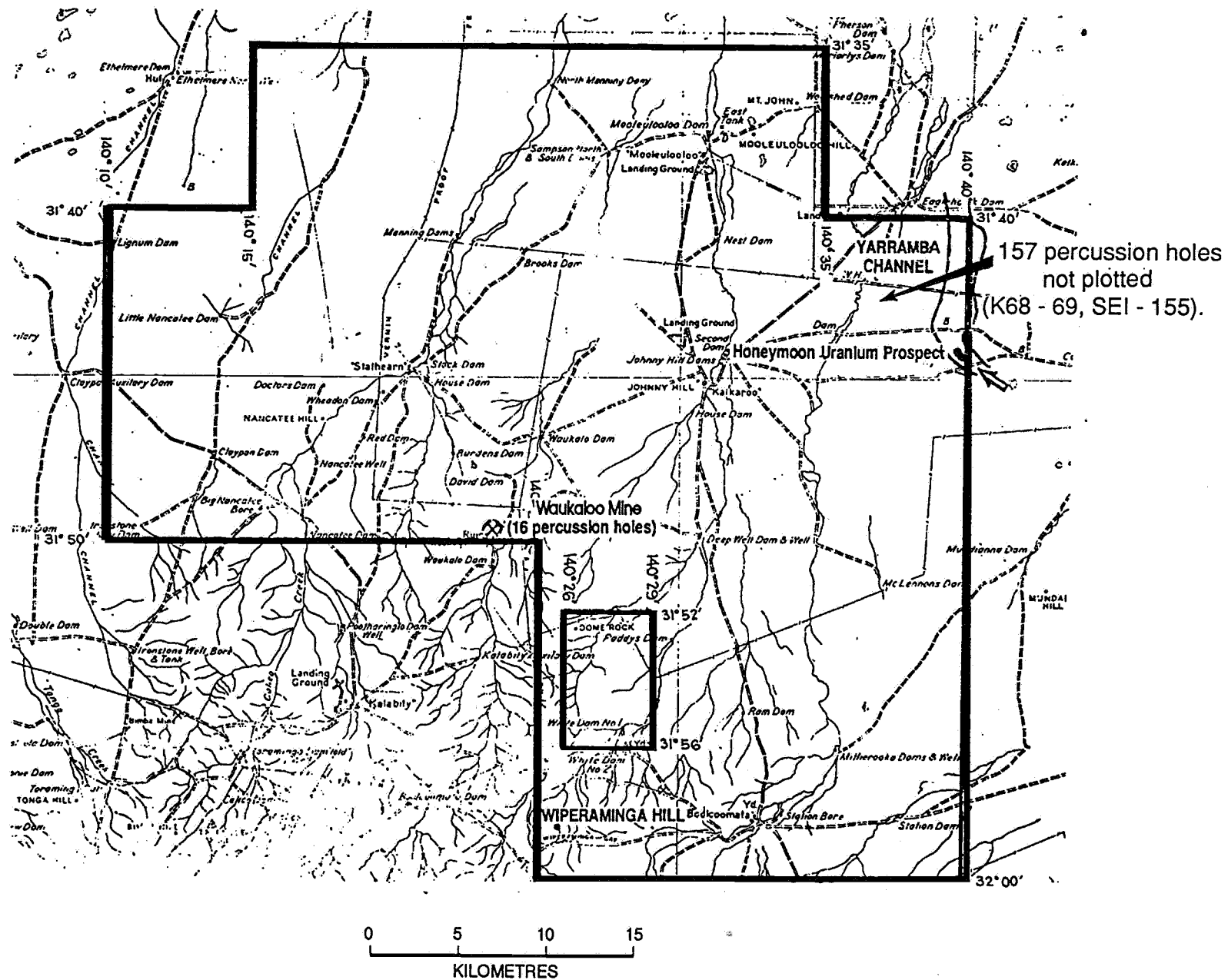


Figure 56

**TENEMENT:** ML 3371 and MLs 3557 to 3562 (formerly SMLs 151, 172, 269, 562, 677 followed ELs 47, 132, 259, 423, 794, 1119, 1497)

**AREA:** 110 ha

**COMMENCEMENT DATE:**

**EXPIRY DATE:** Cancelled

**COMPANY:** NEWMONT PROPRIETARY LIMITED

**ENVELOPE:** 3261

**REFERENCES:** Verwoerd P.J., 1976. Dome Rock Summary Report. Newmont Proprietary Limited (unpublished)

**LOCATION:** Dome Rock Mine

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934

**TARGETS:** Copper

**AGE/ROCK UNITS:** Target is a gossanous horizon (Bimba Formation equivalent) 60 metres stratigraphically above past production shafts in slates and quartzites of Neoproterozoic Age.

**EXPLORATION SUMMARY:** Newmont Proprietary Limited and Samin Limited (in joint venture) negotiated to explore the Dome Rock tenements with Dome Rock Pty Ltd. Core from previous drilling (DR 1 to DR 3) was checked and analysed revealing similar levels to previous work and all major pyrite - arsenopyrite sections were fire assayed for gold but only trace values were recorded. High cobalt values were associated with arsenopyrite. Rock chip channel sampling was completed on the Dome Rock gossan (up to 12 m thick) and one diamond hole was drilled to 272.6 metres. Although a considerable tonnage of sulphide could be present the copper and gold contents were found to decrease in the primary sulphide zone. The joint venture was terminated in 1976. (IP shown on cross section but not recorded in text).

**MINERALISATION/PROSPECTS:** At least 1 km of gossan is exposed on the western limb of a fold structure within the leases. Rock chips channel sampling showed anomalous gold values from 0.5 to 3.5 g/t over widths of 6-12 metres. Silver values (5-7 ppm) and copper (0.06% to 0.23%) were also restricted to this limb and to the nose of the fold. Weak but anomalous lead and zinc values (66-100 ppm Pb, 400-600 Zn) also occur.

Diamond drill hole DR 4 intersected 19.5 m of massive pyrite - pyrrhotite mineralisation from 184 to 203.5 m with weathered pyrite mineralisation in the footwall from 203.5 to 215.2 m. Assay results show low copper and zinc contents and very low (<0.1 g/t) gold and silver values. The best section returned 0.1% Cu from 190 to 194 m in massive pyrite. Petrology showed the stratabound massive pyrite - pyrrhotite mineralisation is in a sequence of metamorphosed dolomitic and tremolitic siltstones and cherts.

**DRILLING:** One diamond drill hole (DR 4) for 272.6 metres.

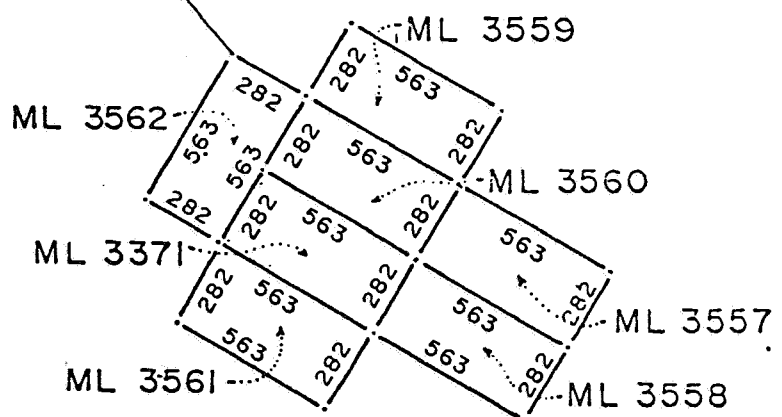
NORTH OUT OF HUNDREDS



△ Dome Rock

(2.8km. approx.)

SEC. 341



0 1000  
METRES

Figure 57

Applicant / Title Holder: Newmont Proprietary Limited

Licence N° : MLs 3371, 3557-3562

DME\_SA 94-139

**TENEMENT:** EL 42 (formerly SMLs 267, 544; followed by ELs 109; 227, 254, 297, 411, 523, 722, 911, 1203, 1065, 1487)

**AREA:** 2577 sq km

**COMMENCEMENT DATE:** 13/3/73

**EXPIRY DATE:** 12/3/74 (part surrendered 25/10/73)

**COMPANY:** PACMINEX PTY LIMITED

**ENVELOPE:** 2305

**REFERENCES:** Langron, W G, Marshall, A G, 1973: Relinquishment Report Portions of ELs 42, 45, 59, Crocker's Well, Lake Frome, South Australia. Pacminex Pty Limited. Rept Ref No PMR 98/73. (unpublished)

**LOCATION:** Curnamona

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Tertiary Eyre and Namba Formations overlying Cretaceous, Cambrian or Precambrian basement.

**EXPLORATION SUMMARY:** The western third and southern half of EL 42 were surrendered on 25/10/73 around the same time as the western half of EL 45 and the southern half of EL 59. The report details the work undertaken in the surrendered portions. Part of the surrendered area was covered by a low level airborne magnetic and radiometric survey in 1971 (see SML 544, Env 1853). In 1972 under-SML 544 the southern part of the EL was farmed-out to Esso who conducted 180 km of gravity surveys along roads and tracks (400 metre station spacing) and drilled 42 rotary holes totalling 5227 metres within the surrendered area. Each hole was logged with resistivity, spontaneous-potential and gamma probes.

**MINERALISATION/PROSPECTS:** The Esso drilling defined four Lower Tertiary sand systems A and B on the eastern side of the EL and C and D on the western side. Each represents palaeochannels sourced from the Olary basement in the south and flowing basinward in a general northerly direction.

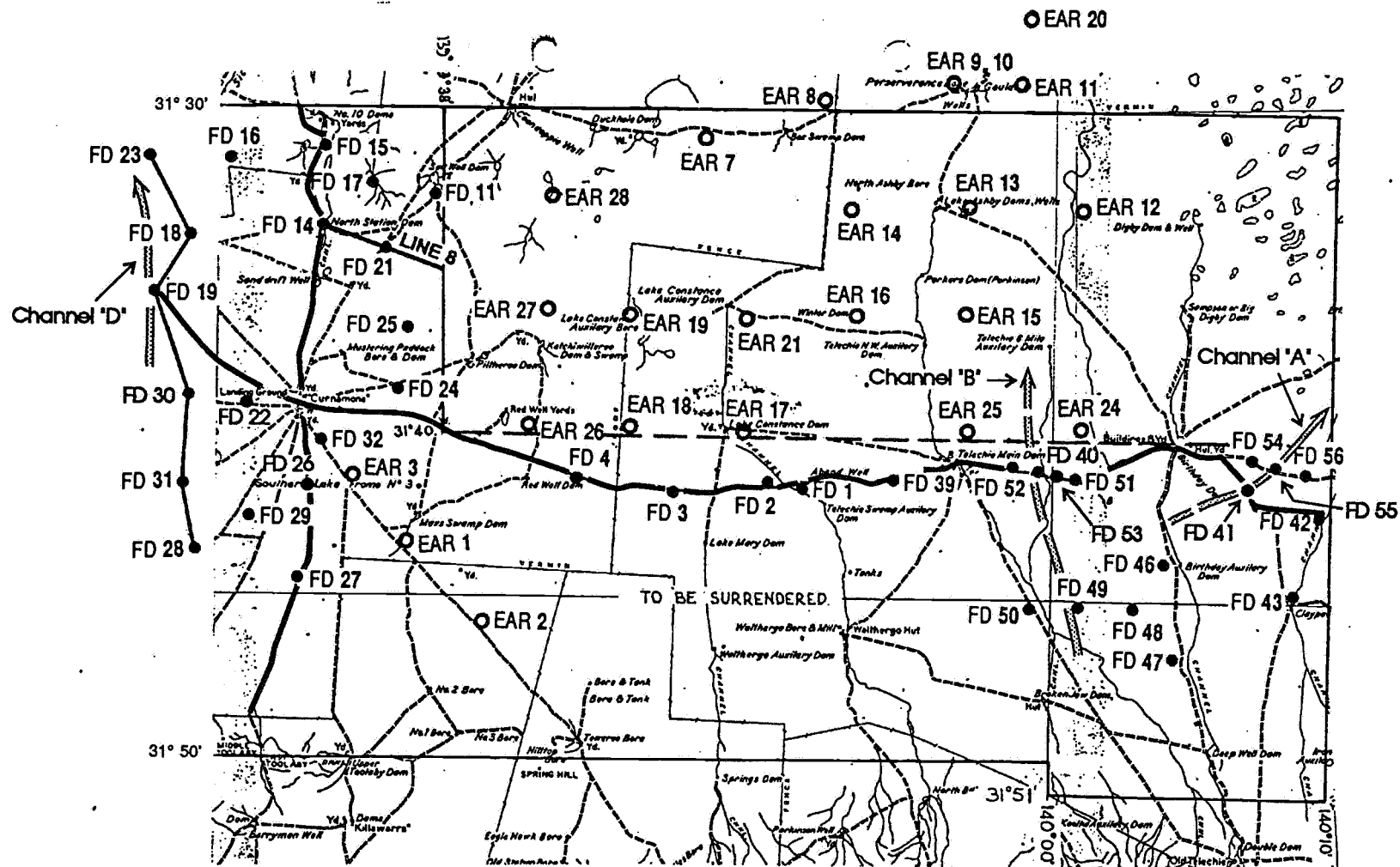
Basal sand units on these channels were well developed but in an oxidized state and logging showed only weakly anomalous radiometric responses the highest being 0.017% U<sub>3</sub>O<sub>8</sub> equivalent in FD21.

For other details see SML 544.

**DRILLING:** Forty-two rotary holes totalling 5227 metres drilled by Esso in joint venture (FD1-4, F11, FD13-19, FD21-32, FD38-56).

Licence N° : EL 42

Applicant / Title Holder: Pacminex Pty Ltd



0 5 10 15  
KILOMETRES

- Gravity traverse (Esso, MESA)
- EAR 2 ● Rotary drill hole (SML 267, E.A. Rudd Pty. Ltd.)
- FD 25 ● Rotary drill hole (SML 544, Esso J.V. with Pacminex)
- Boundary of Esso farm-out area

Figure 58

**TENEMENT:** EL 43 (formerly SMLs 266, 513; followed ELs 174, 549, 679, 957, 1391)

**AREA:** 793 sq km

**COMMENCEMENT DATE:** 12/3/73

**EXPIRY DATE:** 18/9/73 (surrendered)

**COMPANY:** SEDIMENTARY URANIUM NL

**ENVELOPE:** 2281

**LOCATION:** Yantawena East

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** LAKE CHARLES 7034

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Tertiary Eyre and Namba Formations on Cretaceous basement.

**EXPLORATION SUMMARY:** From the brief report it appears that no significant work other than geological interpretation was undertaken after the drilling under SML 513.

**MINERALISATION/PROSPECTS:** In the early Tertiary stream activity caused incision into the Pre-Cambrian basement. This incision is limited to the south-eastern section of the EL.

In the second phase of sedimentation fanning and stream activity off the Benagerie Ridge deposited a thick section of sands, silts and clays over the central and north-eastern sector of the EL. The only evidence of uranium mineralisation was found in this unit in hole 513/48 (see SML 513, Envelope 1546).

After this phase, peneplanation could have occurred resulting in deposition of silts and clays.

It was concluded that the south-eastern part of the area had most potential but in view of the high expenditure commitment, the 'apparent' lack of potential and the state of Sedimentary Uranium it was recommended the licence be relinquished if a joint venture could not be arranged with another company.



TENEMENT: EL 45 (formerly SMLs 268 Rudd, 543; followed by ELs 109, 227, 337, 411, 722, 1065 CSR, 1487 Placer, 1698, 1738).

AREA: 2400 sq km

COMMENCEMENT DATE: 13/3/73

EXPIRY DATE: 12/3/74 (part surrendered 1/11/73)

COMPANY: PACMINEX (OPERATIONS) PTY LIMITED

ENVELOPE: 2305

REFERENCES: Langron, W G, Marshall, A G, 1973: Relinquishment Report Portions of ELs 42, 45, 59, Crocker's Well, Lake Frome, South Australia. Pacminex Pty Limited. Rept Ref No PMR98/73 (unpublished)

LOCATION: Frome Downs

1:250 000 SHEET: CURNAMONA, PARACHILNA

1:100 000 SHEET: PASMORE 6835, REAPHOOK 6735

TARGETS: Sedimentary uranium

AGE/ROCK UNITS: Quaternary sediments above Tertiary Eyre and Namba Formations overlying Cambrian or Precambrian basement.

EXPLORATION SUMMARY: The western half of EL 45 was surrendered on 1/11/73 around the same time as the western third and southern half of EL 42, and the southern half of EL 59. The report details the work undertaken in the surrendered portions. A small part of the surrendered area was covered by a low level airborne magnetic and radiometric survey (see SML 543, Env 1853). The surrendered portion contains the western end of Line 1 an electrical resistivity, gravity and magnetic traverse surveyed by SADME for Pacminex in 1971. Gravity reading were at 61 metre intervals (see Nelson, 1971, SADME Rept Bk 71/122). Two rotary drillholes PMX2 and PMX21 (a water bore) were completed during 1971 in the surrendered area for a total of 263 metres. Holes were logged with gamma, resistivity and spontaneous potential probes.

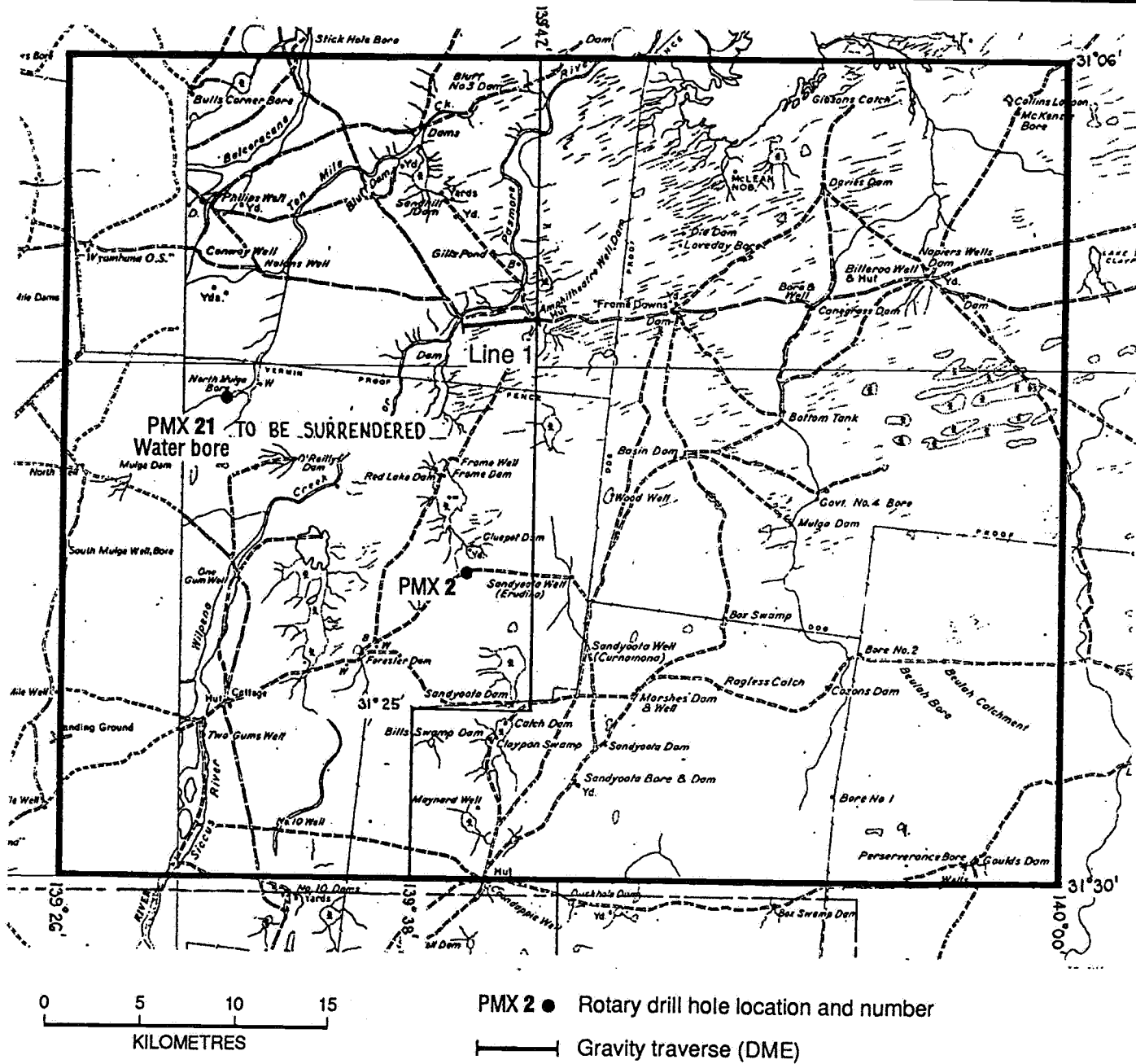
MINERALISATION/PROSPECT: Holes PMX2 and PMX21 showed no significant levels of radioactivity.

A major sand channel which approximately follows the present course of the Siccus River occurs in the relinquished area but the depth of the prospective sand channel is "too great" to warrant further exploration.

DRILLING: Two rotary holes PMX2 and PMX21, totalling 269 metres in surrendered area (Note; statistics are under SML 543).



Figure 60



**TENEMENT:** EL 47 (formerly SMLs 151, 172, 269, 562, 677, MLs 3371, 3559 to 3562; followed by EL 132, 259, 423, 794, 1119, 1497, 1864).

**AREA:** 34 sq km

**COMMENCEMENT DATE:** 16/3/73

**EXPIRY DATE:** 15/3/74

**COMPANY:** CARPENTARIA EXPLORATION COMPANY PTY LTD

**ENVELOPE:** 2251

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Dome Rock Mine

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934

**TARGETS:** Copper, lead, zinc.

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** A 60 degree inclined percussion drill hole PDH DR 1 was sited 1.7 km south-south-east of the Dome Rock Mine to intersect a stratiform limonite-goethite horizon at depth (see also SML 269). The hole was drilled to 201.2 metres and samples were collected at approximately 1.5 metre intervals throughout the hole to be assayed for copper and cobalt except in the ironstone which was analysed for Cu, Pb, Zn, Co, Ag. Magnetic susceptibility readings were taken at 1.5 metre intervals. Geological mapping at 1:20 000 scale was integrated with that on adjacent Els 62 and 85. The 1973 Austral airborne magnetic and radiometric survey covering EL 62 and part of EL 85 was extended over EL 47.

**MINERALISATION/PROSPECT:** The limonite-goethite-haematite horizon was intersected between 73.2 and 92.9 metres. Geochemical analyses of ironstone cuttings showed up to 520 ppm Cu, 12 ppm Pb, 160 ppm Zn, and 42 ppm Co and Ag below detection. The ironstone which was intersected in an oxidized state at a shallower depth than anticipated, is in contact with a thin jasper bed on its western side followed by hornfels and schist with weakly disseminated sulphide.

The highest copper value in the hole was 0.17% in the last 0.6 metres otherwise the highest values were 520 ppm in the ironstone and 430 ppm in a dark grey schist.

Jaspilites interbedded with schists can be traced as markers to Waukaloo and Ironstone Well.

The airborne survey failed to locate a uranium anomaly recorded by Geophoto in 1970.

**DRILLING:** One percussion drill hole PDH DR 1 to 201.2 metres.

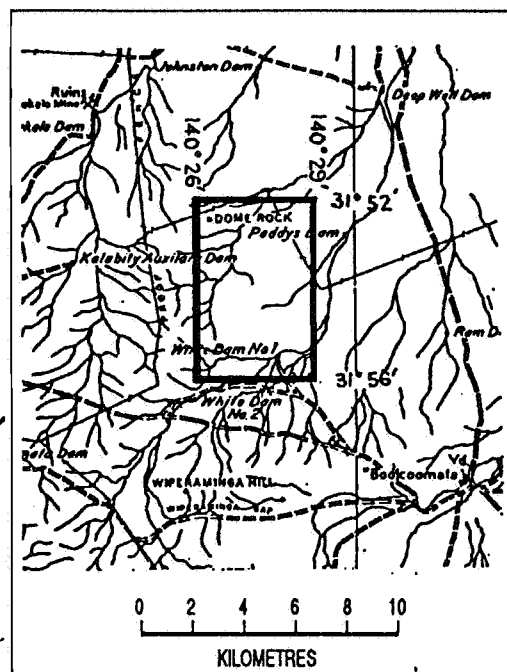
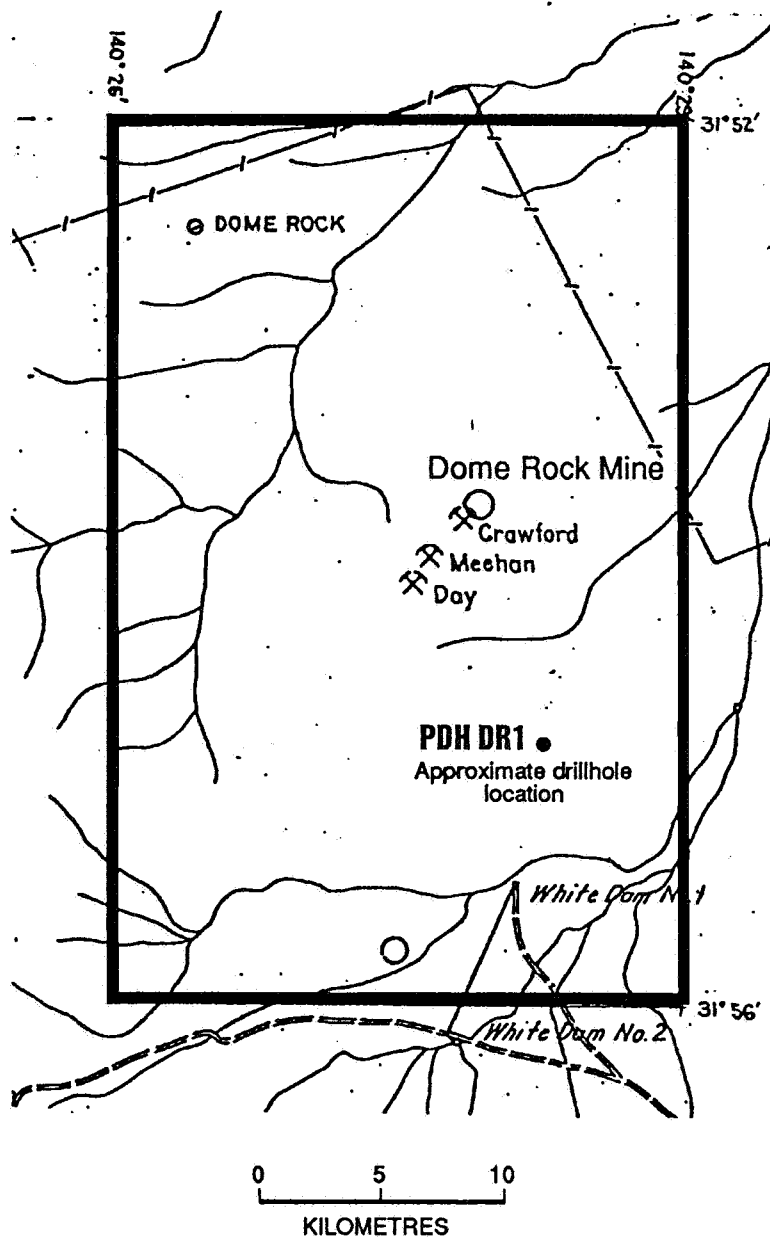


Figure 61

Applicant / Title Holder: Carpentaria Exploration Co. Pty. Ltd.

Licence N° : EL 47

DME\_SA 93-1626

TENEMENT: EL 59 (formerly SML 514; followed by ELs 171, 614, 911, 1065, 1203, 1487, 1698)

AREA: 616 sq km

COMMENCEMENT DATE: 13/4/72

EXPIRY DATE: 12/4/74 (part surrendered 1/10/73)

COMPANY: PACMINEX PTY LIMITED

ENVELOPE: 2279, 2305

REFERENCES: Langron, W G, Marshall, A G, 1973: Relinquishment Report Portions of ELs 42, 45, 59, Crocker's Well, Lake Frome, South Australia. Pacminex Pty Limited. Rept Ref No PMR98/73. (unpublished)

LOCATION: Johnson's New Dam

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: BENAGERIE 6935

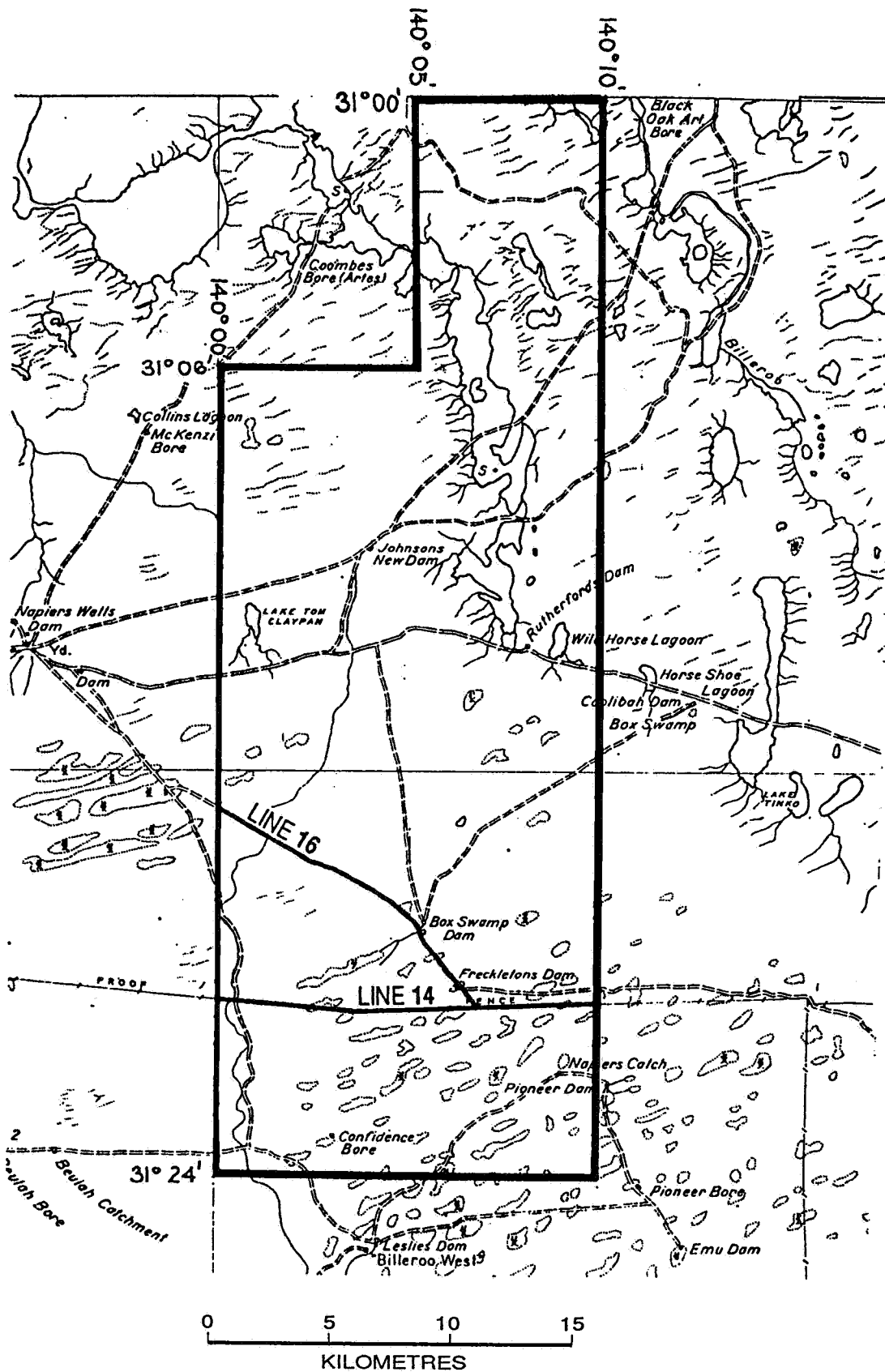
TARGETS: Sedimentary uranium

AGE/ROCK UNITS: Tertiary Eyre and Namba Formations overlying Cambrian or Precambrian basement.

EXPLORATION SUMMARY: Parts of two 1972 gravity traverses (Nos 14, 16) by SADME for Pacminex covered the southern section of EL 59.

No drilling was undertaken in the southern surrendered part of the EL.

MINERALISATION/PROSPECTS: The gravity survey showed there was an absence of Tertiary palaeochannels in the southern part of the EL which was relinquished.



— LINE 14, 16 Gravity traverse (SADME 1972)

Figure 62

Applicant / Title Holder: Pacminex Pty. Ltd.

Licence N° : EL 59

DME\_SA 93-1627

**TENEMENT:** EL 62 (formerly SMLs 118, 210, 210A, 534, 535, 672, 673; followed by ELs 132, 259, 423, 794, 1119, 1497, 1864)

**AREA:** 454 sq km

**COMMENCEMENT DATE:** 19/4/73

**EXPIRY DATE:** 18/4/74

**COMPANY:** CARPENTARIA EXPLORATION COMPANY PTY LTD

**ENVELOPE:** 2283

**REFERENCES:** Brief quarterly reports only.

**LOCATION:** Koolka Hill, Waukaloo, Nancatee Dam

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934

**TARGETS:** Copper

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup. Albitic and calc - silicate units (Pwa).

**EXPLORATION SUMMARY:** An airborne magnetic/radiometric survey was flown in 1973 over this EL and adjacent EL 85 by Austral Exploration Services on 400 metres spaced east-west lines at a mean terrain clearance of 61 metres. The airborne magnetics show prominent stratabound anomalies in the area of the Waukaloo Copper Mine and further south defining the "Waukaloo Copper Horizon" and the "Waukaloo Syncline" the nose of which occurs in the north-eastern corner of this EL adjacent to EL 85. Follow-up involved rock chip sampling and shallow vertical and some inclined percussion drilling (299 holes totalling 9158.7 metres) for copper geochemistry, and geology on ground magnetic traverses over the nose and western limb of the "syncline". In late 1973 diamond drill hole DDH N1 was collared 2 km south-east of Nancatee Dam and was proceeding at 120 metres and a percussion hole PDH N1 was also in progress at 120 metres (Drill statistics for DDH N1 and PDH N1 included in EL 132).

**MINERALISATION/PROSPECTS:** The magnetic copper bearing unit is mapped as a "metaquartzite" however in brief drill logs it is a magnetite and quartz bearing albitolite. Best copper values were in holes ATW22 25, 26, 47, 54 between 450 and 900 metres south of Waukaloo Dam where assays showed up to 15.2 metres at 808 ppm and 32 metres at 803 ppm and ATW 273 about 2 km east of Nancatee Dam which showed 30.5 metres at 790 ppm. (Note : DDH N1 does not appear to have drilled on a significant copper anomaly).

Only brief one line data summaries of the shallow percussion holes were provided and there are no logs of DDH N1 or PDH N1 in the envelope. Some cross - sections were enclosed. Plans 2325 II-I and 2 under EL 85 are relevant in providing hole locations.

There is no comprehensive interpretive report, only very brief quarterly reports.

**DRILLING:** 299 shallow percussion (RAB) holes totalling 9158.7 metres. Note that about 20% of these holes were drilled in the very southern part of EL 85.

Licence N° : EL 62

Applicant / Title Holder: Carpentaria Exploration Company Pty. Ltd.

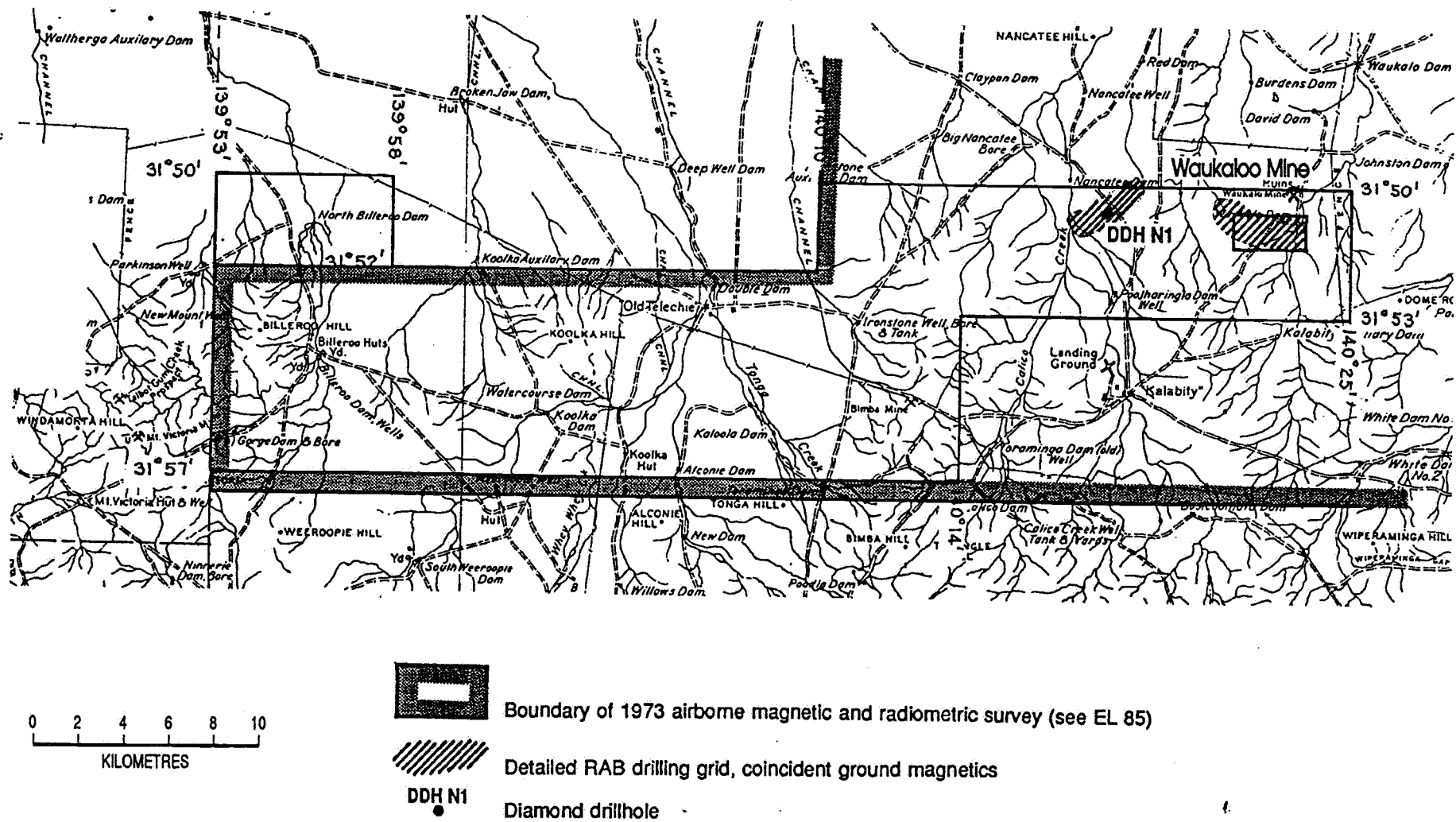


Figure 63

**TENEMENT:** EL 66 (formerly SMLs 513, 514 followed by ELs 217, 385, 549, 614, 911, 957, 1203, 1487, 1608, 1684, 1693, 1860)

**AREA:** 1129 sq km

**COMMENCEMENT DATE:** 4/5/73

**EXPIRY DATE:** 3/5/74

**COMPANY:** MINES ADMINISTRATION PTY LIMITED

**ENVELOPE:** 2291

**REFERENCES:** Brunt, D A, 1973: Quarterly Report El 66 (Lake Yantawena). Period 4/5/73 to 3/8/73. Mines Administration Pty Limited (unpublished).

**LOCATION:** Lake Yantawena

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935, LAKE CHARLES 7035

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Situated on the Benagerie Ridge where there are thin Quaternary and Tertiary sediments unconformably on Cretaceous clays in depressions on a Precambrian 'shale' basement.

**EXPLORATION SUMMARY:** The programme involved the drilling of 30 rotary holes (LY1 to LY30) totalling 2261.5 metres in May 1973. Average hole depth was 75 metres. The objective of this drilling was to locate and evaluate a Tertiary channel interpreted from airborne magnetic data to be present in the south-eastern portion of the licence. Cuttings were collected at 1.5 metre intervals and all holes were logged with gamma, spontaneous potential and resistivity probes.

**MINERALISATION/PROSPECTS:** Tertiary sands and clays locally overlie Cretaceous blue-grey clays and silts 15 to greater than 80 metres thick which occur in depressions in the Precambrian palaeosurface. Precambrian basement was intersected in LY13, 18, 19, 20, 21 23 of red, blue and grey silts along the Benagerie Ridge.

The white and greenish grey clays and silts (Namba Formation) of the Tertiary are more widespread than in sands (Eyre Formation) which were deposited under fluvial to lacustrine conditions in local depressions in the Cretaceous palaeotopography. The sand varies in thickness from 4.4 metres (LY11) to 35.5 metres (LY4) with the thickest section being in the vicinity of LY 3, 4 and 30 about 10 km north-east of Benagerie Homestead. Pyrite and "humic" coatings on quartz grains are rare.

Thin lacustrine fine grained clayey sands are present in LY 15, 18 and 19 while in the north-east of the EL there is a thick sand section up to 53.4 metres (LY 29) which appears to have been developed in a flood plain environment. In contrast the sands in the south-east of the licence are more like the channel sands further south.

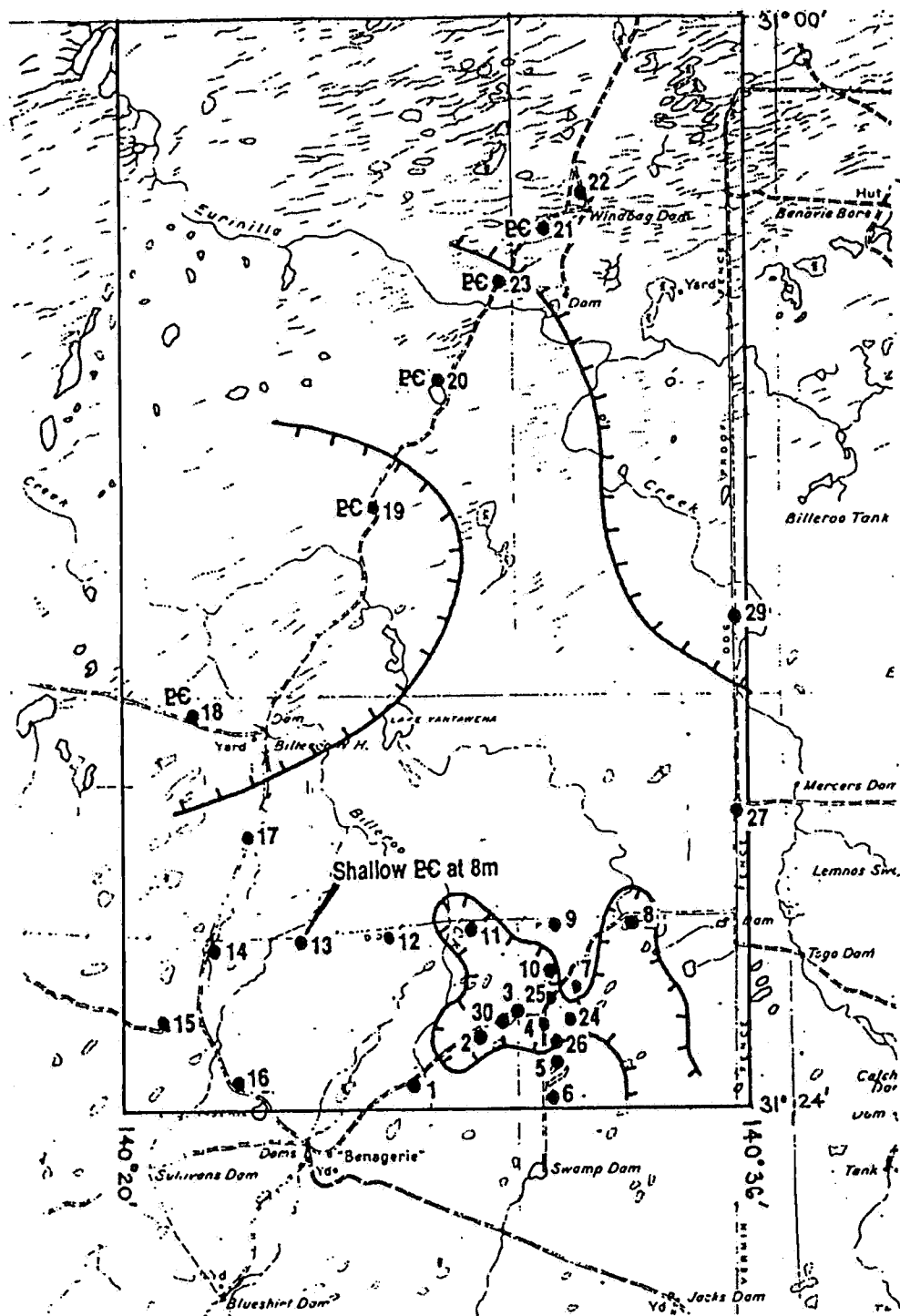
Sands intersected in all holes were radiometrically barren. Weak mineralisation associated with white kaolinitic clays in LY 2, 3, 4 and 30 (best 0.01% e  $U_3O_8$  over one metre in LY3) was considered to be characteristic of the clay lithology and of no economic significance.



Geochemical alteration of sands throughout the area is characterized by weak yellow limonite staining on less than 5% of quartz grains together with an absence of pyrite, carbonaceous matter and humic staining. A very local redox interface was intersected in LY 22 and LY 29 but there was no radioactivity.

It was concluded that although the south-east portion of the area contained "channel" sands, because of the absence of anomalous radioactivity no further exploration could be justified.

DRILLING: Thirty rotary holes (LY 1 to LY 30) totalling 2261.5 metres.



Rotary drillhole, prefix LY

Depression with Tertiary sand development

EC denotes Precambrian basement.  
Cretaceous basement in remaining holes

0 5 10 15  
KILOMETRES

Figure 64

Applicant / Title Holder: Mines Administration Pty. Ltd.

Licence N° : EL 66

DME\_SA 93-1629

**TENEMENT:** EL 69 (formerly SML 514; followed by ELs 127; 217, 614, 911, 1203, 1487, 1684, 1698)

**AREA:** 706 sq km

**COMMENCEMENT DATE:** 1/6/73

**EXPIRY DATE:** 31/5/74

**COMPANY:** TRICENTROL AUSTRALIA LIMITED

**ENVELOPE:** 2308

**REFERENCES:**

**LOCATION:** Lake Tinko

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Quaternary sediments over Tertiary Eyre and Namba Formations on Cambrian sediments and Proterozoic basement of quartz-feldspar porphyry and metamorphics.

**EXPLORATION SUMMARY:** Exploration undertaken in joint venture with Getty Mining Pty Ltd, involved grading of access tracks for 120 km and the drilling of 50 rotary holes (LT1-50) at roughly 1600 metre intervals and totalling 3898 metres. Holes ranged from 60 to 103 metres deep. All were logged with resistivity, spontaneous potential and gamma probes. Cuttings were sampled at 1.5 metre intervals and assayed for uranium when significant radiometric responses were recorded.

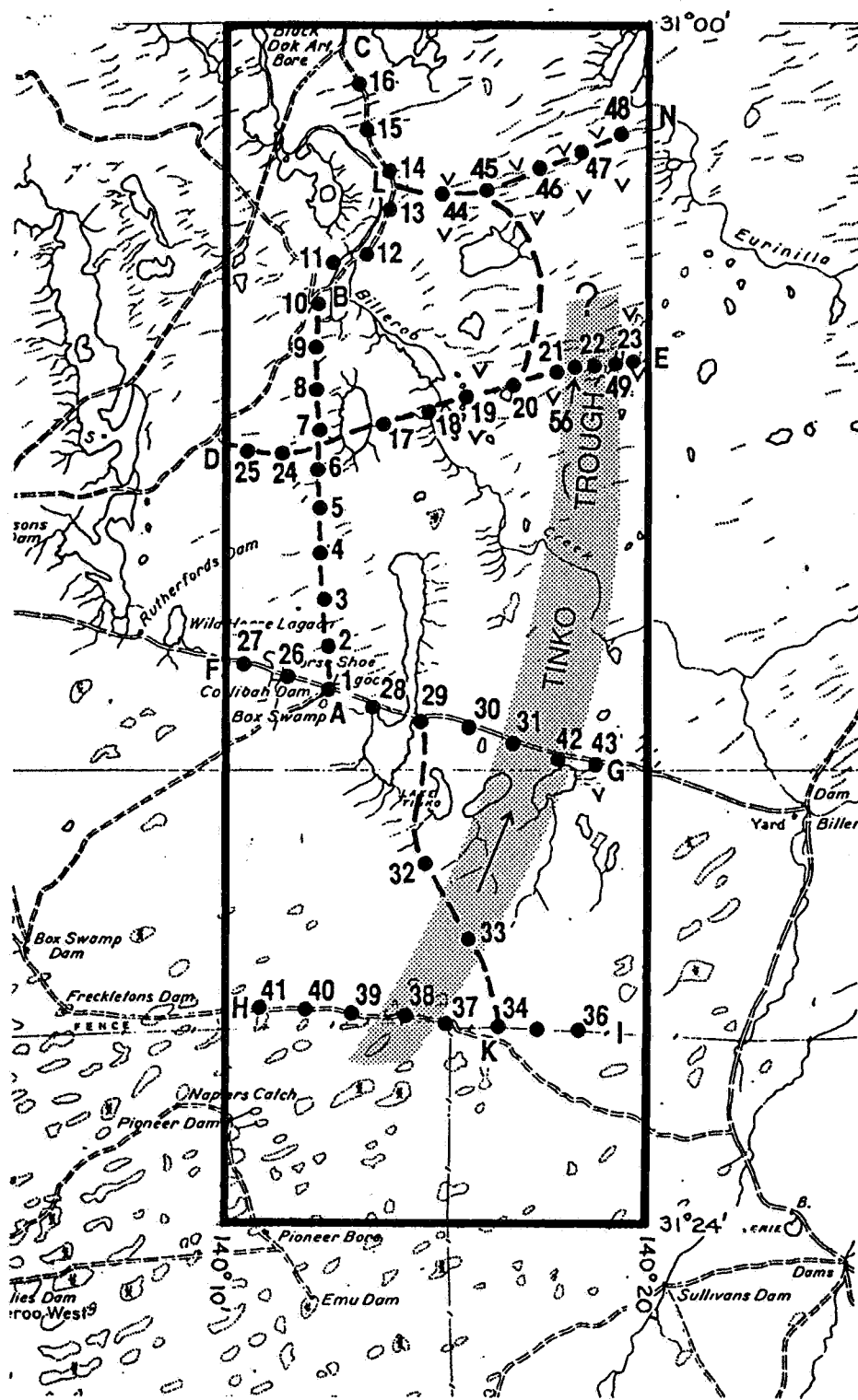
**MINERALISATION/PROSPECTS:** The EL is situated to the west of the Benagerie Ridge. Tertiary formations lens out towards the south of the EL while in the northern part of the area the Eyre Formation is very extensive as an unoxidized slightly carbonaceous, pyritic sand. A north-south trending Tertiary depression termed the 'Tinko Trough' extends through the eastern part of the EL. The Eyre Formation rests on shallow basement of fresh quartz-feldspar porphyry (Proterozoic?) in the north-eastern half of the area where the eastern flank of the Tinko Trough is quite steep rising towards the Benagerie Ridge. Elsewhere the Eyre Formation rests on Cambrian? 'red beds' (shale, siltstone) in most of sections F-G and H-I in the south or on Cretaceous clays in the north-eastern sector of the EL. In the Tinko Trough the thick basal sands in holes LT22, 49, 50 are still in a reduced condition on line D-E while an oxidation-reduction interface was evident on line F-G (holes LT31 and 42) with oxidation further south.

Anomalous gamma activity was encountered in a number of holes the highest being divorced from the Tinko Trough. In holes LT9 to LT12 peaks up to 80 cps (20 times background) or 0.014%  $U_3O_8$  equivalent were recorded at the interface of Eyre Formation sand and Cretaceous clay. A sample of silty clay from LT12 (72-73.5 m) showed 60 ppm U. Elsewhere anomalous radioactivity was in clay sections especially where they are carbonaceous, notably near the Tinko Trough.

Although slightly uraniferous groundwater has been coursing through the Eyre Formation from south to north as evidenced from uranium absorbed on clays in holes LT9 to 12, "there is no evidence of significant uranium deposition". The uranium is likely sourced from the quartz-feldspar porphyry.

EL 69 was combined with part of EL 34 to form EL 127.

DRILLING: Fifty rotary holes (LT1-50) totalling 3898 metres.



- A --- B** Drill section
- 8●** Rotary drill hole location and number (prefix LT)
- v v v** Proterozoic quartz-feldspar porphyry in basement

0 5 10 15  
KILOMETRES

Figure 65

Applicant / Title Holder: Tricentrol Aust. Ltd.

Licence N° : EL 69

DME\_SA 93-1630

TENEMENT: EL 85 (formerly SMLs 222, 440, 595, 714; followed by ELs 132, 259, 377, 423, 597, 794, 970, 1004, 1119, 1352, 1412, 1497, 1786, 1864).

AREA: 1585 sq km

COMMENCEMENT DATE: 25/7/73

EXPIRY DATE: 24/7/74

COMPANY: CARPENTARIA EXPLORATION COMPANY PTY LTD

ENVELOPE: 2325

REFERENCES: Successive quarterly reports

LOCATION: South Eagle

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: KALABITY 6934, MULYUNGARIE 7034

TARGETS: Sedimentary uranium, copper.

AGE/ROCK UNITS: Tertiary Namba and Eyre Formation on basement Cretaceous clays or Palaeoproterozoic Willyama Supergroup.

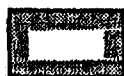
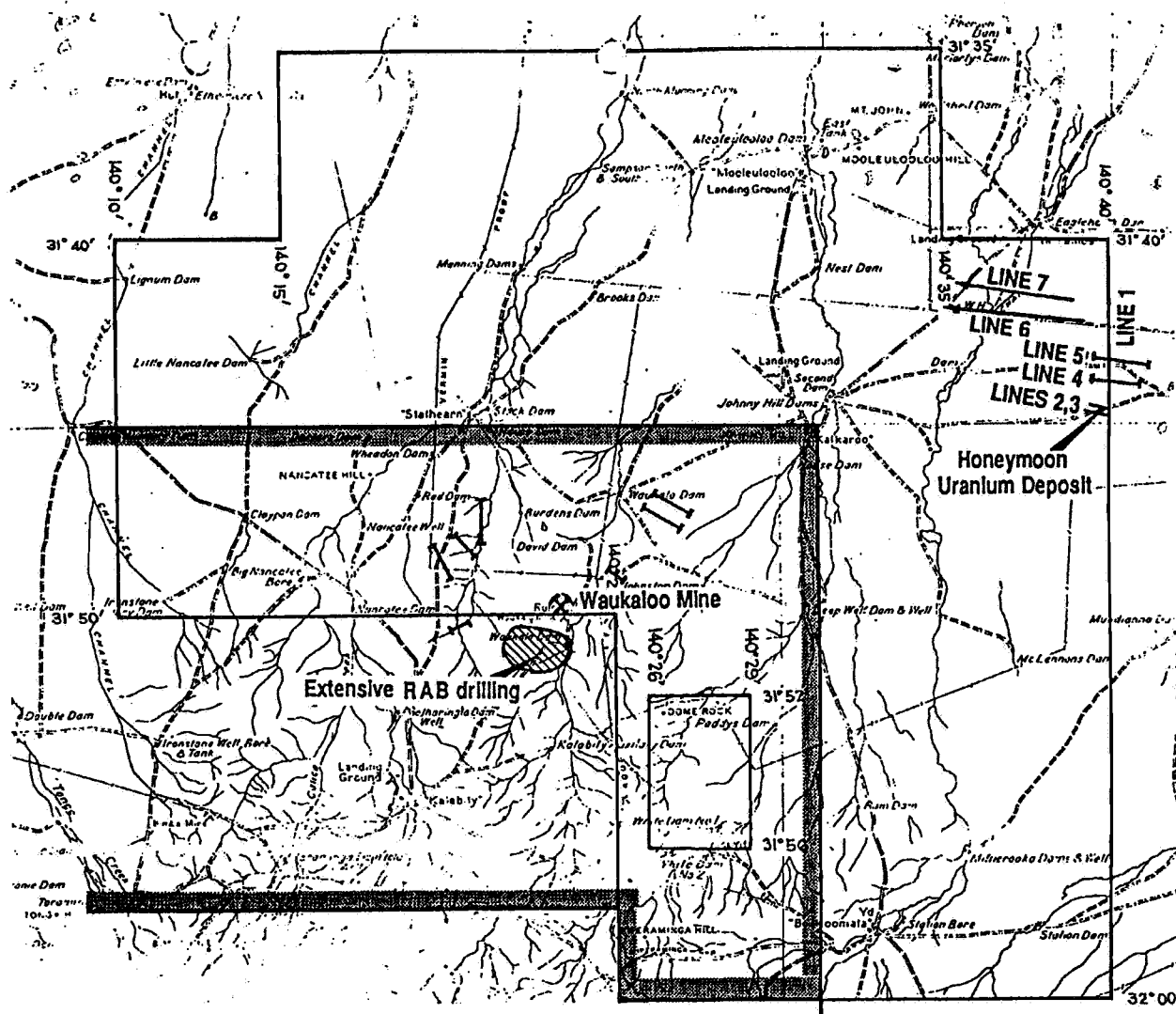
EXPLORATION SUMMARY: The exploration was undertaken in joint venture with Minad-Teton as manager on the South Eagle uranium prospect and other sedimentary uranium areas, while Carpentaria explored for copper in the Proterozoic basement. In the search for sedimentary uranium Minad-Teton conducted a trial resistivity survey over the Honeymoon uranium deposit followed by a more detailed survey by Murdoch Geophysics in February 1974 involving 7 traverses, of which three covered Honeymoon and the other four the Yarramba Channel further north. The grade determinations on Honeymoon using gamma logs were reviewed and recalculated to arrive at a new "resource" estimate. All holes drilled in the area were surveyed and levelled.

In March 1973 Carpentaria contracted Austral Exploration Services to conduct an airborne magnetic and radiometric survey over part of this EL and the adjacent EL 62. The survey was flown on 400 metres line spacing in east-west direction at 61 metres terrain clearance (maps are in this envelope). The results of W15 (150.0 metres) a percussion drill hole at Waukaloo Copper Mine completed under SML 714 are included. A deep diamond drill hole to test for copper beneath percussion holes W12 and W18 was completed at 459.6 metres in December 1973. Shallow drag bit (RAB?) drilling to outline the "Waukaloo Copper Horizon" in this EL and EL 62 was completed on a series of magnetic/drilling traverses. Reverse circulation percussion drilling and a diamond drill hole near Nancatee Dam in EL 62 commenced. (Note No logs or assay results of the shallow, RC or diamond drilling are in this envelope).

MINERALISATION/PROSPECTS: The resistivity surveys at Honeymoon confirmed that the channel could be defined with acceptable precision and more detailed surveys may be able to isolate zones which have anomalous pyrite content. The revised "reserve" estimate for Honeymoon was 1.4 million kilograms of  $U_3O_8$  at an average grade of 0.37%  $U_3O_8$ .

W15 intersected magnetite quartzite with an average of about 200 ppm Cu over most of its length, best interval being 3.1 metres at 0.23% (27.4 - 30.5). The diamond drill hole (number not given) showed scattered blebs of chalcopyrite throughout its length with several one metre splits greater than 1% Cu. The shallow drilling outlined the "copper horizon" up to 10 km from Waukaloo Mine. (see also EL 62)

DRILLING: For shallow percussion drilling see EL 62. One diamond drill hole (No?) to 459.6 metres.



Boundary of 1973 airborne magnetic and radiometric survey



LINE 4 Resistivity traverse



Magnetic and/or RAB drilling traverse



Figure 66

Applicant / Title Holder: Carpentaria Exploration Company Pty. Ltd.

Licence N° : EL 85

DME\_SA 93-1631



TENEMENT: EL 87 (formerly SMLs 280, 414, 697; followed by ELs 549, 957, 1391, 1608, 1693).

AREA: 145 sq km

COMMENCEMENT DATE: 6/8/73

EXPIRY DATE: 5/10/74

COMPANY: MINES ADMINISTRATION PTY LIMITED AND TETON EXPLORATION DRILLING CO PTY LTD

ENVELOPE: 2344

LOCATION: Low Stoney Hill

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: KALABITY 6934

TARGETS: Sedimentary uranium

AGE/ROCK UNITS: Tertiary Etadunna Formation on a basement of Proterozoic slate or Cretaceous clays.

EXPLORATION SUMMARY: Resistivity survey by Murdoch Geophysics (three profiles) with rapid soundings at 500 metre centres and Schlumberger array soundings at 2 km intervals over the eastern portion of the EL with the objective of defining Tertiary palaeochannels.

Four rotary holes (LSH1-4) were drilled for a total of 231.5 metres and all holes were logged for resistivity, spontaneous-potential and gamma ray response.

MINERALISATION/PROSPECTS: The EL is on the eastern edge of the Benagerie Ridge and some outcrops of Proterozoic metasediments (slate, siltstone) are present eg Low Stoney Hill (also intersected in holes LSH3 and 4). Cretaceous clays were intersected in holes LSH1 and 2 on the eastern margin of the area. The thin Tertiary section consists of clays probably belonging to the Upper Tertiary Etadunna Formation.

The resistivity survey failed to define any possible channels only areas of Tertiary thickening marginally prospective for sedimentary uranium. Thickening was indicated at the eastern end of Line 12, the northern end of Line 8 and the southern end of Line 13. In addition resistivity surveys to the south on EL 132 indicate a possible Tertiary palaeochannel extending northwest to a point 7 km west of the southern end of Line 3.

Drilling showed shallow Proterozoic or Cretaceous basement in all four holes with a thin Tertiary section devoid of channel type sand. No anomalous radioactivity was recorded and it was concluded that because of the absence of a channel sand section uranium prospects in the area were poor.

DRILLING: Four rotary holes (LSH 1 to 4) totalling 231.5 metres.

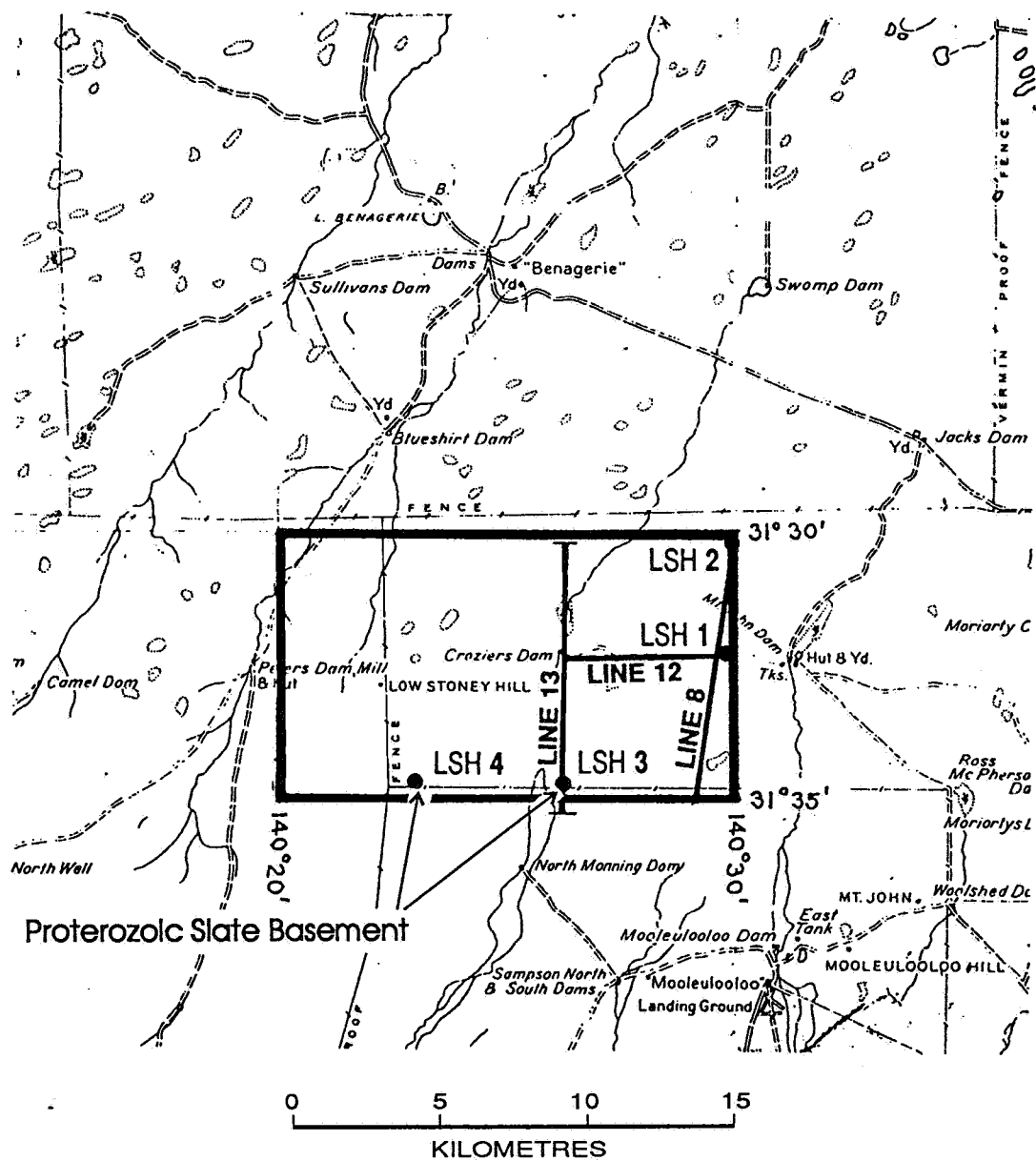


Figure 67

Applicant / Title Holder: Mines Administration Pty. Ltd.

Licence N° : EL 87

DME\_SA 93-1632

**TENEMENT:** EL 89 (formerly SMLs 414, 697 Sedimentary Uranium; followed by ELs 296, 522, 911, 1203 Minad - Teton, 549, 957 Marathon and 1391 Panaust, 1487, 1608, 1684, 1693, 1698).

**AREA:** 746 sq km

**COMMENCEMENT DATE:** 6/8/73

**EXPIRY DATE:** 5/12/74

**COMPANY:** SOUTHERN VENTURES PTY LTD

**ENVELOPE:** 2326

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Lake Benagerie

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935, KALABITY 6934

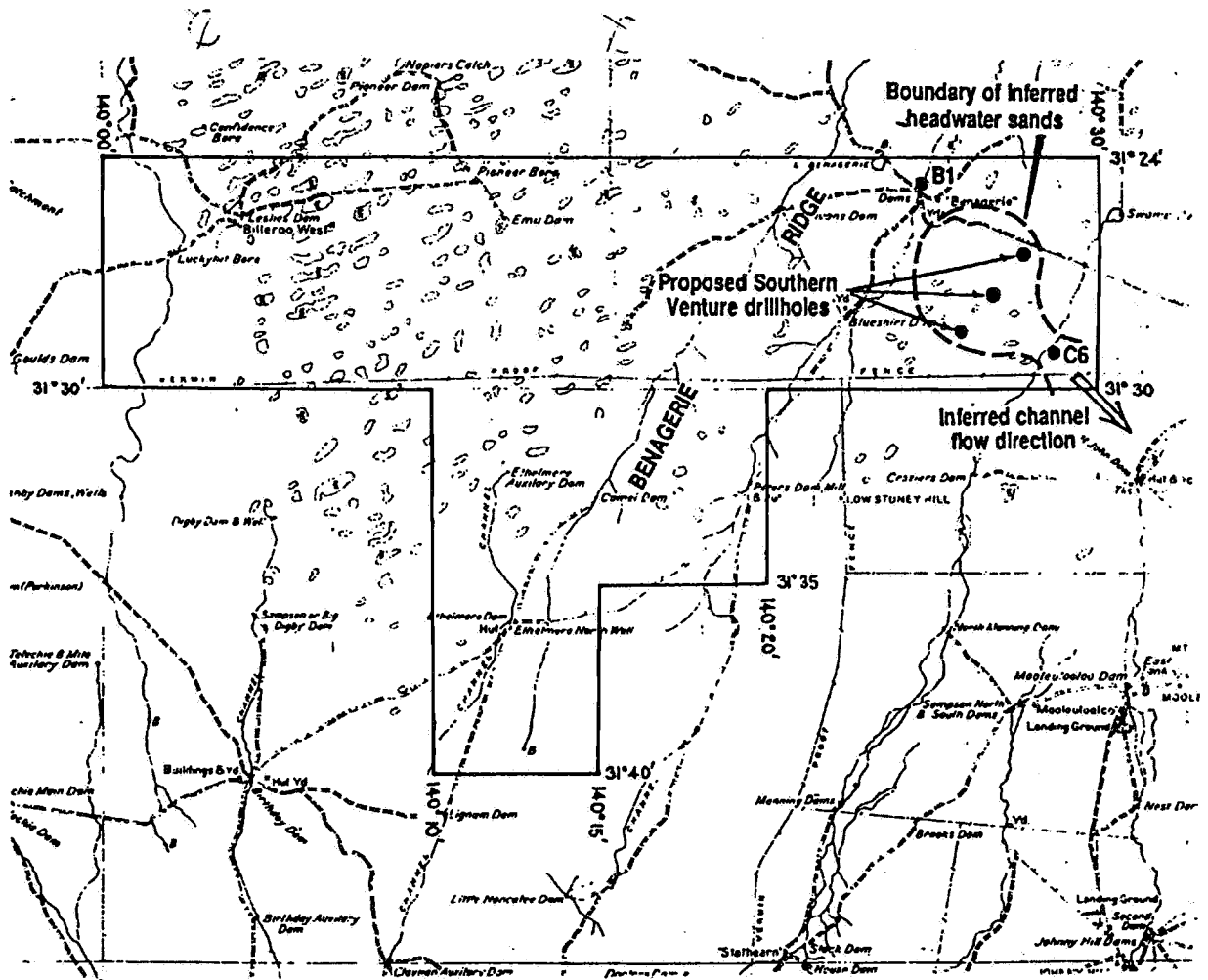
**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Situated on the Benagerie Ridge, thin quaternary sediments on Namba, and possibly Eyre Formation locally, on a Cretaceous clay basement in the south-east and north-west of the EL area.

**EXPLORATION SUMMARY:** No work was completed other than a review of previous exploration by Sedimentary Uranium N.L. under SMLs 414 and 697. It was intended to drill three rotary holes to test inferred Tertiary channel sands about 5 km south-east of Benagerie Homestead in the latter half of 1974 but these holes were never drilled because the allotted budget for drilling on the three Southern Ventures ELs was exhausted before the time for the work on EL 89.

**MINERALISATION/PROSPECTS:** It was concluded from the review of previous exploration that there was little potential in the western sector of the licence because of the Benagerie Ridge but that lying on the south-east flank of the ridge there was a south-east draining channel south-east of Benagerie Homestead as revealed by previous drilling with head waters immediately south-east of the homestead between Sedimentary Uranium N.L. holes B1 and C6 which intersected sands. It was inferred that this represented the upper reaches of the Yarramba Palaeochannel draining in a south easterly direction off the Benagerie Ridge towards Honeymoon.

Because of the perceived "relatively small potential" of the EL it was considered an extension of tenure in order to complete the proposed drilling was not warranted.



• C6  
• B1 Holes drilled by Sedimentary Uranium NL under SML 414

0 5 10 15  
KILOMETRES

Figure 68

Applicant / Title Holder: Southern Ventures Pty. Ltd.

Licence N° : EL 89

DME\_SA 93-1633

**TENEMENT:** EL 90 (formerly SMLs 266, 513; followed by ELs 178; ELs 435, 549, 957, 1391 Marathon 1608, 1693 Lynch)

**AREA:** 1838 sq km

**COMMENCEMENT DATE:** 6/8/73

**EXPIRY DATE:** 5/12/74 (1520 sq km surrendered 5/8/74)

**COMPANY:** SOUTHERN VENTURES PTY LTD

**ENVELOPE:** 2327, 2467

**REFERENCES:**

**LOCATION:** Lake Yalkalpo

**1:250 000 SHEET:** CURNAMONA, FROME

**1:100 000 SHEET:** LAKE CHARLES 7035, THURLOOKA 7036

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Tertiary Eyre (Murnpeowie) and Namba Formations overlying Cretaceous basement on eastern flank of Benagerie Ridge.

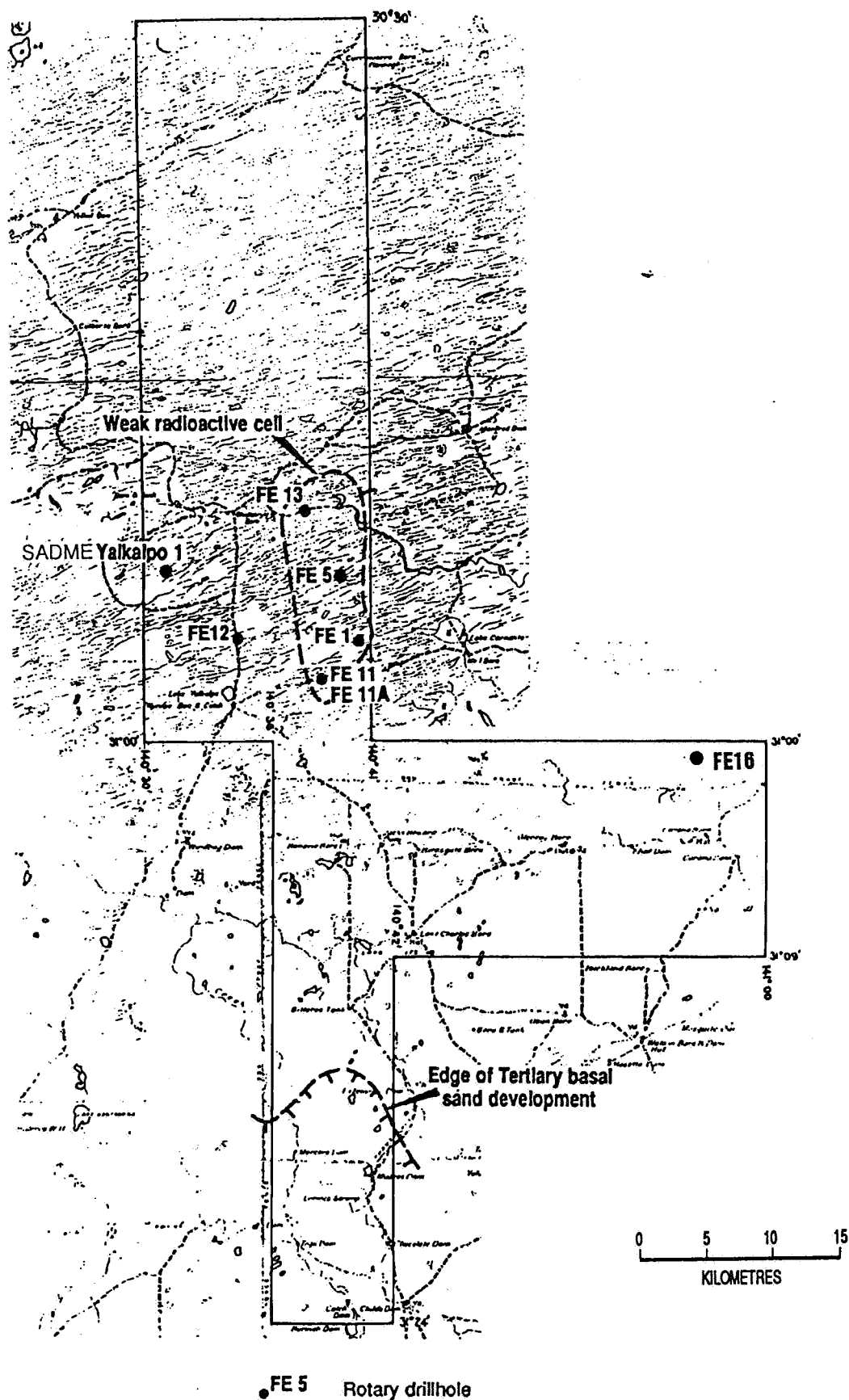
**EXPLORATION SUMMARY:** Analysis of previous drilling by Chevron (EL 40), Sedimentary Uranium (SML 513) and by SADME (Cored Yalkalpo No 1) lead to the conclusion there was a possible channel near Benarie Bore which warranted drilling. Seven rotary holes totalling 618 metres (FE1, 5, 11, 11A, 12, 13, 16) were drilled and logged with resistivity, spontaneous-potential and gamma probes. All but FE16 (122 m) were on FROME near the southern boundary.

**MINERALISATION/PROSPECTS:** Conclusions from the interpretation of previous work were that the southern part of the EL lacked a basal sand unit, and there was a thickening of sand in a possible channel trending north-east through Benarie Bore on the north-east flank of the Benagerie Ridge.

Drilling intersected Cretaceous basement from about 80 to 90 metres. Basal Tertiary comprised fine grained sand to gravel often containing carbon trash and pyrite with varying amounts of interbedded clay and silt. FE1, 5 and 11A showed the highest radiometric responses from logs with calculated assays ranging from 0.006%  $U_3O_8$  to 0.022%  $U_3O_8$  in FE5. Lithological data suggested there may be some relationship between the mineralisation and a thickening of the basal sand unit which trends north-west immediately to the east of FE1. Further drilling may be required to the south of FE 11A and north-east of FE5.

The northern portion of the EL remained virtually undrilled but favourable formations were considered likely to be at depths exceeding 120 metres.

**DRILLING:** Seven rotary holes (FE1, 5, 11, 11A, 12, 13, 16) totalling 618 metres. FE11 (16 m) was redrilled and FE 16 collapsed. Note that the above seven holes were drilled as part of a 17 hole programme (FE 1 to 17). Details of the additional 10 holes were not provided although locations are given under EL 178 (Env. 2584). Consequently 17 holes were probably drilled in 1974 but some were beyond the boundaries of EL 90. Note: FE 16 (122 metres) was the only hole on CURNAMONA.



Note: Locations of FE 1 to 17 are shown on EL 178 locality map

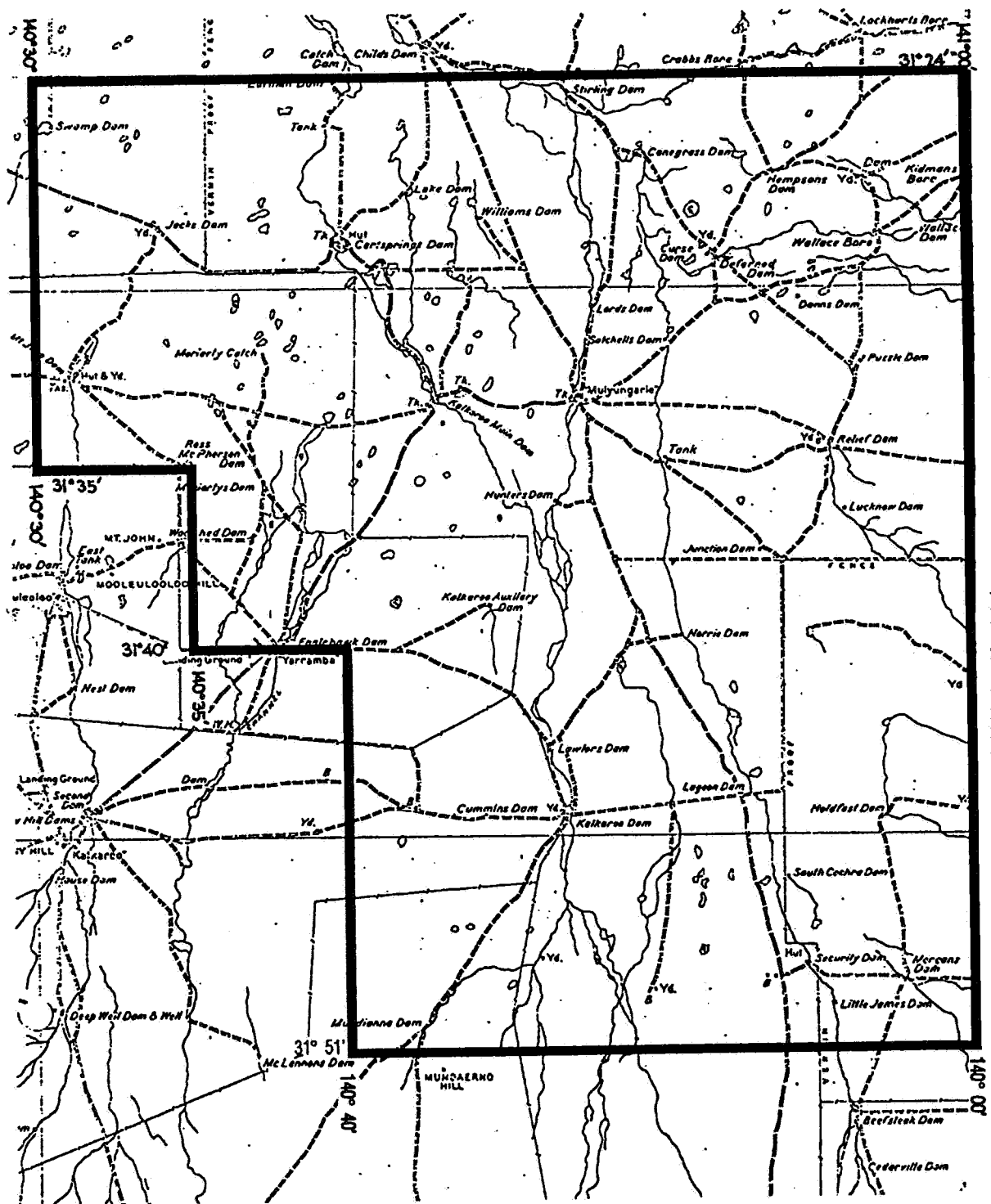
Figure 69

Applicant / Title Holder: Southern Ventures Pty. Ltd.

Licence N° : EL 90

DME\_SA 93-1634

<u>TENEMENT:</u>	EL 98 (formerly SMLs 279, 415, 580, 696; followed by ELs 238, 412, 721, 1060, 1382, 1763)
<u>AREA:</u>	1968 sq km
<u>COMMENCEMENT DATE:</u>	28/9/73
<u>EXPIRY DATE:</u>	27/9/76
<u>COMPANY:</u>	SEDIMENTARY URANIUM N.L.
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATION:</u>	East Kalkaroo (Mulyungarie)
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	MULYUNGARIE 7034; LAKE CHARLES 7035
<u>TARGETS:</u>	Sedimentary uranium
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CONFIDENTIAL ENVELOPE
<u>MINERALISATION/PROSPECTS:</u>	



0 5 10 15  
KILOMETRES

Figure 70

Applicant / Title Holder: Sedimentary Uranium N.L.

Licence N° : EL 98

DME\_SA 93-1635



**TENEMENT:** EL 109 (formerly SMLs 267, 268, 514, 543, 544; ELs 42, 45, 59; followed by ELs 227, 411, 722, 1065, 1487, 1698).

**AREA:** 2652 sq km

**COMMENCEMENT DATE:** 12/11/73

**EXPIRY DATE:** 11/11/75

**COMPANY:** PACMINEX PTY. LIMITED

**ENVELOPE:** 2361

**REFERENCES:** Ellis, G.K., 1975: Summary of Phase II Drilling Programme on EL 109 (Billeroo West) - April - May 1975. Mines Administration Pty Limited (unpublished).

**LOCATION:** Billeroo West

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, PASMORE 6835, KALABITY 6934, BENAGERIE 6935.

**TARGETS:** Sedimentary uranium.

**AGE/ROCK UNITS:** Quaternary cover on Tertiary Namba and Eyre Formations resting on a basement of Cambrian.

**EXPLORATION SUMMARY:** Exploration was conducted in joint venture with Minad - Teton as managers earning 49% from November 1973. A resistivity survey was completed by Murdoch Geology and Geophysics in August 1974 on 10 lines (1 to 9 incl 3A) totalling 91.5 km with the aim of determining the path of the Billeroo West channel between existing lines of drill holes and to establish whether channelling may exist in other parts of the EL.

The Phase I drilling programme of 57 holes (BW 1 to BW 57) totalling 7742 metres was completed in October - November 1974 to further delineate the Billeroo West palaeochannel and clarify stratigraphy and controls of mineralisation. Holes were drilled at 500 metres or closer spacing along the resistivity traverses. This work lead to the discovery of the Goulds Dam Deposit.

Phase II drilling of 55 holes (BW 58 to BW 112) totalling 7126 metres was completed in April-May 1975 at 60 metres spacing on lines 200 metres apart. The objective was to determine the areal extent of the Goulds Dam deposit and establish controls on mineralisation; and to further investigate low grade uranium discovered by Pacminex near PMX 29a, 1.5 km north of Goulds Dam; and PMX 7, 7a situated 2 km to the south of Goulds Dam. Six holes (BW 103 to 105 and 109 to 111) were drilled near PMX 29a and three holes (BW 97 to 99) were sited near PMX 7, 7a.

All holes were accurately surveyed and levelled, logged with gamma, spontaneous potential and resistivity probes and sampled at 1.5 metre intervals.

**MINERALISATION/PROSPECTS:** The resistivity survey confirmed the existence of the Billeroo West Channel and defined the extent of the channel in zones where there was little control.

The Phase I drilling confirmed that there was a discrete body of uranium mineralisation which was termed the Goulds Dam deposit. Further definition came with completion of Phase II drilling which confirmed that there was a thin low grade uranium deposit 1000 metres long, 100 to 350 metres wide, about 2 metres thick at 115 metres depth below surface and averaging about 0.18%  $eU_3O_8$ . The limits of the deposit were considered adequately defined and prospects of extensions limited.

Phase I encouragement was between BW8 and BW9 where ore grade was evident over 100 metres width. More promising holes included BW 44 with 2.6 metres at 0.176%  $eU_3O_8$  in Sand Unit B and 1 metre at 0.171%  $eU_3O_8$  in the basal Sand Unit A; and BW 29 with 1.3 metres at 0.448%  $eU_3O_8$  in Unit B.

The principal mineralisation in the Lower Tertiary Eyre Formation occurs associated with Sand Units A, B and C usually separated by thin clay beds. Lithologically these three units are quite similar but there is a slight decrease in grainsize of the light grey quartzose sands from medium to coarse in the basal sand Unit A to the upper Sand Unit C which is silty in part. The factors controlling uranium concentration are the presence of pyrite and carbonaceous matter, restricted paths for uranium rich waters and a close inter-relationship of geochemical cell interfaces of the mineralized Sand Units A, B and C.

Only thin low grade uranium intervals were intersected near PMX 29a and PMX 7, 7a. Best hole at this locality was BW 103 with 1.1 metres at 0.147%  $eU_3O_8$ .

DRILLING: 112 rotary holes (BW 1 to BW 112) totalling 14868 metres.

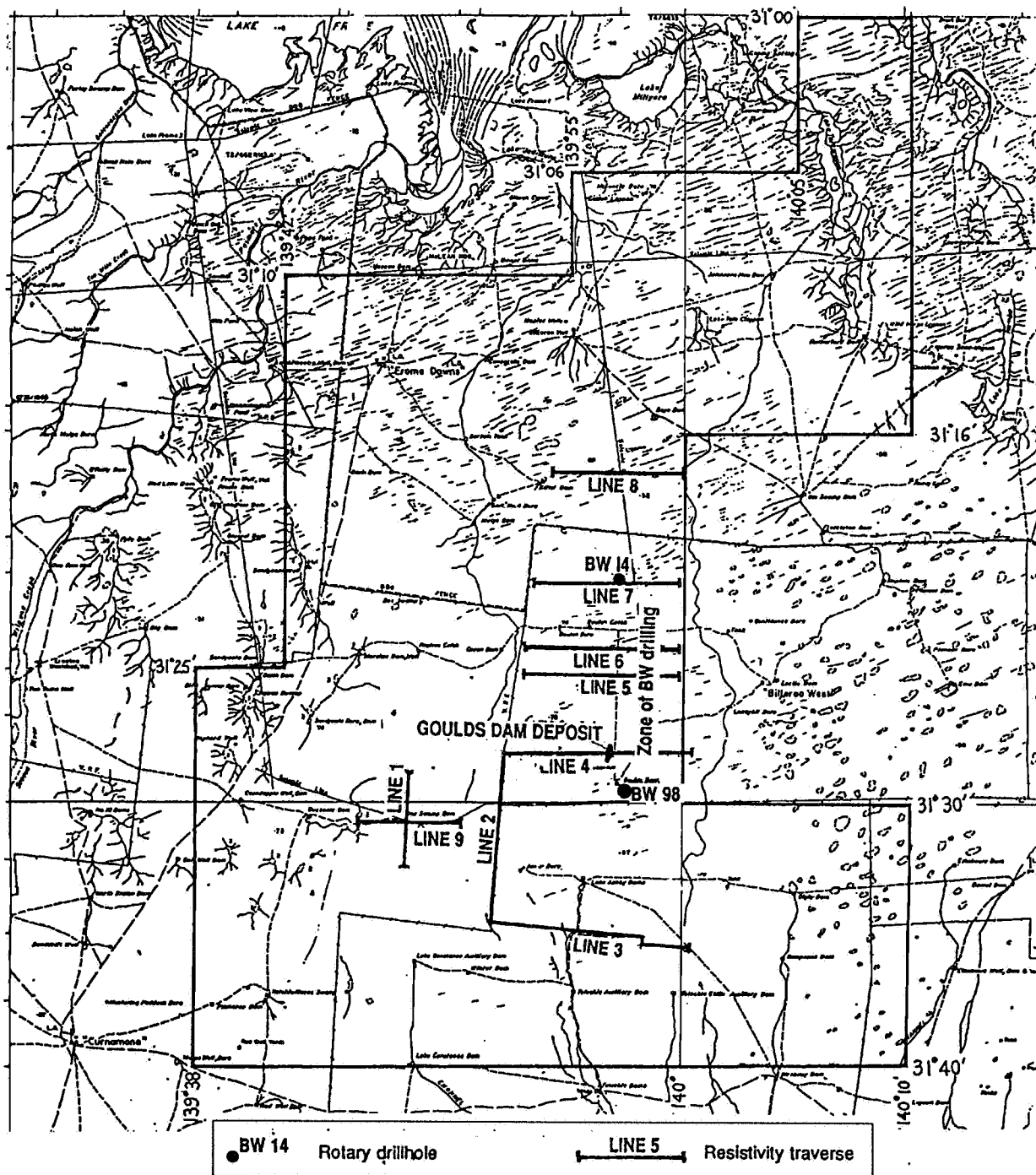


Figure 71

Applicant / Title Holder: CSR LIMITED

Licence N° : EL 109

DME\_SA 93-1636

TENEMENT EL 121 (formerly SMLs 279, 415, 694; followed by ELs 189, 457, 848, 1258, 1606, 1676).

AREA: 524 sq km

COMMENCEMENT DATE: 7/1/74

EXPIRY DATE: 6/1/75

COMPANY: CARPENTARIA EXPLORATION COMPANY PTY LTD,  
TETON EXPLORATION DRILLING CO PTY LTD,  
MINES ADMINISTRATION PTY LIMITED.

ENVELOPE: 2399, 2502

REFERENCES:

LOCATION: Mundaerno Hill

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: MULYUNGARIE 7034

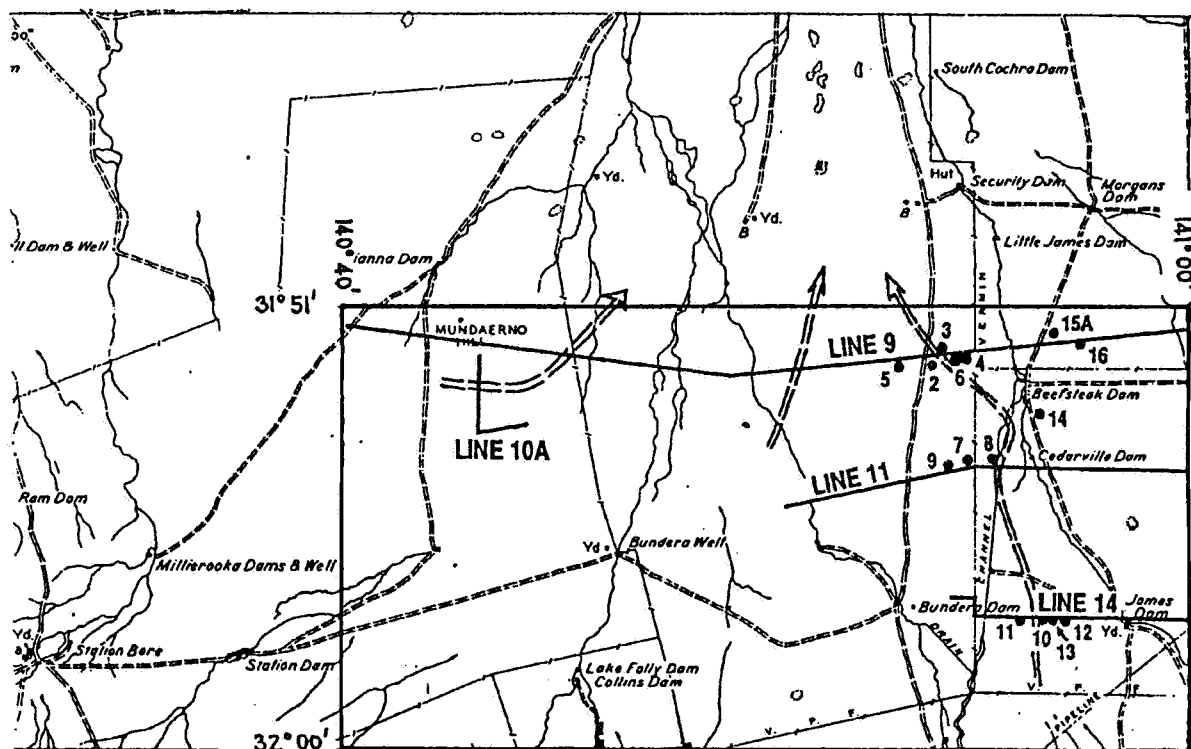
TARGETS: Sedimentary uranium

AGE/ROCK UNITS: Tertiary palaeochannels incised into Cretaceous Maree Formation overlying Proterozoic palaeosurface.

EXPLORATION SUMMARY: Surface resistivity on four east-west oriented lines covering most of the licence area was completed by Murdoch Geology and Geophysics Pty Ltd. Three Tertiary palaeochannels were located with one 2 km wide channel on line 9 probably along a Precambrian - Cretaceous faulted contact. Sixteen holes were drilled and logged for gamma ray, resistivity and spontaneous potential by Geoscience Associates. No anomalous radioactivity was detected.

MINERALISATION/PROSPECTS: Drilling confirmed the presence of Tertiary palaeochannels which are typically 1.3 km wide and up to 50 m thick with the top of the channel at 70 metres depth. In general an upper channel from 70 to 95 m consists of sandy silts and clay while a lower channel from 95 to 120 m consists of well sorted, medium to coarse sands. The sands are oxidised throughout.

DRILLING: Sixteen rotary holes (BD1-16) for a total of 1445.7 metres.



0 5 10 15  
KILOMETRES

LINE 9 Resistivity traverse and line number

→ Axis of Palaeochannel

● 16 Rotary drillhole, prefix BD

Figure 72

**Applicant / Title Holder:** Carpentaria Exploration Pty. Ltd. ,  
Teton Exploration Drilling Co. Pty. Ltd. &  
**Licence N° :** EL 121 Mines Administration Pty. Ltd.

DME\_SA 93-1637

**TENEMENT:** EL 127 (formerly SML 514, EL 69; followed by ELs 217, 614, 911, 1203; 1487, 1684, 1698)

**AREA:** 1431 sq km

**COMMENCEMENT DATE:** 1/6/74

**EXPIRY DATE:** 31/5/75

**COMPANY:** TRICENTROL AUSTRALIA LIMITED

**ENVELOPE:** 2432

**REFERENCES:** Middleton, T W, 1975. Lake Coonarbine EL 127 Relinquishment Report - Technical Report, Tricentrol Australia Limited (unpublished).

**LOCATION:** Lake Coonarbine

**1:250 000 SHEET:** CURNAMONA, FROME

**1:100 000 SHEET:** BENAGERIE 6935, COONARBINE 6936

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Tertiary Eyre and Namba Formations resting on basement/Proterozoic quartz-feldspar porphyry and Proterozoic? shale-siltstone.

**EXPLORATION SUMMARY:** A drilling programme was undertaken in August 1974 with the objective of completing traverses at 4.8 km spacings with holes 0.8 km apart over the longitudinal extent of the "Tinko Trough" previously identified under EL 69 on the western flank of the Benagerie Ridge. Twenty seven holes (LC1-27) totalling 1899.5 metres were completed. Holes ranging from 48 to 110 metres deep were drilled on four traverses spaced between those drilled under EL 69 and one other traverse B-B' where holes were drilled between LT holes completed under EL 69. All holes were logged with resistivity, spontaneous potential and gamma probes.

**MINERALISATION/PROSPECTS:** The "Tinko Trough" was found to be more complex than previously thought nonetheless a well-defined NNE trending channel was defined with a tributary on line D-D'.

Anomalous gamma activity was observed in the Eyre Formation channel sediments and in basement rocks. The highest readings were 1550 cps (about 0.28%  $U_3O_8$  equiv) in hole LC2 at 74.4 metres in either basal Tertiary clay or weathered basement, 1100 cps in a clay interbed in LC23 and 720 cps in a carbonaceous clay in LC13.

The Tertiary channel sediments are divided into an upper largely oxidized sand, an intermediate clay sometimes lignitic and a basal unoxidized carbonaceous pyritic sand. This sequence is best developed in the centre of the channels. The maximum Cainozoic section was 105 metres in LC21. The basement is either quartz-feldspar porphyry sequence which may be Proterozoic rather than Cambrian 'red beds' as suggested. No Mesozoic sequence was intersected.

It was concluded that while no significant zones of uranium enrichment had been found in the channel the section between drill traverses A-A' and B-B' remains the most prospective part of the EL and that in different politico-economic circumstances further investigation may have been warranted. The above zone is the interval where there is a change from oxidized to reduced conditions in the channel sediments of the Eyre Formation.

DRILLING: Twenty-seven rotary holes (LC1-27) totalling 1899.5 metres.





TENEMENT: EL 132 (formerly SMLs 118, 151, 172, 209, 209A, 210, 210A 269, 562, 677, 714, ELs 47, 62; followed by ELs 259, 377, 423, 597, 1004, 1412, 1786, 1864).

AREA: 2345 sq km

COMMENCEMENT DATE: 15/5/74

EXPIRY DATE: 14/5/76

COMPANY: CARPENTARIA EXPLORATION COMPANY PTY LTD

ENVELOPE: 2426 (base metals), 2511 (sedimentary uranium)

REFERENCES: Successive quarterly reports

LOCATION: Kalabity

1:250 000 CURNAMONA

1:100 000 SHEET: CURNAMONA 6834, KALABITY 6934, MULYUNGARIE 7034

TARGETS: Copper, lead, zinc and sedimentary uranium.

AGE/ROCK UNITS: Palaeoproterozoic Willyama Supergroup (base metals) and Tertiary gravels (sedimentary uranium)).

#### EXPLORATION SUMMARY:

1. Base Metals Exploration continued with systematic regional mapping at 1:20 000 including collection of grab samples of outcrop and float which were assayed for Cu, Pb, Zn. Detailed mapping at 1:5 000 and 1:2 500 was undertaken at Nancatee Trend, Burden's Dam, Waukaloo copper prospect and Dome Rock mine. The prospects were extensively drilled and tested geophysically (including ground magnetics, IP and EM).
2. Sedimentary uranium The Honeymoon uranium deposit is located on portion of EL 132 (South Eagle) which was farmed-out to Minad - Teton Australia. A resistivity survey located 6 possible palaeochannels similar to the Yarramba Channel which hosts Honeymoon. Drilling in 1974-75 extended known mineralisation and obtained core for in situ leach testing. A track etch survey was completed.

#### MINERALISATION/PROSPECTS:

1. Base Metals A limonite - goethite - haematite horizon at Dome Rock Mine and other jasper or iron-rich calc-silicate rocks were the target of exploratory drilling. DDHW2 at Waukaloo drilled under W1 to a depth of 218.1 m and returned best assays of 1.4 and 1.1% Cu from 172 to 173 metres. DDHW3 collared 2 m south of W2 was drilled to 600 m. The highest assay returned was 6% Cu over 0.15 metres from a massive chalcopyrite vein at 205.9 metres. The best zone in W3 was 2 m averaging 2.9% from 567 m in a magnetite - rich brecciated albitolite. DDHNI at Nancatee was drilled to 333.7 m but did not return any anomalous assays.

Deep percussion drilling (generally 200 metres per hole) at Nancatee returned up to 0.2% Cu while at Waukaloo W21 returned 1.55% Cu over 1.5 metres. Holes at Burden's Dam (N7-9) were barren. DR 2 at Dome Rock (1 km south east of Day shaft) returned 1.53 metres at 1.55% Cu but DR3 (2 km south west of Day Shaft) was less than 0.2% Cu. Airtrack and drag bit holes (equivalent to RAB holes) in the ATW series were drilled to test the above named prospects and other areas of the licence. The holes generally sampled weathered bedrock and were assayed for Cu, Pb, Zn, Co and Mn.

At Dome Rock an EM survey extended the sulphide body 600 metres north and 150 m south.

2. Sedimentary Uranium The Honeymoon deposit is situated in the Lower Tertiary Yarramba Channel at a distinct redox front. Some sixty holes at Honeymoon have outlined 2500 tonnes of contained uranium ( $eU_3O_8$ ) at an average grade of 0.262%.

#### DRILLING:

##### 1. Base Metals

Airtrack and drag bit : 451 holes (ATW359-815) totalling 7,077.3 metres

Rotary Percussion : 18 holes (W20-22, N1-11, DR 2-5) totalling 3092.5 metres

Diamond Drilling : 3 holes (DDHW2-3, DDHNI) totalling 1151.8 metres.

##### 2. Sedimentary uranium (Honeymoon)

Rotary : 48 holes totalling 4 827 metres

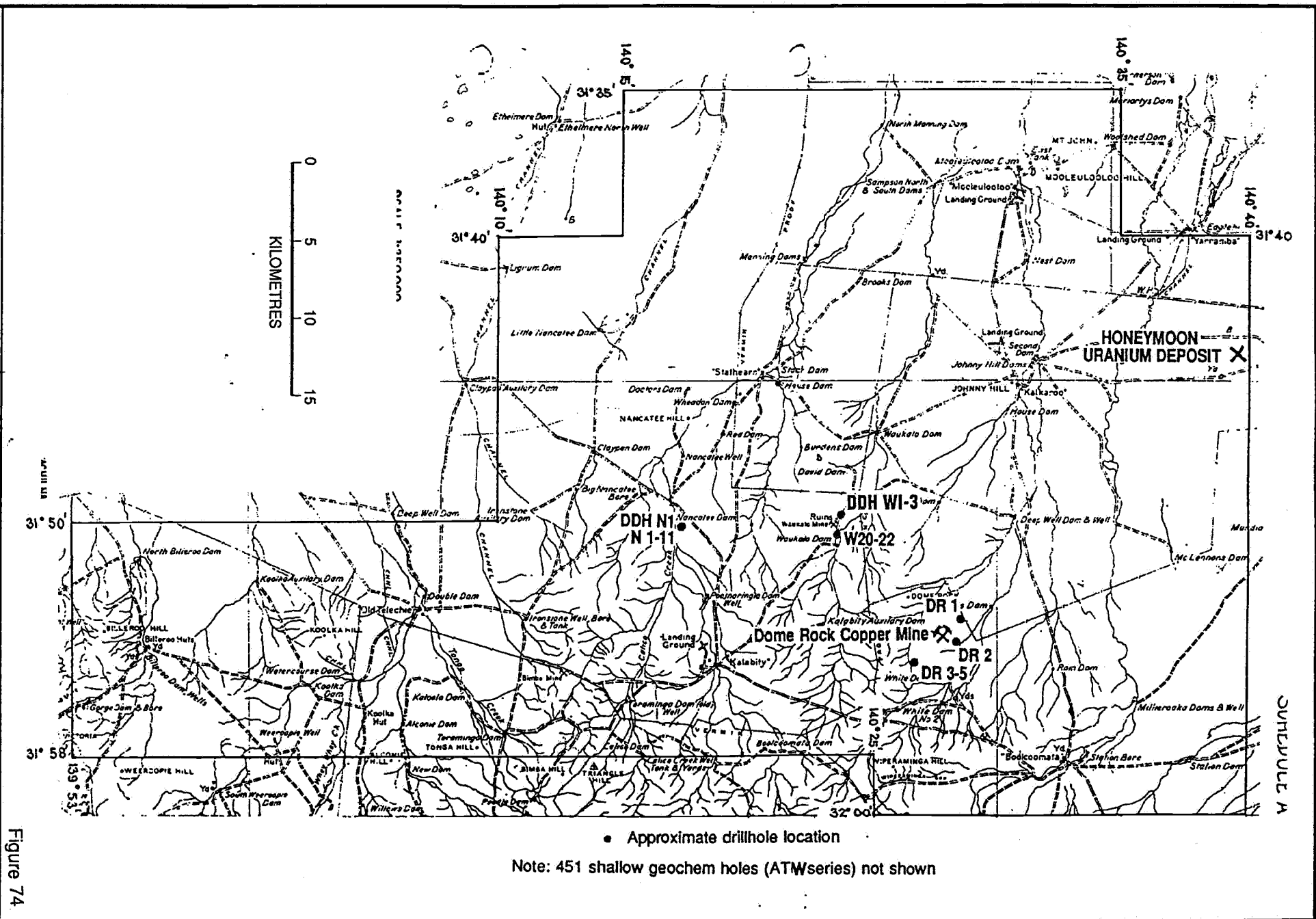
Core Drilling : 4 holes totalling 480.5 metres

Combined sedimentary uranium drilling: 52 holes totalling 5307.5 metres

Licence N° : EL 132

Applicant / Title Holder: Carpentaria Exploration Company Pty. Ltd.

DME\_SA 93-1639



TENEMENT: EL 159 (followed by ELs 263, 450, 848, 970, 1257, 1389)

AREA: 870 sq km (reduced to 387 sq km)

COMMENCEMENT DATE: 1/11/74

EXPIRY DATE: 31/10/75

COMPANY: INTERNATIONAL NICKEL AUSTRALIA LIMITED

ENVELOPE: 2500

REFERENCES: Hughes, D.C., 1976: EL 159 Ethiudna Hill Final Report for Period 1/11/1974 to 31/10/1975. International Nickel Australia Limited.

LOCATION: Ethiudna Hill

1:250 000 SHEET: OLARY, CURNAMONA

1:100 000 SHEET: WINNININNIE 6833, OLARY 6933, CURNAMONA 6834, KALABITY 6934

TARGETS: Copper, lead, zinc

AGE/ROCK UNITS: Palaeoproterozoic Willyama Supergroup

EXPLORATION SUMMARY: Three areas were selected for detailed study:

- (i) Plumbago South Banded Iron Formation - 3 km south Plumbago HS Ground magnetic traverses; 1:5000 mapping; 10 rock chips for Cu, Pb, Zn, Mn, Ag, P<sub>2</sub>O<sub>5</sub>; 59 soils for Cu, Pb, Zn; two I.P. traverses.
- (ii) Doughboy Well Copper Mine - 1:5000 mapping; 7 rock chips for Cu, Pb, Zn, Mn, Ag, P<sub>2</sub>O<sub>5</sub>; 153 soils for Cu, Pb, Zn; stream sediment sampling; 2 lines of IP.
- (iii) Spring Well (old Cu occurrence) - sketch mapping, soil sampling on two grids for Cu, Pb, Zn.

Focus as for EL 102 was on quartz-magnetite and calcareous horizons.

MINERALISATION/PROSPECTS: Results were:

Plumbago South - weak geochemical and IP results.

Doughboy Well - anomalous copper geochemistry was confined to known mineralisation in ironstained horizon in quartz-mica-andalusite schist - limited in extent. IP showed fair (second order) anomalies.

Spring Well - copper anomaly over limited area in vicinity of old workings in feldspar-quartz-hornblende-mica schist and amphibolite.

No encouraging results.

Results for Pb decidedly low in all geochemistry.

Licence N° : EL 159

Applicant / Title Holder: International Nickel Australia Ltd

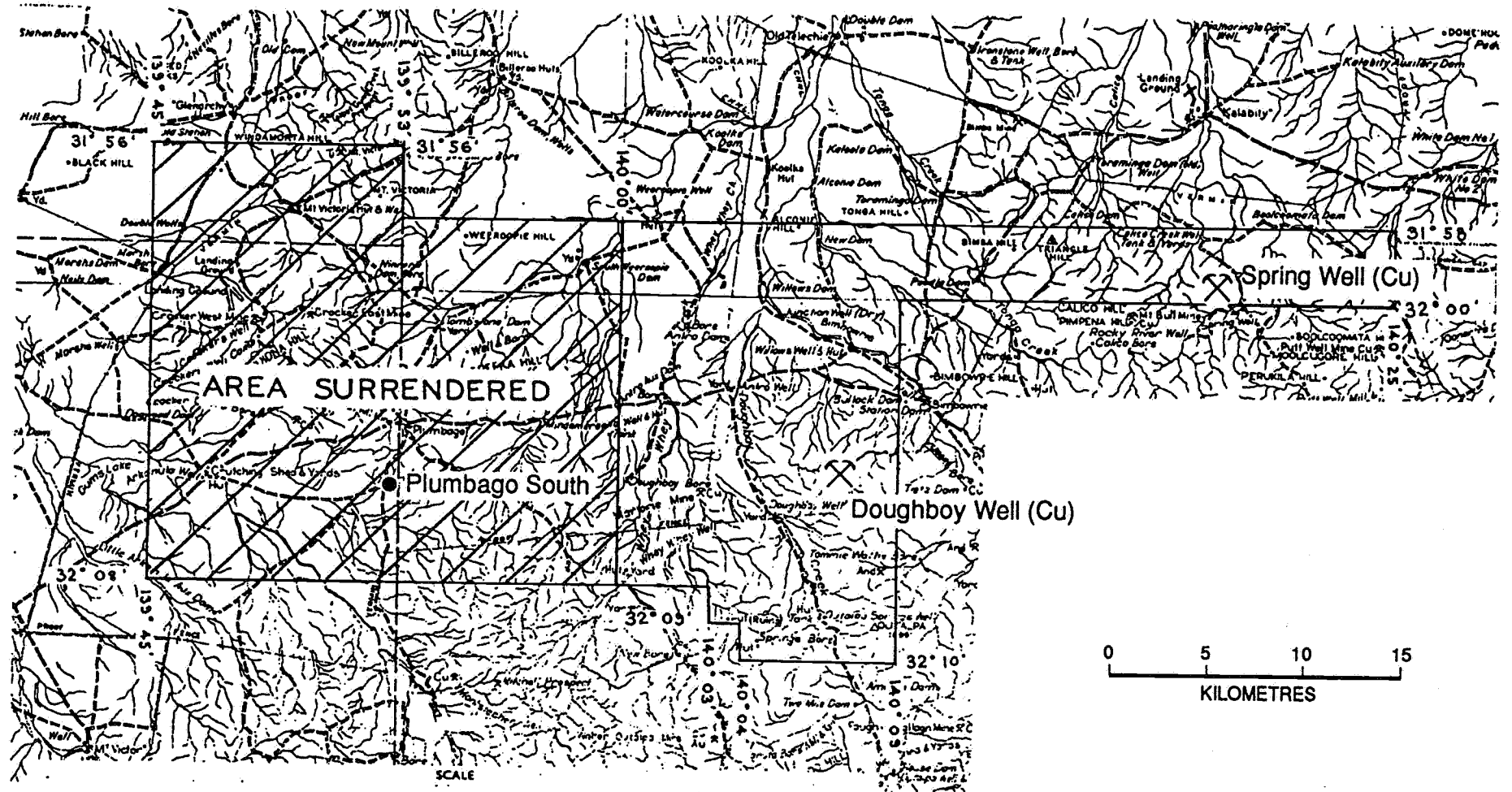


Figure 75

<u>TENEMENT:</u>	EL 168
<u>AREA:</u>	1446 sq km
<u>COMMENCEMENT DATE:</u>	24/12/74
<u>EXPIRY DATE:</u>	23/12/75
<u>COMPANY:</u>	AGIP NUCLEARE AUSTRALIA PTY LTD
<u>ENVELOPE:</u>	DM 848/74
<u>REFERENCES:</u>	
<u>LOCATION</u>	Curnamona
<u>1:250 000 SHEET:</u>	CURNAMONA, PARACHILNA
<u>1:100 000 SHEET:</u>	CURNAMONA 6834, PASMORE 6835, REAPHOOK 6735, WILLIPPA 6734
<u>TARGETS:</u>	Sedimentary uranium
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	No report on file.

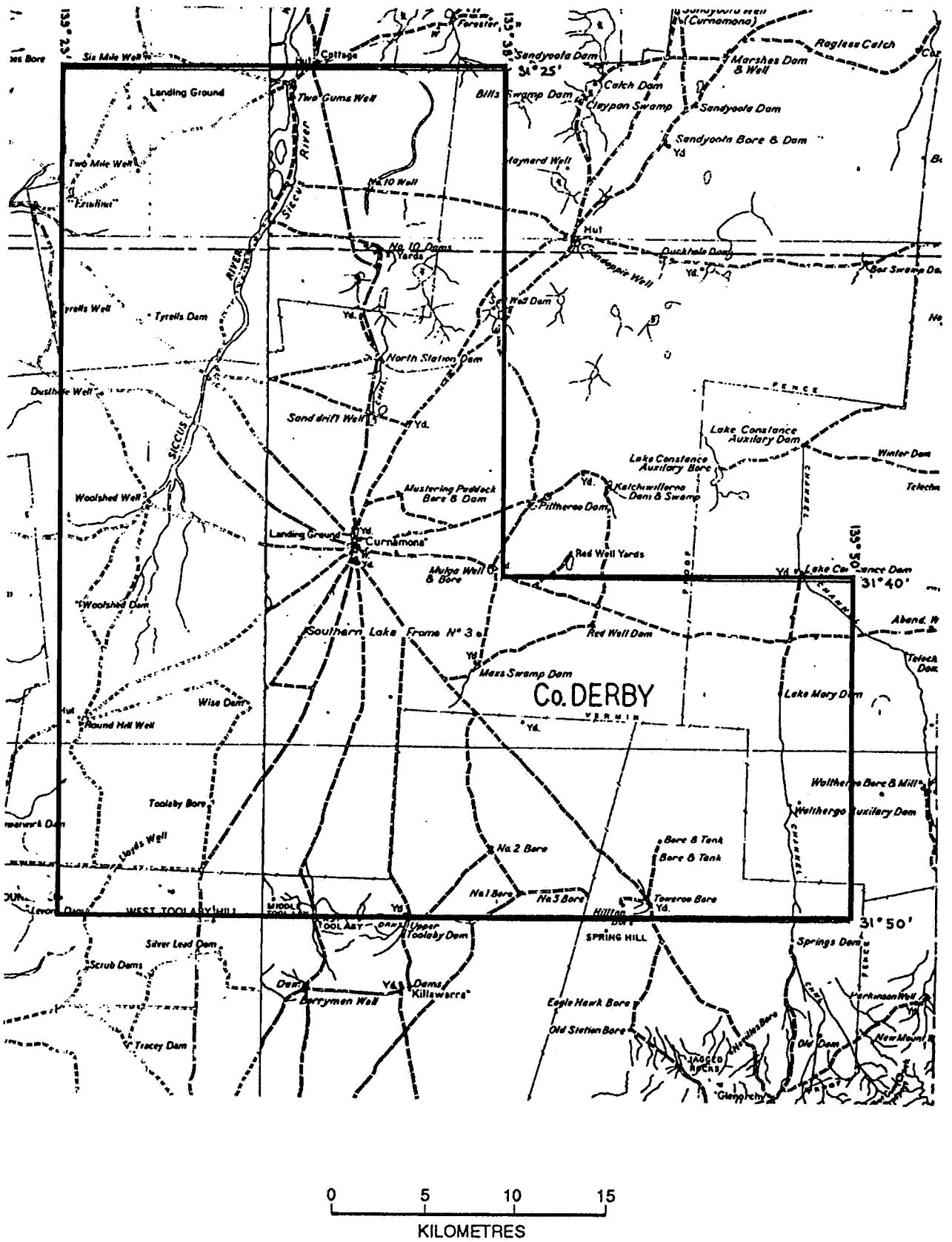


Figure 76

Applicant / Title Holder: AGIP Nucleare Australia Pty Ltd

Licence N° : EL 168

DME\_SA 93-1641

**TENEMENT:** EL 171 (formerly SML 514 and EL 59 followed by ELs 614, 911, 1203, 1487, 1698).

**AREA:** 234 sq km

**COMMENCEMENT DATE:** 17/2/75

**EXPIRY DATE:** 16/2/76

**COMPANY:** MINES ADMINISTRATION PTY LIMITED AND TETON EXPLORATION DRILLING CO PTY LTD

**ENVELOPE:** 2531

**REFERENCES:** Ellis, G.K., 1975: Final Report EL 171 Pioneer Dam Mines Administration Pty Limited (unpublished).

**LOCATION:** Pioneer Dam

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Quaternary and Tertiary sediments (Eyre and Namba Formations) overlying predominantly Cambrian basement (minor Cretaceous) on western flank of Benagerie Ridge.

**EXPLORATION SUMMARY:** The exploration involved 72.5 km of resistivity surveys on 5 lines by Murdoch Geophysics with the objective of defining Tertiary channels. This was followed in April 1975 by a 5 hole rotary drilling programme (PD 1-5) totalling 421 metres with logging for gamma-ray, resistivity and spontaneous potential to test the resistivity interpreted basement depressions. Cuttings were collected at 1.5 metre intervals and anomalously radioactive carbonaceous clay samples from PD2 were assayed for U<sub>3</sub>O<sub>8</sub>, Th, V, Cu, Pb and Zn.

**MINERALISATION/PROSPECTS:** The resistivity survey further delineated the basement depression in the north east of the EL previously defined by Sedimentary Uranium holes 514/8, 9 and 13. Two other possible northwest-southeast trending channels were outlined in the western part of the EL.

Drilling showed the lower Tertiary section consisted of a thick monotonous sequence of light to medium grey clay overlying Cambrian siltstone and mudstone or thin Cretaceous clays.

The Minad-Teton drilling PD1 and PD5 failed to locate the narrow palaeochannel containing some sands intersected in holes 514/8, 9 and 13. It was concluded this channel was of limited extent and had poor potential for sedimentary uranium. No sands were encountered in the other resistivity interpreted depressions and no anomalous radioactivity was intersected except in a black carbonaceous clay in PD2 which showed 60 ppm U<sub>3</sub>O<sub>8</sub> over 1.5 metres (31.5 - 33.0 metres).

It was concluded the area had little potential for discovery of sedimentary uranium deposits.

**DRILLING:** Five rotary holes (PD 1 to PD 5) totalling 421 metres.



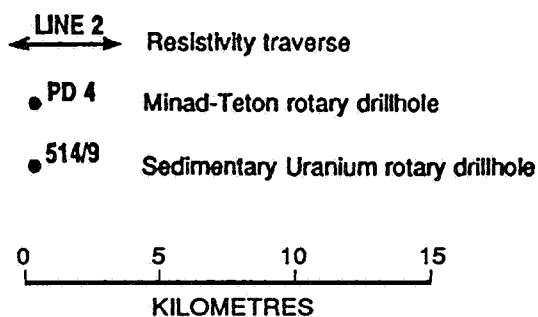
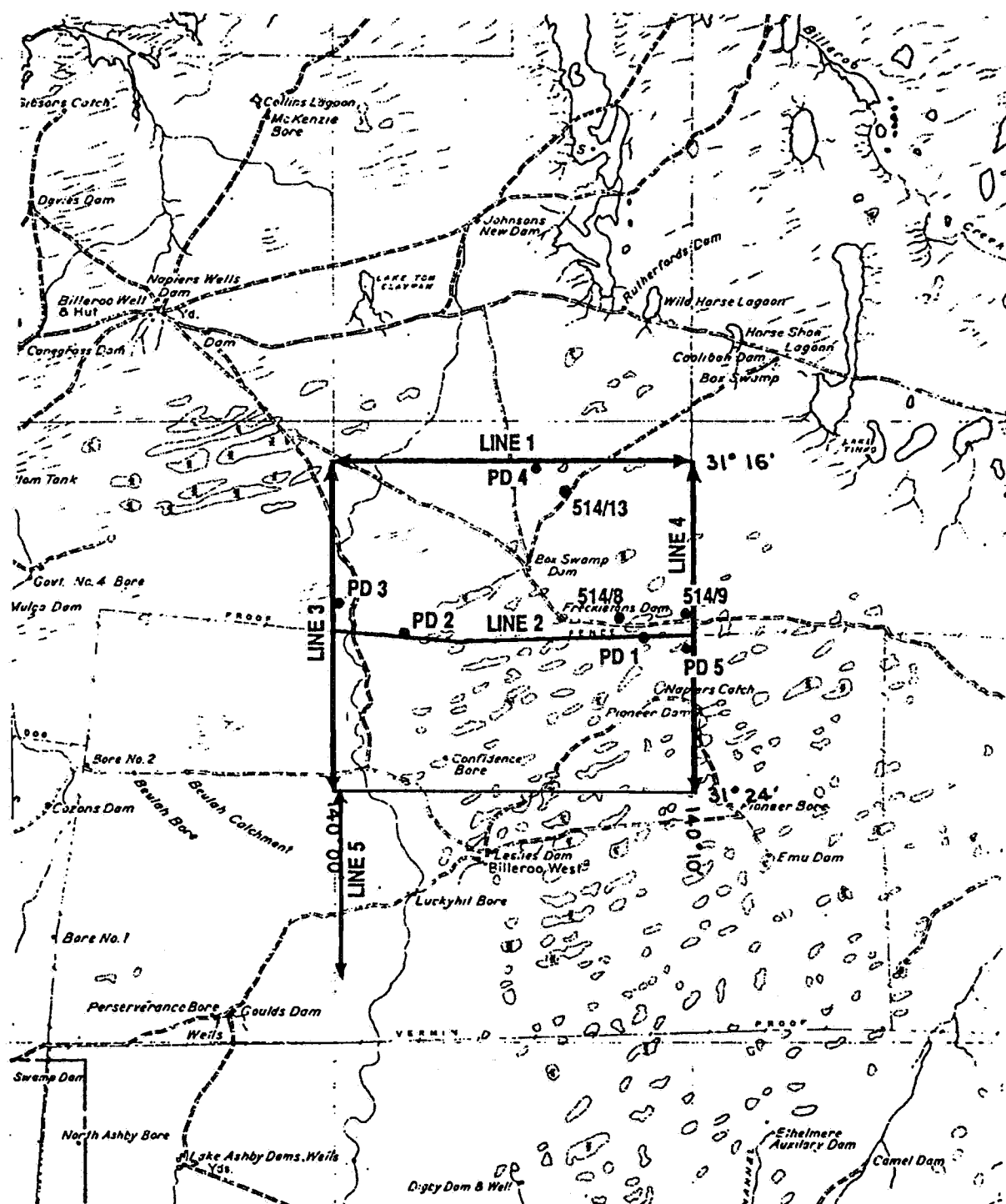


Figure 77

Applicant / Title Holder: Mines Administration Pty Ltd &  
 Teton Exploration Drilling Company Pty Ltd

Licence N° : EL 171

DME\_SA 93-1642

**TENEMENT:** EL 174 (formerly SMLs 266 Planet, 513, EL 43 Sedimentary Uranium; followed by ELs 549, 679, 957, 1391).

**AREA:** 845 sq km

**COMMENCEMENT DATE:** 24/2/75

**EXPIRY DATE:** 23/2/76

**COMPANY:** MINES ADMINISTRATION PTY LIMITED and TETON EXPLORATION DRILLING CO PTY LTD

**ENVELOPE:** 2532

**REFERENCES:** Ellis, G.K., 1975: Quarterly Report EL 174 Furlough Dam Mines Administration Pty Limited (unpublished).

**LOCATION:** Furlough Dam

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** MULYUNGARIE 7034

**TARGETS:** Sedimentary uranium

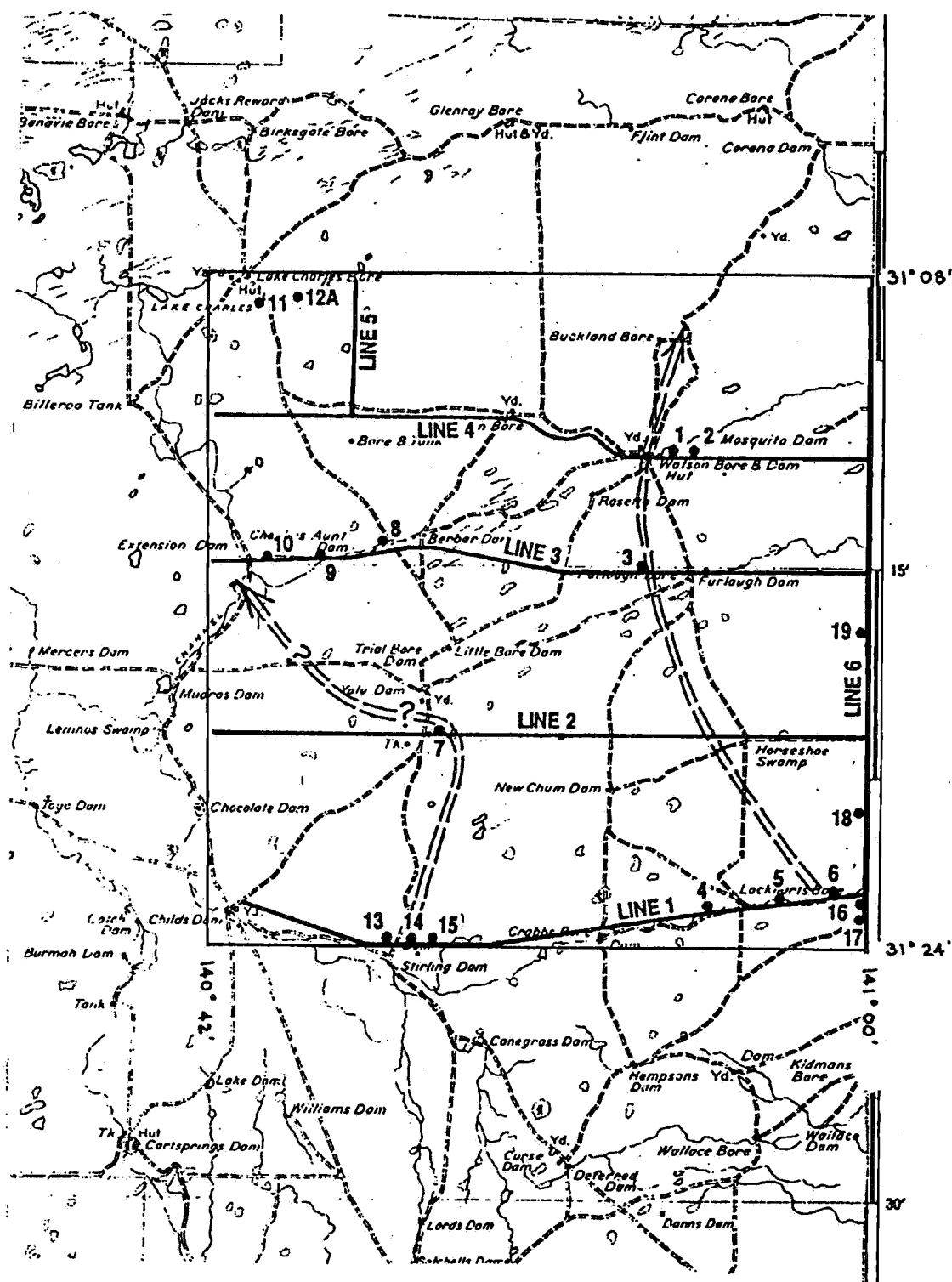
**AGE/ROCK UNITS:** Quaternary resting on Tertiary Namba and Eyre Formations on a basement of dominantly Cretaceous clays or overlying Cambrian.

**EXPLORATION SUMMARY:** A resistivity survey was conducted by Murdoch Geophysics on 6 lines in April-May 1975 with the objective of more precisely defining Lower Tertiary channels outlined in drilling by Sedimentary Uranium in 1971-72 (SML 513). In May - June 1975 a 19 hole (FD1-19) rotary drilling programme totalling 2252 metres was completed. Cuttings were collected at 1.5 metres and all holes were logged for gamma-ray, resistivity and spontaneous potential by Geoscience Associates.

**MINERALISATION/PROSPECTS:** The top of Lower Tertiary Eyre Formation lowermost sands occur at depths ranging from 100 metres to 130 metres while the base of this section varies from 120 to 145 metres suggesting some possible drainage from north to south. The sand is light grey, very fine to medium grained and subrounded with fair to good sorting. The upper half tends to be weakly oxidised to neutral whereas the lower half is neutral to unoxidised, showing a trace of humic staining on quartz grains and trace to common pyrite. Sand channels are also to be found in probably two younger systems.

Anomalous radioactivity of three times background was intersected over three individual 0.8 to 0.9 metre intervals of the channel sand of FD6 in the south-east of the area. No clear relationship was established between anomalous radioactivity and redox characteristics. In general the lowermost Tertiary palaeodrainage was interpreted to be in channels in the eastern and northwestern parts of the EL. 'Anomalous' radioactivity was found in the sands of two of the three interpreted systems in areas of confluence. The licence was not renewed but the reasons for this decision were not given.

**DRILLING** Nineteen rotary holes (FD 1-19) totalling 2252 metres.



- LINE 3** Resistivity traverse
- 6 Rotary drillhole, prefix FD
- ←== Interpretated palaeochannel at base of Tertiary

0 5 10 15  
KILOMETRES

Figure 78

Applicant / Title Holder: Mines Administration Pty Ltd &  
Teton Exploration Drilling Co.

Licence N° : EL 174

DME\_SA 93-1643

**TENEMENT:** EL 178 (formerly SML 513, ELs 90 and 105; followed by ELs 334, 435, 802, 1144, 1252)

**AREA:** 775 sq km

**COMMENCEMENT DATE:** 24/3/75

**EXPIRY DATE:** 23/2/76

**COMPANY:** SOUTHERN VENTURES PTY LTD

**ENVELOPE:** 2584

**REFERENCES:** Quarterly Report for Southern Ventures EL 178 Frome Embayment. South Australia, Derry, Michener and Booth Pty Ltd, August 1976.

**LOCATION:** Lake Carnanto Area

**1:250 000 SHEET:** CURNAMONA; FROME

**1:100 000 SHEET:** LAKE CHARLES 7035, THURLOOKA 7036

**TARGETS:** Sedimentary uranium.

**AGE/ROCK UNITS:** Tertiary Namba and Eyre Formations on a basement of Cretaceous clays (Marree Subgroup).

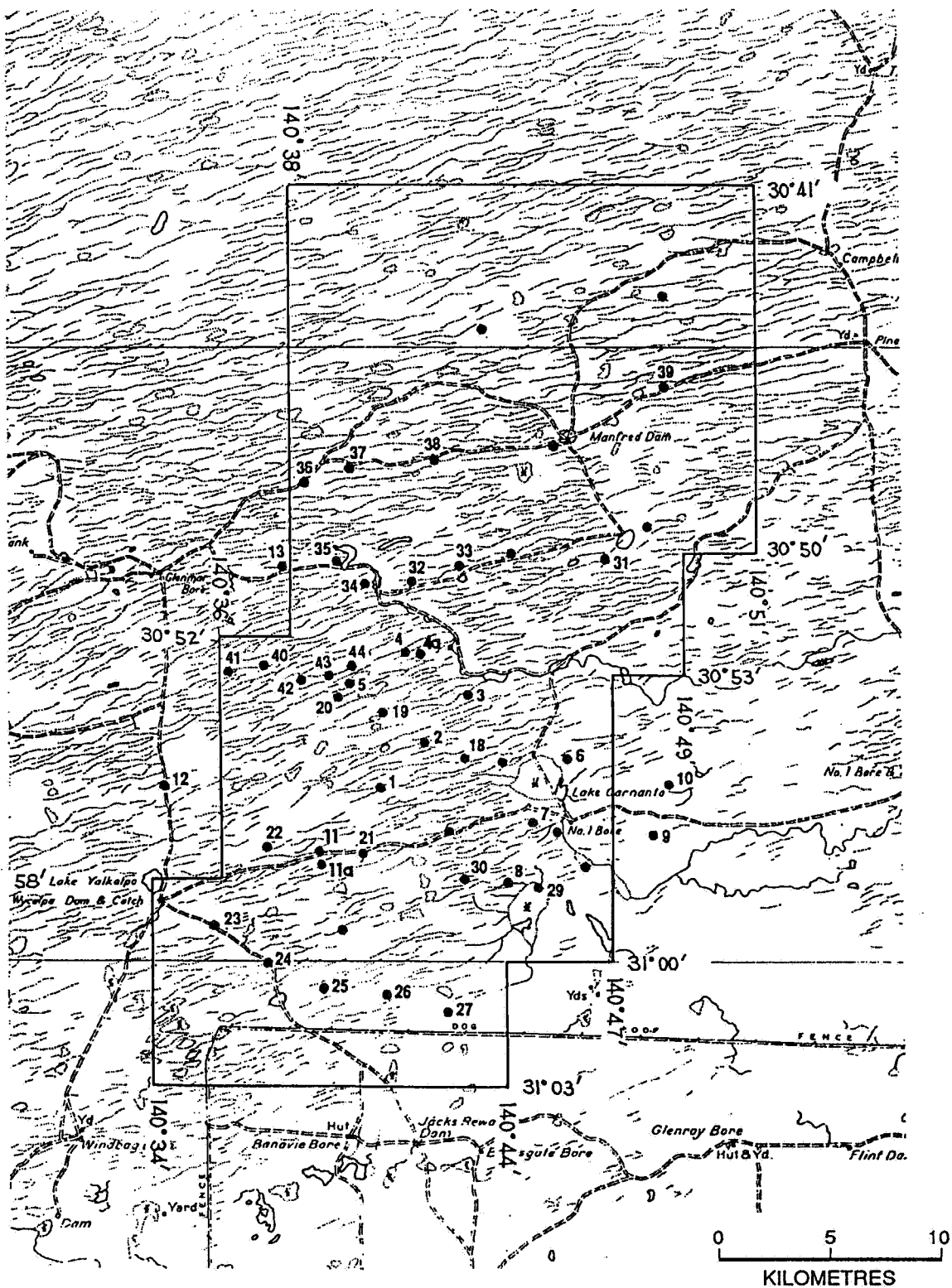
**EXPLORATION SUMMARY:** A rotary drilling programme of 31 holes (FD 18 -48) totalling 3080.5 metres was completed on five east west traverses roughly 5 km apart with holes spaced at 2 to 3 km. The objective of this drilling was to test the western flank of a major Tertiary palaeodrainage feature previously defined in ELs 90 and 105 by the drilling of hole FE 1 to FE 7 which intersected some anomalous radiometric responses. All holes were logged with gamma - ray, resistivity and spontaneous potential probes.

**MINERALISATION/PROSPECTS:** Drilling intersected a thick Tertiary sequence of carbonaceous/non carbonaceous claystone with thin fine grained sand units overlying a pyritic, occasionally carbonaceous, basal sand/gravel unit of variable thickness resting on an undulating Cretaceous clay basement.

Evidence of significant oxidation, such as limonite staining, was generally lacking in the basal sands.

The best intersection not in basal sands, was 1.5 metres (26.3 to 27.8 metres) of 0.028%  $U_3O_8$  (calculated) in FE 44. Holes FE 45 to 48 were drilled around this general area as relatively shallow tests which did not yield anomalous results.

**DRILLING:** Thirty one rotary holes (FE 18 to FE 48) totalling 3080.5 metres. Four holes (FE 24 to FE 27) totalling 384 metres drilled on CURNAMONA.



- 1 - 17 Rotary drillhole 1974 (EL 90), prefix FE
- 18 - 48 Rotary drillhole 1976 (EL 178), prefix FE
- Drillhole, another Company

Note : Holes FE 14 to 17 are east of this plan

Figure 79

Applicant / Title Holder: Southern Ventures Pty Ltd

Licence N° : EL 178

DME\_SA 93-1644

TENEMENT: EL 189 (formerly SMLs 279, 415, 612, 694, EL 121; followed ELs 457, 848, 1258, 1606, 1676))

AREA: 236 sq km

COMMENCEMENT DATE: 30/4/75

EXPIRY DATE: 29/4/76

COMPANY: MINES ADMINISTRATION PTY LIMITED, TETON DRILLING CO PTY LTD, AND CARPENTARIA EXPLORATION PTY LTD

ENVELOPE: 2586

REFERENCES: Brunt, D, 1976 : Final Report EL 189 (Beefsteak Dam) Mines Administration Pty Limited (unpublished).

LOCATION: Beefsteak Dam

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: MULYUNGARIE 7034

TARGETS: Sedimentary uranium

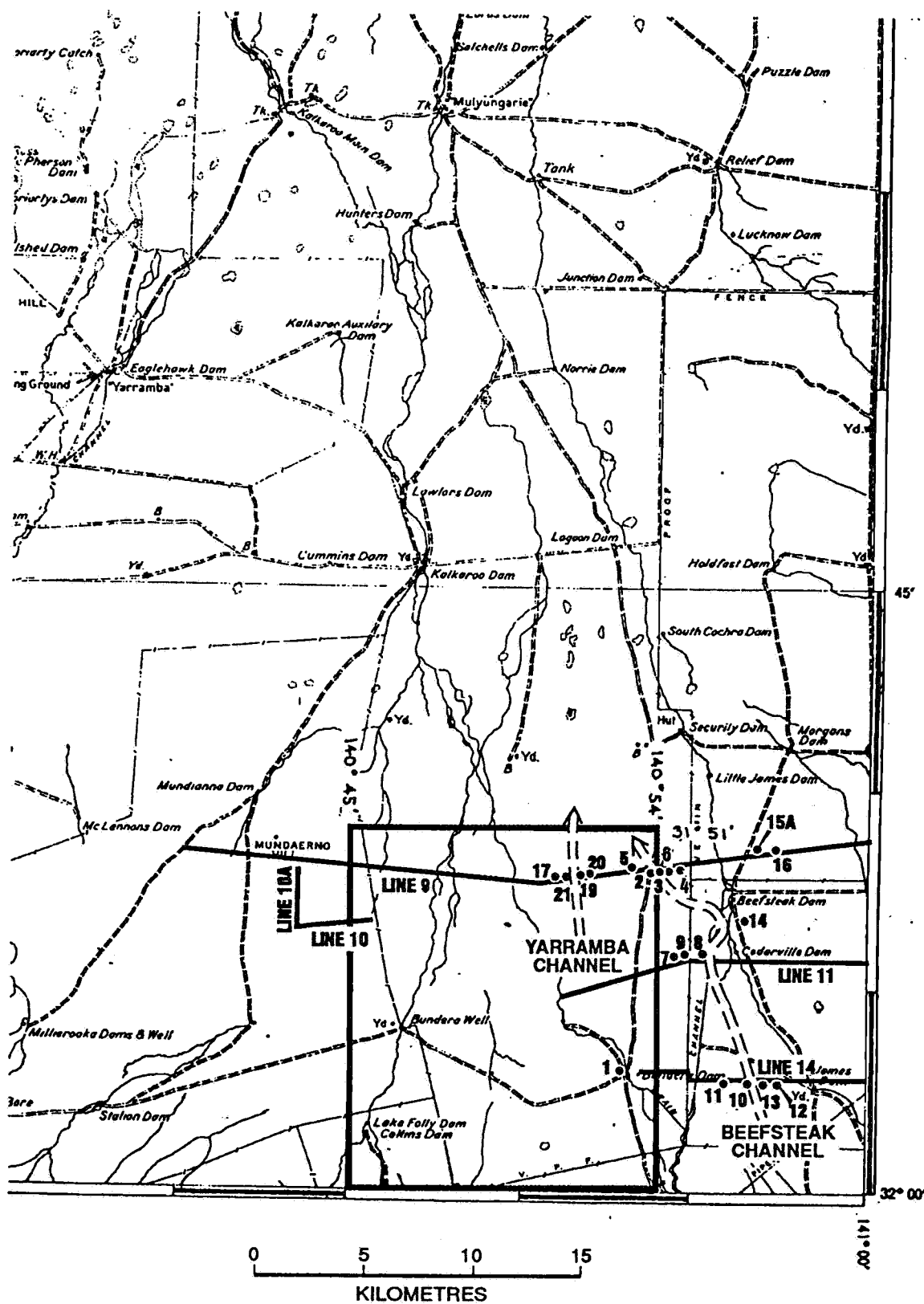
AGE/ROCK UNITS: Tertiary Namba and Eyre Formations of the Tarkarooloo Sub-basin overlying Early Proterozoic basement in south - eastern corner of Frome Embayment.

EXPLORATION SUMMARY: Previously, under EL 121, a programme of reconnaissance resistivity traversing was undertaken with some follow-up open hole drilling (BD 1-16). During April 1976, 5 rotary holes (BD 17-21) totalling 614.7 metres were drilled into an untested channel interpreted on Resistivity Traverse 9. Cuttings were collected at 1.5 metre intervals and all holes were logged for gamma - ray, resistivity and spontaneous potential.

MINERALISATION/PROSPECTS: The drilling confirmed the presence of a Lower Tertiary palaeochannel on Line 9 but no anomalous radioactivity was intersected in this depression believed to be the southern extension of the Yarramba palaeochannel. The upper channel section from 62 to 90 metres consists of light olive, fine grained, quartz sands and light olive grey clays and silts overlying a lower channel section approximately 90 to 120 metres consisting of pale yellowish grey, moderately well sorted, medium to coarse-grained sand with angular quartz grains and minor interbedded kaolinite clay. Granitic wash is present in the very deepest part of the channel and this contains pyrite, haematite, limonite and black humic staining.

Yellow limonitic oxidation on quartz grains demonstrates a geochemical cell has migrated through the channel sands and leached out any uranium formerly present.

DRILLING Five rotary holes (BD 17-21) totalling 614.7 metres.



13. Rotary drill hole location and number (prefix BD)

LINE 14

Resistivity traverse location and number

Figure 80

Applicant / Title Holder: Mines Administration Pty Ltd &  
Teton Exploration Drilling Co. Pty Ltd & Carpentaria Exploration Pty Ltd  
Licence N° : EL 189

DME\_SA 93-1645

TENEMENT: EL 217 (formerly SML 514, ELs 69, 127; followed by ELs 614, 911, 1203, 1487, 1684, 1698, 1860).

AREA: 925 sq km

COMMENCEMENT DATE: 4/11/77

EXPIRY DATE: 3/11/77

COMPANY: MINES ADMINISTRATION PTY LIMITED and TETON EXPLORATION DRILLING CO PTY LTD

ENVELOPE: 2683

REFERENCES: Ellis, G.K., 1977 : Evaluation of Results of Phase 1 Drilling Programme on EL 217 (Lake Namba) - May 1976. Mines Administration Pty Limited (unpublished).

LOCATION: Lake Namba Area

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: BENAGERIE 6935

TARGETS: Sedimentary uranium

AGE/ROCK UNITS: West flank of Benagerie Ridge Quaternary sediments above Tertiary Namba and Eyre Formations resting unconformably on a basement of either Cretaceous clays, Cambrian siltstone/shale or Proterozoic quartz feldspar porphyry.

EXPLORATION SUMMARY: The programme commenced in November 1975 with a reconnaissance resistivity survey by Murdoch Geophysics comprising seven east-west profiles to further delineate the channel located by Tricentrol. Evaluation of past exploration concluded that there was one geochemical cell in two channel sand units and that the prospect of economic uranium mineralisation on the Lake Namba Channel were excellent since no holes had been drilled to date into the redox front.

In May 1976, 27 rotary holes (LN 1 to 26, incl. 16A) totalling 1884.8 metres were drilled with the principal objective of delineating the Lake Namba Channel and the contained uranium mineralisation originally discovered by Tricentrol and to more precisely define the geochemical cell boundaries within the channel especially on bends apparent in resistivity data (c.f. Honeymoon) Holes were levelled, sampled at 1.5 metre intervals and logged for gamma-ray, resistivity, spontaneous potential, and some neutron activity.

MINERALISATION/PROSPECTS: The Lake Namba Channel is 2 to 3 km wide, defined over 20 km with up to 30 metres of Lower Tertiary channel sediments including a basal sand up to 20 metres. It is sinuous with alternating shallow and steeper channel profiles. The Lake Tinko Channel is 1.5 to 2 km wide defined over 10 km with 25 metres of channel sediments including an upward fining basal sand up to 20 metres thick. It has a steeper gradient than Lake Namba and hence a less sinuous course. The Eyre Formation section is divisible into three sub-units: a Basal Sand; a Middle Unit of silt and sandy silt; and an Upper Unit of "blanket sands" unconformably overlying the Middle Unit and interpreted as derived from the west or north west by reworking of Mesozoic or basal Eyre Formation Sands in broad meandering river systems. The Basal Sand in the Lake Namba Channel is



a light grey to white to pale yellow and orange, very fine to medium grained quartzose sand. Pyrite and carbonaceous matter is present in varying amounts in fresh sands. Where altered by oxidising groundwaters they are stained with yellow and/or orange limonite. No oxidation was detected in the Lake Tinko Channel.

By far the most significant uranium mineralisation occurs in the Lake Namba Channel. Most anomalous radioactivity was intersected at the contact of the Basal Sand with basement on the profile LN 16A to LN 1. The best intersection was 0.4 metres at 0.112% e  $U_3O_8$  at 70.4 metres in LN 11 at a redox interface near the channel bank with some roll front similarities. Fairly uniform anomalous radioactivity is found in the Middle Unit indicative of widespread low grade mineralisation of syngenetic or supergene origin. There are spiky gamma responses to 0.025% e  $U_3O_8$  and an average grade over the entire 10 to 15 metre interval of approximately 0.004% e  $U_3O_8$ . The uranium present appears to be preferentially attracted to clays. LN8 and LN 16 A were the most anomalous holes in this unit.

DRILLING: Twenty seven rotary holes (LN 1 to 26, including 16 A) totalling 1884.8 metres.

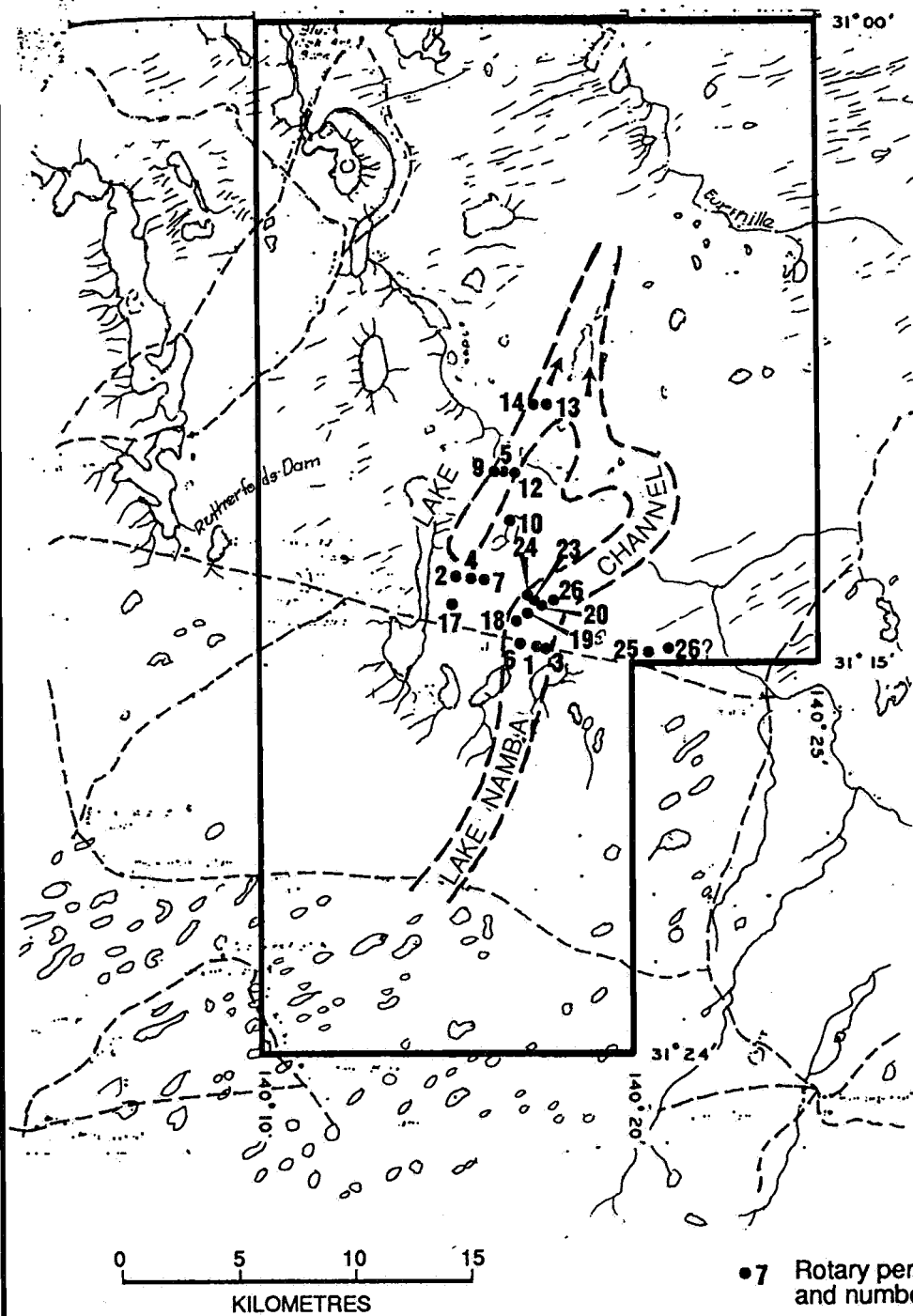


Figure 81

Applicant / Title Holder: Mines Administration Pty Ltd

Licence N° : EL 217

DME\_SA 93-1646

TENEMENT: EL 227 (SMLs 267, 268 514, 543, 544, ELs 42, 45, 59,109, followed by ELs 411, 722, 1065, 1487, 1698)

AREA: 2490 sq km

COMMENCEMENT DATE: 12/1/76

EXPIRY DATE: 11/1/78

COMPANY: CSR Limited

ENVELOPE: 2713, 2809

REFERENCES: Ellis, G.K., 1976 : Phase III Drilling Programme on EL 227 (Billeroo West) - May - June 1976. Mines Administration Pty Limited (unpublished).

Ellis, G.K., 1976: Ore Reserves - Goulds Dam Deposit Mines Administration Pty Limited (unpublished memorandum)

LOCATION: Frome Downs (Billeroo West)

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: CURNAMONA 6834, PASMORE 6835, KALABITY 6934, BENAGERIE 6935

TARGETS: Sedimentary uranium

AGE/ROCK UNITS: Quaternary cover on Tertiary Namba and Eyre Formations resting on a basement of largely Cambrian siltstone and mudstone.

EXPLORATION SUMMARY: Joint venture partners Minad-Teton completed the following exploration programme:

- Two resistivity profiles by Murdoch Geophysics in the north-east of the EL in the search for a northerly extension to the Billeroo Channel.
- A trial detailed resistivity survey by Murdoch in April 1976, east-west traverses across the west bank of the Billeroo Channel centred on the Goulds Dam uranium deposit to test the effectiveness of the method for mapping the edge of the channel and locating channels bends and embayments.
- Phase III rotary drilling in May - June 1976 over portions of the mineralised Billeroo Channel - 54 holes (BW 113 to 166) totalling 7208 metres.
- The rotary drilling of 21 holes (BW 167 to 186 including BW178A) totalling 2886 metres in November - December 1976 to more precisely delineate and test the Curnamona Channel in the south-western sector of the EL.

In both drilling programmes samples were collected at 1.5 metre intervals and logging for gamma ray, resistivity, spontaneous - potential and neutron was undertaken.

**MINERALISATION/PROSPECTS:** The resistivity traverses in the north-east located a possible channel and a broad depression trending north-east but neither appear to be a northerly extension of the Billeroo Channel. The trial detailed resistivity survey did not precisely define the channel banks or channel floor topography as shown by subsequent drilling. An embayment north of Goulds Dam interpreted from the resistivity proved from drilling to be a cut - off anabranch with a basement bar separating it from the main channel. Sands within the anabranch were fresh and barren.

In addition to the holes in the resistivity embayment area drilling at Billeroo was directed at the "terminal lobe" area of the geochemical cell in the Unit 3 sands (C & D). Even after this drilling the redox interface of the terminal lobe had still not been accurately delineated primarily because of the complex geometry of numerous "fingers" of altered ground extending well downstream into a "seepage" zone". Further thick mineralised intervals of relatively low grade were intersected eg BW 118, 2.1 metres at 0.063% e  $U_3O_8$  and B116, 2.6 metres at 0.039% e  $U_3O_8$  and 1.3 metres at 0.06% e  $U_3O_8$ .

The third area drilled in the Billeroo Channel was in the vicinity of PMX 29, 29a situated about one km north of Goulds Dam. Drilling was on six profiles each 200 metres apart, with drill holes generally at 60 metres spacing along profiles. Thick low grade mineralisation was encountered over a 1200 metre length of channel and in a broad area 3 km further north eg BW 157, 4.5 metres at 0.04% e  $U_3O_8$  in Sand B. Some mineralisation was also encountered in Sand A.

Overall the channel was shown to be reasonably straight but slightly sinuous with several mid channel bars. The Eyre Formation consists of two prospective sands units 1 and 3, with the lower Unit 1 being separated from Unit 3 by a clay. These units may each in turn be subdivided into two partially distinct sand units (A & B in Unit 1, C & D in Unit 3). Lithologically the sands are similar although there is a slight degree of upward fining.

The sedimentary features of the braided stream environment of the Billeroo palaeochannel appear to be intimately related to the features of the geochemical cells within each of the sands units, and their associated uranium mineralisation. Variations in permeability related to individual channels within the braided channel system have determined the path of the geochemical cell within each sand unit, and hence the locus of deposition of the uranium mineralisation.

Drilling in the Curnamona Channel has defined it over 35 km. It is up to 10 km wide and contains up to 65 metres of channel fill sediments with a basal sand up to 15 metres thick. It extends from the south-west of EL 227 in an easterly to northeasterly direction before eventually joining the Billeroo Channel. The basal sand has a neutral to fresh appearance with humic staining on 10% of grains, trace to common pyrite and trace carbonaceous matter. No uranium mineralisation of economic significance was intersected in the channel sands of the area tested. Carbonaceous clays associated within the limestone member of the Namba Formation showed a best results of 0.034% e  $U_3O_8$  over 0.6 metres in BW182.

In September 1976 the uranium content of the Goulds Dam Deposit was revised to allow for possible mining by in situ leaching. Unit 1 was estimated to contain 276.5 tonnes e  $U_3O_8$  (average grade 0.095%  $U_3O_8$ , average thickness 2.0 m). Unit 3 was estimated to contain 1,150.9 tonnes e  $U_3O_8$  (average grade 0.139% e  $U_3O_8$ , average thickness 1.6 m).

**DRILLING:** Seventy-five rotary holes (BW 113 to BW 186 and BW 178 A) totalling 10094 metres.

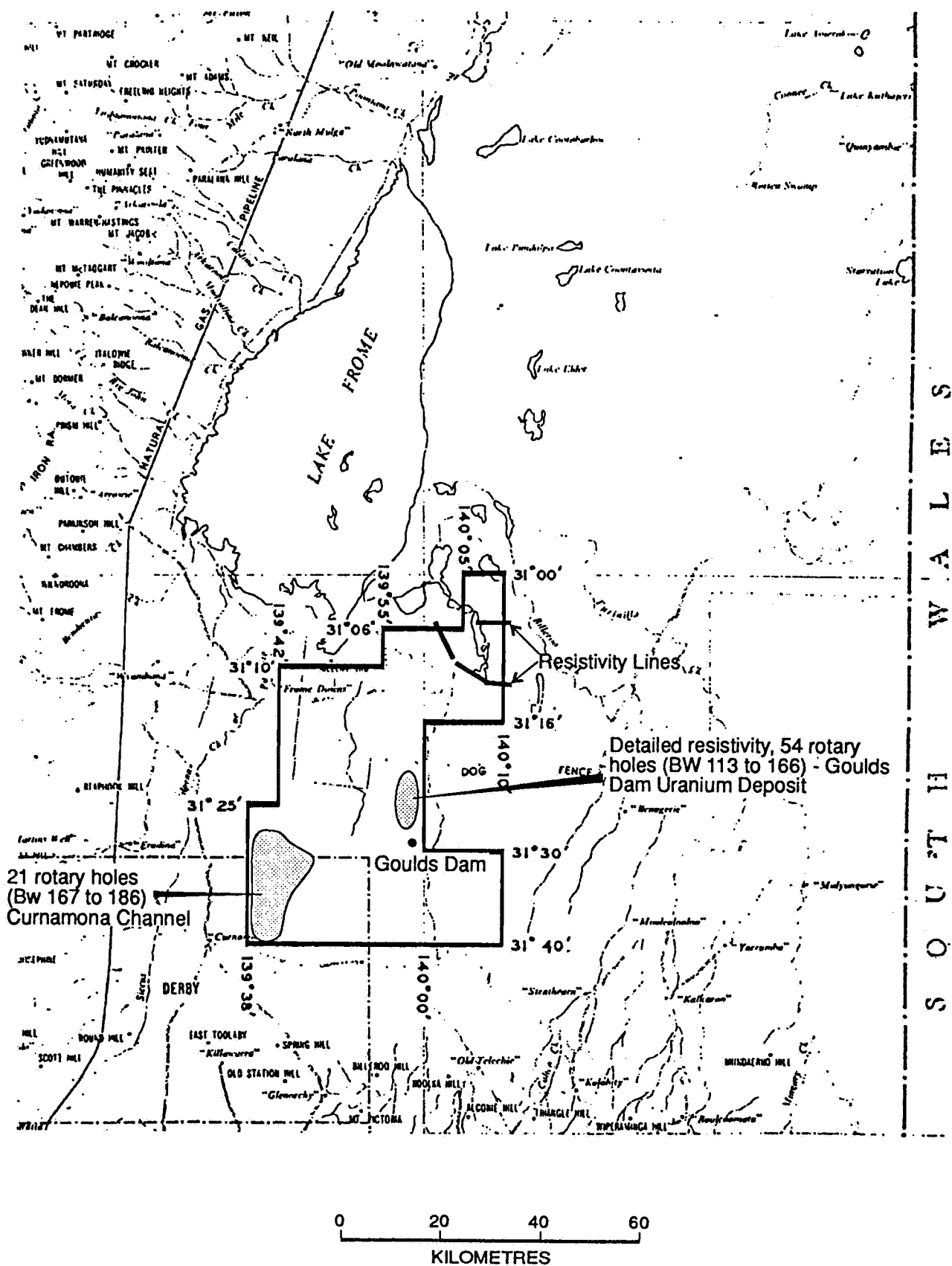


Figure 82

**Applicant / Title Holder:** CSR Limited

**Licence N° : EL 227**

DME\_SA 93-1647

5810412.22

<u>TENEMENT:</u>	EL 238 (formerly SMLs 279, 415, 580, 696, EL 98; followed by ELs 412, 721, 1060, 1382, 1763).
<u>AREA:</u>	1968 sq km
<u>COMMENCEMENT DATE:</u>	8/3/76
<u>EXPIRY DATE:</u>	7/3/78
<u>COMPANY:</u>	SEDIMENTARY URANIUM NL
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATION:</u>	East Kalkaroo (Mulyungarie)
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	MULYUNGARIE 7034; LAKE CHARLES 7035
<u>TARGETS:</u>	Sedimentary uranium,
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CONFIDENTIAL ENVELOPE
<u>MINERALISATION/PROSPECTS:</u>	

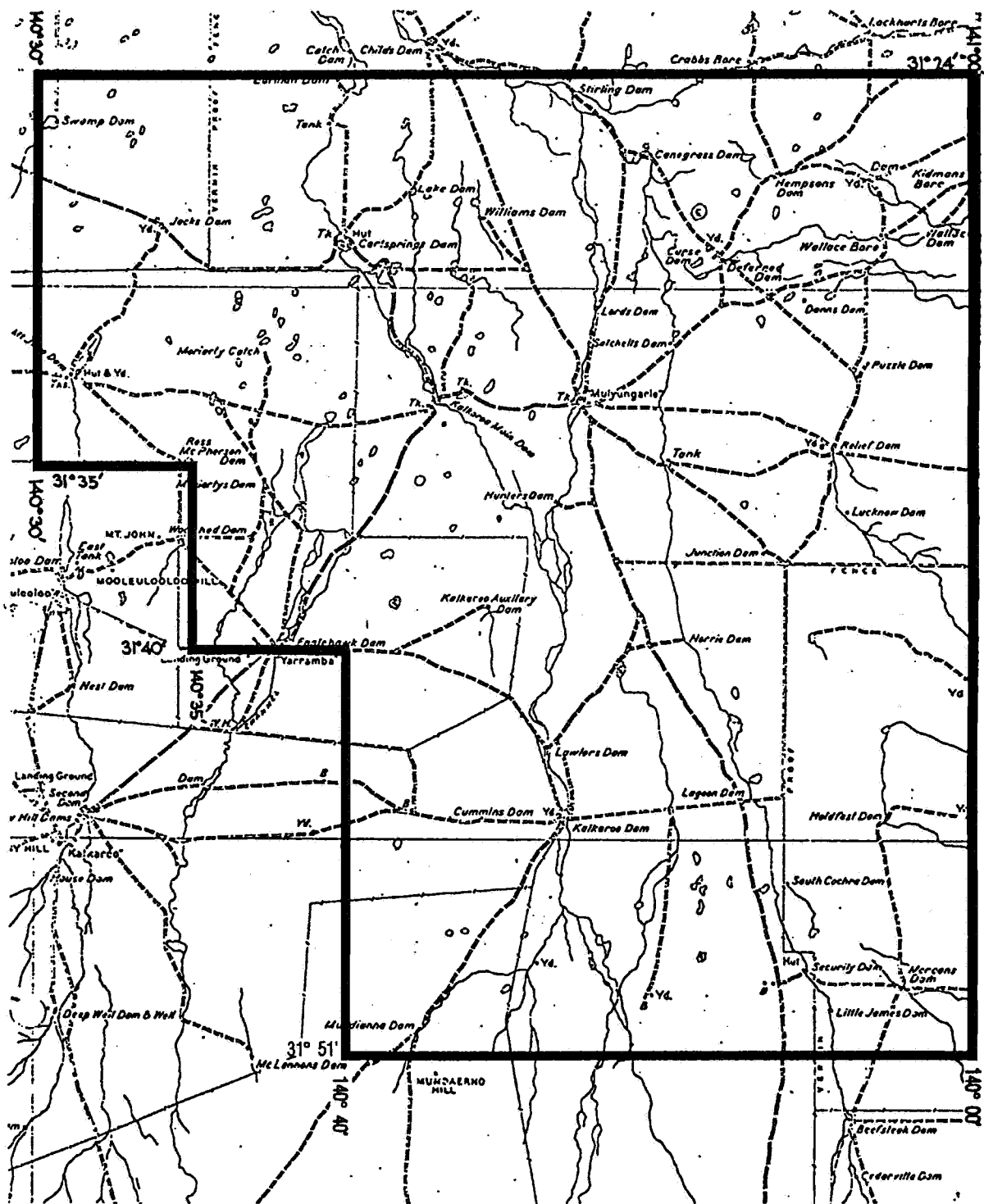


Figure 83

Applicant / Title Holder: Sedimentary Uranium N.L.

Licence N° : EL 238

DME\_SA 93-1648

**TENEMENT:** EL 254 (formerly SML 267, Rudd; SML 544, ELs 42, 168; followed by ELs 970, 971, 1738)

**AREA:** 716 sq km reduced to 105 sq km on 2/7/77

**COMMENCEMENT DATE:** 2/7/76

**EXPIRY DATE:** 1/7/78

**COMPANY:** MINES ADMINISTRATION PTY LIMITED and TETON EXPLORATION DRILLING CO PTY LTD

**ENVELOPE:** 2818

**REFERENCES:** Ellis, G.K., 1977: Evaluation of Results of Drilling Programme on Exploration Licence 254 (Curnamona) November/December 1976 Mines Administration Pty Limited (unpublished)

**LOCATION:** Curnamona

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** South-west corner of Frome Embayment. Quaternary cover over Tertiary Namba and Eyre Formations resting on a basement of Cambrian siltstone/shale in the northern two-thirds and minor Proterozoic (Adelaidean?) slate in extreme south.

**EXPLORATION SUMMARY:** A reconnaissance resistivity survey was completed on 5 east-west lines and one north-south line by Murdoch Geophysics in mid - 1976. In November - December 1976, 22 rotary holes (C1 to C22) totalling 3115 metres were drilled to further define the Curnamona Channel and other channels (Killawarra?) located previously under SMLs 267, 544 and EL 42. All holes were surveyed and levelled together with those previously drilled by Rudd (SML 267) and Esso (EL 42). Samples were collected at 1.5 metre intervals and holes were logged for gamma ray, resistivity and spontaneous potential. The majority of holes were drilled in the area north of Curnamona Homestead.

**MINERALISATION/PROSPECTS:** The north-easterly trending Curnamona Channel is poorly developed in EL 254. It is 5 to 10 km wide, defined over 10 km and contains up to 65 metres of channel fill sediments. It has a low gradient, meanders and shows increased sinuosity over time. Five units can be recognised in the Eyre Formation from the base upwards:

- (i) Basal Sand - up to 15 metres of light grey to light grey brown fine to medium grained quartzose sand. Neutral to fresh with humic staining, trace to common pyrite, trace carbonaceous matter.
- (ii) Lower Clay - up to 5 metres thick.
- (iii) Middle Unit - up to 10 metres of light grey, fine to medium grained quartz sand with neutral appearance and locally trace to common fine pyrite.



(iv) Upper Clay.

(v) Upper Unit - interbedded sand, silt and clay.

Holes C3 and C6 in the southern part of the EL intersected immature sands up to 70 metres thick considered to be locally derived.

The Miocene Namba Formation contains a 5 to 9 metre thick limestone in the area north of Curnamona Homestead.

Drilling did not intersect any significant uranium mineralisation or evidence of oxidation in the basal sands.

There were minor gamma responses in the neutral to fresh sands of the channel section and with carbonaceous clay interbeds in the lower half of the Namba Formation limestone unit. The Namba uranium was probably introduced during deposition of the enclosing sediment.

The hard rock uranium potential of the Spring Hill Prospect was assessed and dismissed as being too small.

**DRILLING:** Twenty-two rotary holes (C1 to C 22) totalling 3115 metres.



**TENEMENT:** EL 259 (formerly SMLs 118, 151, 172, 209, 209A, 210, 210A, 269, 562, 677, 714, ELs 47, 62, 132: followed by ELs 377, 423, 597, 1004, 1412, 1786, 1864)

**AREA:** 2345 reducing to 1639 sq km

**COMMENCEMENT DATE:** 13/9/76

**EXPIRY DATE:** 12/9/77

**COMPANY:** CARPENTARIA EXPLORATION COMPANY PTY LTD

**ENVELOPE:** 2808, 2809, 2844, 3203

**REFERENCES:** Successive quarterly reports.  
Amdel, 1997. Honeymoon In-Situ Leach Project. Phase 1 Tests Interim Report (unpublished).  
Hunkin, G.G., 1976. Test Procedures for In-Situ Uranium Leaching, of the MTA Deposits of South Australia (unpublished).  
SADME Rept Bk. No 803. An assessment of hydrogeology of the Southern Frome Embayment with particular respect to possible exploitation of uranium deposits.

**LOCATION:** Kalabity

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934, MULYUNGARIE 7034

**TARGETS:** Base metals and sedimentary uranium.

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup base metals. Quaternary and Tertiary sediments overlying Cretaceous and Precambrian rocks are host to uranium roll-front deposits.

**EXPLORATION SUMMARY:** The licence area was subdivided with uranium exploration being conducted in joint venture with Mines Administration Pty Limited in the eastern portion. Base metal exploration included collecting 591 rock chip samples and drilling 228 shallow rotary percussion holes.

Evaluation of the Honeymoon sedimentary uranium deposit continued in the South Eagle portion of EL 259.

Three holes were drilled and "push-pull" leaching tests conducted using ammonium bicarbonate and hydrogen peroxide as reagents.

The uranium content of the deposit was reassessed assuming possible extraction by in situ leaching methods and found to be 2522.8 tonnes eU<sub>3</sub>O<sub>8</sub>.

## MINERALISATION/PROSPECTS:

### (i) Base Metals

591 rock chip samples were collected and analysed for Cu, Zn with many also analysed for Pb, Co, Mo, Ag and Ba. 228 rotary percussion holes were drilled as geochemical tests for Cu Pb Zn Co at Waukaloo, Burden's Dam, Nancatee South, Eagle Well, Ironstone Dam, Mt Howden and Billeroo North. The geochemical response was generally low with maximum values of 2600 ppm Cu, 1500 Pb, 3700 Zn, 170 ppm Co, in cemented ironstone at Ironstone Well East.

Ground magnetics (Fluxgate M 700) on 5 lines 1 km long covering 600 m width was completed at North Billeroo. 16.5 km of transient electromagnetics (TEM) was conducted with significant responses at Dome rock and Mt Howden.

Air photo, aeromagnetic and structural lineaments were compiled at 1:20 000 scale. Geological mapping at the same scale covering the entire EL was also collated with some maps at 1:5 000 drawn up for selected areas.

### (ii) Sedimentary Uranium

At Honeymoon "push-pull" leach tests in 3 cored holes indicated high recovery from non-pyritic mineralisation with lower recovery with increased pyrite content. Amdel conducted the trials under the direction of US consultant Mr G G Hunkin. A three-stage series of bottle roll tests was carried by Amdel on core from the "push-pull" holes. SADME drilled a cable tool hole to investigate hydrogeology and concluded that in situ leaching techniques pose no threat to the aquifers in the Frome Embayment provided that appropriate well construction methods are used.

## DRILLING:

### (1) Base Metals

228 shallow percussion holes equivalent to RAB geochemical tests (3 471 metres).

### (2) Sedimentary Uranium

Three holes (HC 1, HC 2A, HC 3) were cored to minimum depths of 104, 74.2 and 105 meters (283.2 metres). End of hole depths not recorded. SADME cable tool hole QD14 drilled to 122.3 metres.

i.e. rotary drilling equivalent four holes for 405.5 metres.

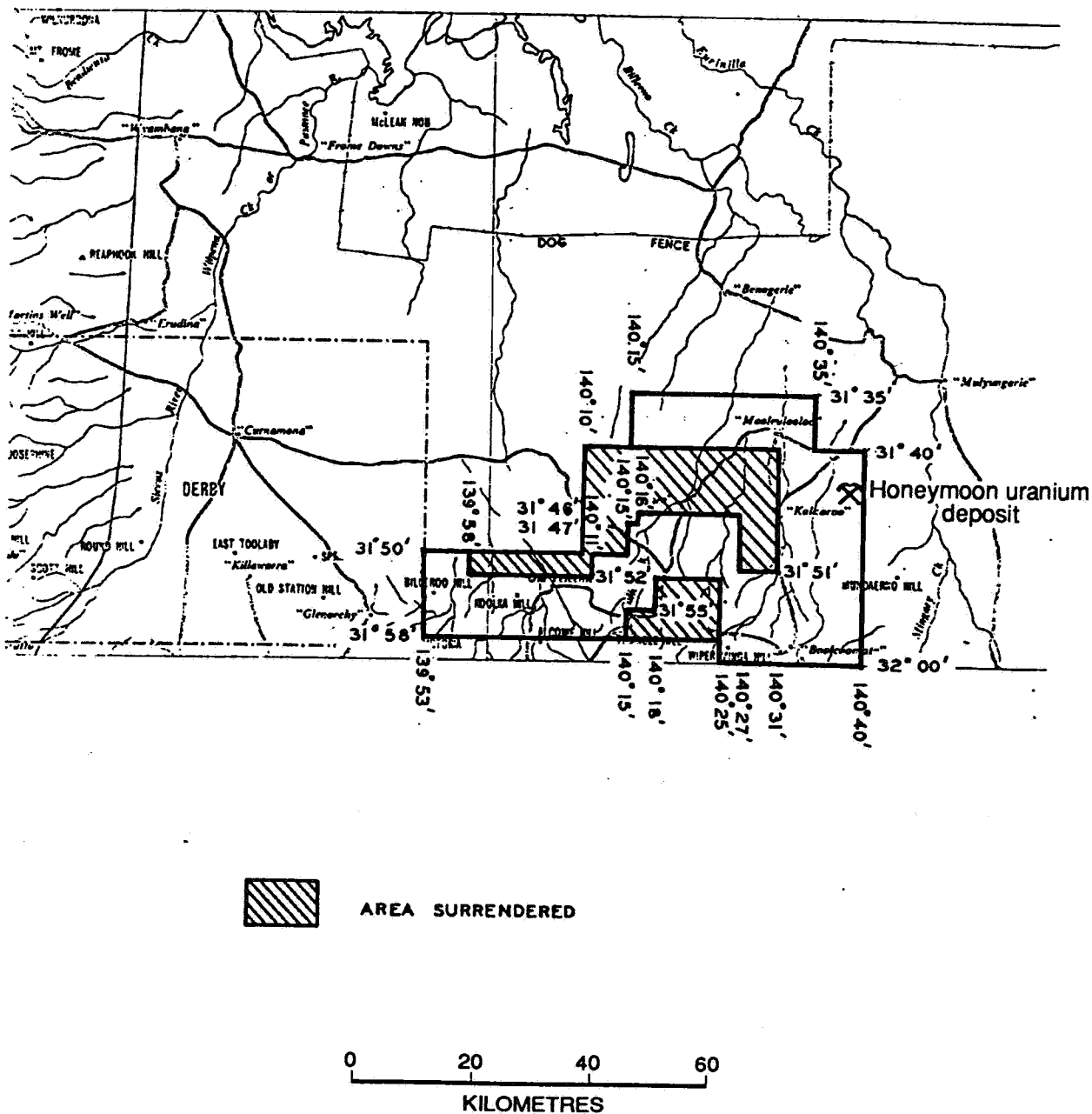


Figure 85

Applicant / Title Holder: Carpentaria Exploration Pty Ltd

Licence N° : EL 259

DME\_SA 93-1650

**TENEMENT:** EL 263 (followed by ELs 450, 848 and 1175)

**AREA:** 2 205 sq km

**COMMENCEMENT DATE:** 23/9/76

**EXPIRY DATE:** 22/9/78

**COMPANY:** ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC

**ENVELOPE:** 2847, 4301

**REFERENCES:** Yearly Report of Exploration to September 23, 1977 EL 263 South Australia

Ashley, P.M., Cotton, B.J., Craven, B.L., Fraser, N: 1978: Plumbago EL 263. Annual Report to September 23, 1978 Esso Exploration and Production Australia Inc

**LOCATION:** Plumbago

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934, WINNININNIE 6833, OLARY 6933, MINGARY 7033

**TARGETS:** Uranium, copper, lead, zinc

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama & Supergroup overlain by Neoproterozoic Adelaidean rocks.

**EXPLORATION SUMMARY:** Application for this very large Exploration Licence was lodged with the objective of exploring principally for uranium deposits localised at the Adelaidean-Willyama unconformity and bulk tonnage low grade uranium mineralisation in granitic rocks at Crocker Well (Rossing SW Africa model). This was the main thrust of exploration for the full two years of the licence to September 1978 after which the Crocker Well and Radium Hill areas were relinquished for the new EL 450. More than 90% of the exploration reported under relinquishment of part of EL 450 (Envelope 4301) was undertaken during the two year term of EL 263.

Exploration in 1976 began with uranium reconnaissance in the form of:

- (i) **Track-etch surveys** of the Adelaidean-Willyama contacts extending from Plumbago to Radium Hill and along major lineaments in the Ethiudna-Plumbago and Mount Victoria Hut areas. A total of 949 detectors were placed at 400m spacings along the contacts and 200m spacings along the lineaments. Soil samples to be analysed for Cu, Pb, Zn, U<sub>3</sub>O<sub>8</sub> were collected from each site auger hole and a scintillometer reading was taken at each location. 26 anomalies were followed up with 1:2000 and/or 1:5000 geology leading to selection of four areas, Plumbago Homestead (see also EL 331), Perryhumuck Hut, Plumbago Airstrip and Ethiudna North for detailed follow up in form of 1:2000 and/or 1:5000 geology, track-etch, radiometrics, magnetics (all but Ethiudna) and drilling of limited number of holes at each property to test radon anomalies (see later under Drilling). None of the holes intersected any significant mineralisation.

- (ii) Helicopter Radiometric surveys involving the flying of Willyama-Adelaidean contacts on two lines 500m apart at 60-70m ground clearance for 760 line km ie. 380 km of contact. Four anomalous areas, Dead Horse Corner Dam, Montstephen Well, Doughboy Well and Pennynellie Springs were selected for helicopter grid flying (total 358.7 line km). There is record of only one anomaly (7471 near Doughboy Well) being ground checked with negative results.
- (iii) Regional Geological Mapping 1:83000 photogeological mapping of outcropping Willyama Supergroup in South Australia by Loxton Hunting and 1:20000 mapping of the South Plumbago, Weekeroo-Walparuta and Ameroo Hill regions.

Concurrently there was a programme involving:

- (iv) Appraisal of Miscellaneous Base metal and Uranium Prospects Mutooroo West Copper and Putts Well Copper by 1:2400 and 1:1200 geology respectively and Mindamereeka Hill uranium area by 1:2000 geology and ground radiometrics. No further work was undertaken at these localities under this title.

In 1977 and 1978 very intensive uranium exploration was undertaken in the Crockers Well-Ninnerie-Glenorchy area (well described in Envelope 4301). This initially involved reconnaissance in the form of:

- Helicopter Radiometric Surveys
  - (a) Crockers Well-Ninnerie Area in December 1977-January 1978 involving 870 line km, line spacing 125m, terrain clearance 50m. Follow-up of 91 anomalies.
  - (b) Glenorchy Area in June 1978 involving 605 line km, line spacing 150m, terrain clearance 50m. Follow-up of 33 anomalies.
  - (c) Binberrie Hill and Outalpa areas.
- Track-Etch Radon Survey at Crockers Flats (defined as the general area north of line joining Crockers Original to Crockers Main Eastern) -991 track-etch cups were placed on 200m x 100m grid within a 30 sq km area with simultaneous soil sampling for Cu, Pb, Zn, U<sub>3</sub>O<sub>8</sub>.

Following the track-etch survey at Crockers Flats a programme of rotary-percussion drilling was undertaken to penetrate the shallow cover (138 holes, 2583m) leading to the discovery of the largely covered Junction Prospect near Crocker Well. An intensive programme of percussion drilling then followed at Junction (122 holes), Crockers Original (82 holes), Crockers Main Eastern and Central (38 holes) and Crockers Western and South-Western (26 holes). Limited diamond drilling was undertaken at these four prospects (13 holes, 1293m). For statistics from May 1977 to March 1978 see drilling tabulation. All holes were radiometrically logged and assayed for U<sub>3</sub>O<sub>8</sub> in one metre intervals. In all 419 holes totalling approximately 24863m were drilled in the general Crockers area to test the brannerite mineralisation hosted in the sodic igneous rocks (adamellite, alaskite).

The above prospects together with other uranium occurrences at Camp South, Black Boy, Camels Hump, Ninnerie Dam, Ninnerie East, Ninnerie Summit, Ninnerie Creek, Windamerta South and Mindamereeka Hill were examined by geological mapping, magnetics and radiometrics as detailed on the summary table. Metallurgical tests on the Crockers mineralisation was completed.

Geological mapping ranging from 1:1000 prospect scale to 1:20 000 for the Plumbago Block (2847 XII 1 and 2) was extensive, detailed and well documented.

The uranium programme overlapped very slightly into the term of follow-on title EL 450. This included dewatering of Crocker Main Eastern shaft and workings and underground mapping and sampling. The Binberrie Hill/Outalpa airborne radiometrics was flown late in the term of EL 263 and not reported under that title.

The results of the pattern percussion drilling programmes are well summarised in Env. 4301 (EL 450). Drilling showed widespread erratically distributed low grade uranium (brannerite absite) mineralisation in range 0.5 to 1.0 lb/ton  $U_3O_8$  (0.02%-0.04%). Drilling data was apparently placed on computer at University of Adelaide but no ore reserve estimates are reported.

Junction Prospect shows more widespread but generally lower grade mineralisation than others, with best intersections 23m at 533 ppm (E118A) and 28m at 409 ppm  $U_3O_8$  (E 214).

Cumulative expenditure for the two years was \$1.37 million.

## MINERALISATION/PROSPECTS

Uranium mineralisation in the Crockers Well - Mount Victoria area is virtually confined to a north-east trending belt of sodic plagioclase rich anatectic granitoids and gneisses surrounded by an aureole of potash feldspar rich granitoids devoid of uranium minerals. The most common host for uranium is trondjemite consisting of bluish quartz and white soda feldspar, and white soda alaskite and sodic gneiss. Brannerite occurs erratically as an accessory mineral in trondjemite or soda alaskite or in fractures, breccias or quartz veins nearly always accompanied by rutile, apatite, phlogopite and bluish quartz. Traces of fluorite, monazite or tourmaline are also present.

Davidite occurs in quartz rich pegmatite at the Billeroo Prospect and 2 km west of Crockers Original Prospect.

No significant uranium discoveries beyond the known Crockers occurrences and the Junction Prospect appear to have been located from the intensive regional prospecting although subeconomic occurrences are widespread in the area covered by helicopter radiometrics.

No ore reserve estimates appear to have been made but the data are presented in tables of significant intercepts of chemical and radiometric  $U_3O_8$  determinations and plans and sections showing these intercepts at a cut-off of 5m x 300 ppm  $U_3O_8$ . No geological correlation of intercepts was attempted.

The vast majority of drilling showed intersections of less than 250 pm  $U_3O_8$  with intervals greater than 500 pm being most uncommon. Best chemical intersections were very localised at Main Eastern with 20m at 2657 ppm (X1), 25m at 1001 ppm (X2), 24m at 1605 ppm (D1) and 30m at 1387 (D3). Radiometric assays were generally lower. Crockers Original showed next best results with best 8m at 1088 ppm (Z1).



## DRILLING:

### Crockers Well Uranium Area 1977-78

#### Percussion Drilling

Prospect	Hole Nos	Number	Metres
Crockers Main Eastern and Central	X1-X38	38	3140
Crockers Original	Z1-Z82	82	7200 approx
Crockers Western and Southwestern Junction	Y1-23, Y26-28 E139-153, E115A, E117A, E62A-78A(6), E154-238, E250- 264 excluding E254	26 122	2184 8508 approx
Crockers Flats (including Junction)	E1-138	138	2538
Sub-total		<hr/> 406 holes <hr/>	<hr/> 23570 metres <hr/>

#### Diamond Drilling

Crockers Main Eastern and Central	D1, D2, D3, D11	4	388.1
Crockers Original	D4, D7, D10, D13	4	396.8
Crockers Southwestern Junction	D9 D5, D6, D8, D12	1 4	98.0 410.3
Sub-total		<hr/> 13 holes <hr/>	<hr/> 1293.2 metres <hr/>

#### Other Prospects (Radon Anomalies) 1977

#### Percussion Drilling

Perryhumuck Hut	PE1	1	94.0
Ethiudna North	EN1-4	4	198.0
Plumbago Homestead	PH1-2	2	159.0
Plumbago Airstrip	PA1-4	4	140.0
		<hr/> 11 holes <hr/>	<hr/> 591.0 metres <hr/>

#### Combined Total:

417 percussion drill holes totalling 24161 metres approx.  
13 diamond drill holes totalling 1293.2 metres.

Note: All drilling on OLARY.

**PLUMBAGO EL 263 ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC**

<b>PROSPECT OR AREA</b>	<b>GEOLOGY SCALE</b>	<b>MAGNETICS</b>	<b>TRACK- ETCH</b>	<b>AREA KM<sup>2</sup></b>	<b>RADIOMETRICS</b>	<b>COMMENTS</b>
Willyama Block						
Photogeology	1:83000			8787		
Weekeroo-						
Walparuta	1:21000			216		M F Foy
Ameroo Hill	1:20000			24		
Region						
South Plumbago						
Region	1:20000			45		
Plumbago Block	1:20000			310		High quality, location of
						uranium prospects.
Ninnerie Area	1:10000			64		
Crockers Well						
Area	1:10000			63		
Crockers Flats	1:5000	1:5000	1:5000	30	1:5000	Flats are north of Main
						eastern-Original line.
Crocker Central-						
Main Eastern	1:1000	1:1000		0.3	1:1000	Uranium
Crockers South-						
western-Western	1:1000	1:1000		0.3	1:1000	Uranium
Crockers Original	1:1000			0.24	1:1000	Uranium
Crockers Junction	1:1000			0.18	1:2000	Uranium
Camp South	1:1000			0.44	1:1000	Uranium
Blackboy	1:1000			0.09	1:1000	Uranium 500m east of
						Main Eastern Crockers
Camels Hump	1:5000			6		
Ninnerie Area		1:5000			1:5000	
Ninnerie Dam	1:2000			0.16	Uranium	
Ninnerie East	1:2000			0.15	1:2000	Uranium
Ninnerie Summit	1:2000			0.14	1:2000	Uranium
Ninnerie Creek	1:2000				1:2000	Overlap into EL 450.
						Uranium
Glenorchy Area	1:5350			36		3 sheets (Curnamona
						1:250 000)
Windamerta South	1:1000			0.24	1:1000	Overlap into EL 450
						Uranium
Plumbago						
Homestead	1:5000	1:5000		4		Follow-up of Track-Etch
						anomalies
Plumbago Airstrip	1:5000	1:5000	1:5000	3		Follow-up of Track-Etch
						anomalies
Perryhumuck Hut		1:5000	1:5000	0.3		Follow-up of Track-Etch
						anomaly
Ethuidna North	1:2000		1:2000			Follow-up of Track-Etch
						anomaly
Ethuidna Mine	1:5000	1:5000		0.6	1:5000	Maps not present in
						envelopes 2847 and 4301
Mutooroo West						
Copper Mine	1:2400			1.7		L G Nixon
Putts Well Copper	1:1200			0.12		L G Nixon
Mindamereeka Hill	1:2000			0.16		Uranium occurrence. Map
						not present in envelopes
						2847 and 4301

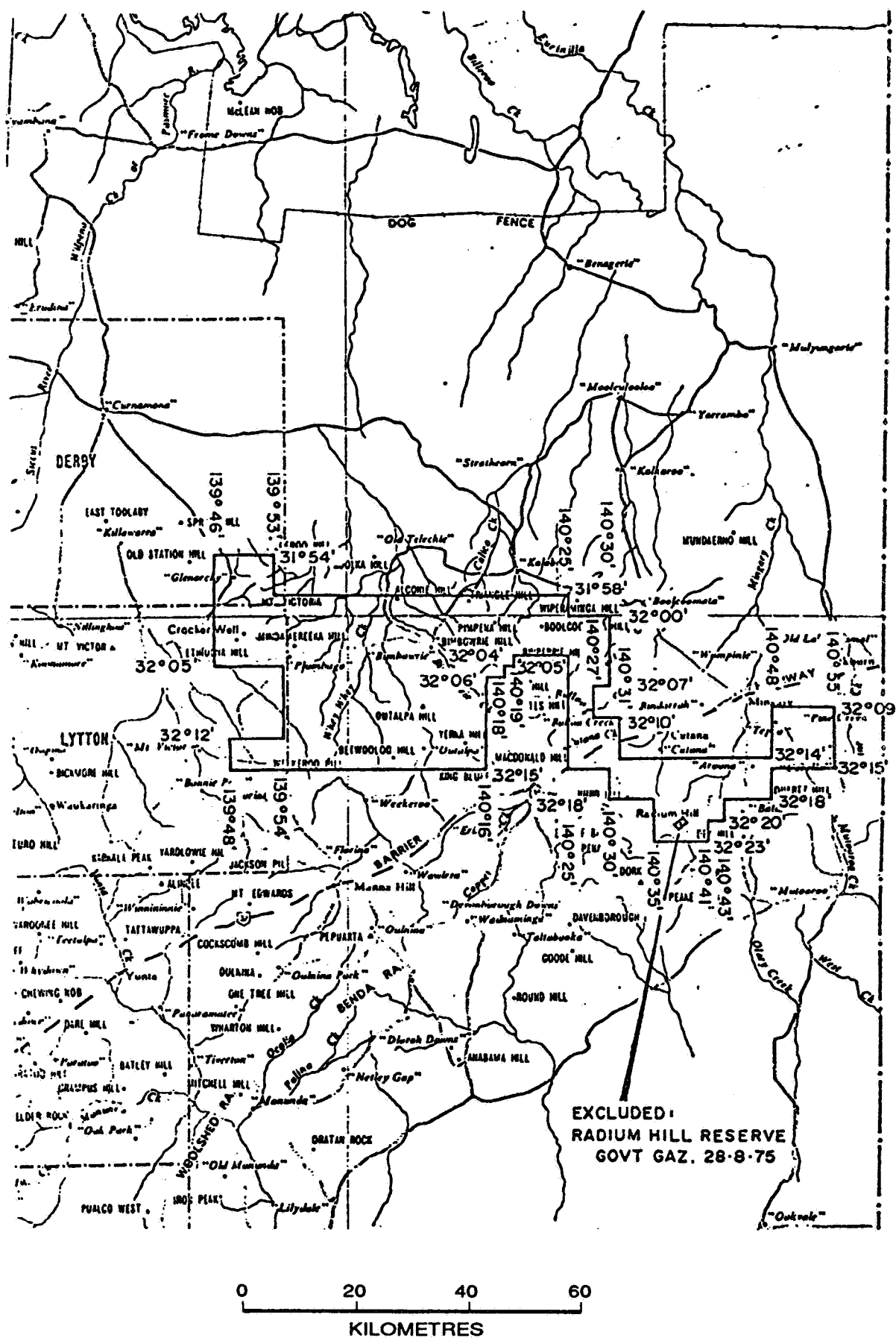


Figure 86

Applicant / Title Holder: Esso Exploration and Production Aust. Inc.

Licence N° : EL 263

DME\_SA 93-1651

**TENEMENT:** EL 278 (formerly SMLs 273, 438; followed by ELs 970, 971, 1307, 1444)

**AREA:** 1560 sq. km

**COMMENCEMENT DATE:** 14/1/77

**EXPIRY DATE:** 13/1/79

**COMPANY:** MINES ADMINISTRATION PTY LIMITED, TETON EXPLORATION DRILLING CO PTY LTD AND CARPENTARIA EXPLORATION COMPANY PTY LTD

**ENVELOPE:** 2948

**REFERENCES:** Wecker, R., 1979: Final Report of Exploration Licence 278 (Koonamore) South Australia

**LOCATION:** Mount Victor

**1:250 000 SHEET:** OLARY, CURNAMONA, ORROROO

**1:100 000 SHEET:** WINNININNIE 6833, CURNAMONA 6834

**TARGETS:** Sedimentary uranium.

**AGE/ROCK UNITS:** Cainozoic sediments overlying a basement of Adelaidean rocks

**EXPLORATION SUMMARY:**

The objective was to explore for sedimentary uranium in possible Tertiary sands preserved in intermontane basins under the Koonamore Plains between the Willyama Block and the Frome Embayment. The work programme involved a reconnaissance resistivity survey of 100 km on four largely north-south lines in the eastern central and western parts of the EL. Then followed the drilling of 16 rotary holes (K1 to K16) totalling 957.2m, most being drilled in the northern sector of the licence west of the outcropping Willyama rocks near Killawarra HS. Literature review of uranium potential in Willyama Block.

**MINERALISATION/PROSPECTS:** The resistivity survey lead to drilling of the maximum thicknesses of Cainozoic sediments which proved to be a limited Quaternary section of perhaps Pliocene to Recent age. Surficial deposits were very thin overlying Adelaidean rocks in the central and western parts of the EL. Suspected channelling from resistivity interpretation in the northern part of the EL was found to be thicker sections of highly weathered Adelaidean sediments. Sands were intersected in only one hole, K16 about 5.5 km south of "Killawarra" where depth to basement was about 100m. The entire Cainozoic section of limited Quaternary overlying deeply weathered Adelaidean sediments was derived from Adelaidean and strongly oxidized. No anomalous radioactivity was intersected. It was concluded there was no potential for sedimentary uranium and that the Willyama rocks of limited area had been adequately explored.

**DRILLING:** Sixteen rotary holes (K1-16) totalling 957.2 metres.  
Eight holes (K9-16) totalling 581.9 metres on CURNAMONA.

Applicant / Title Holder: Mines Administration Pty Ltd,  
Teton Exploration Drilling Co. Pty Ltd, Carpentaria Exploration Co. Pty Ltd  
Licence N° : EL 278

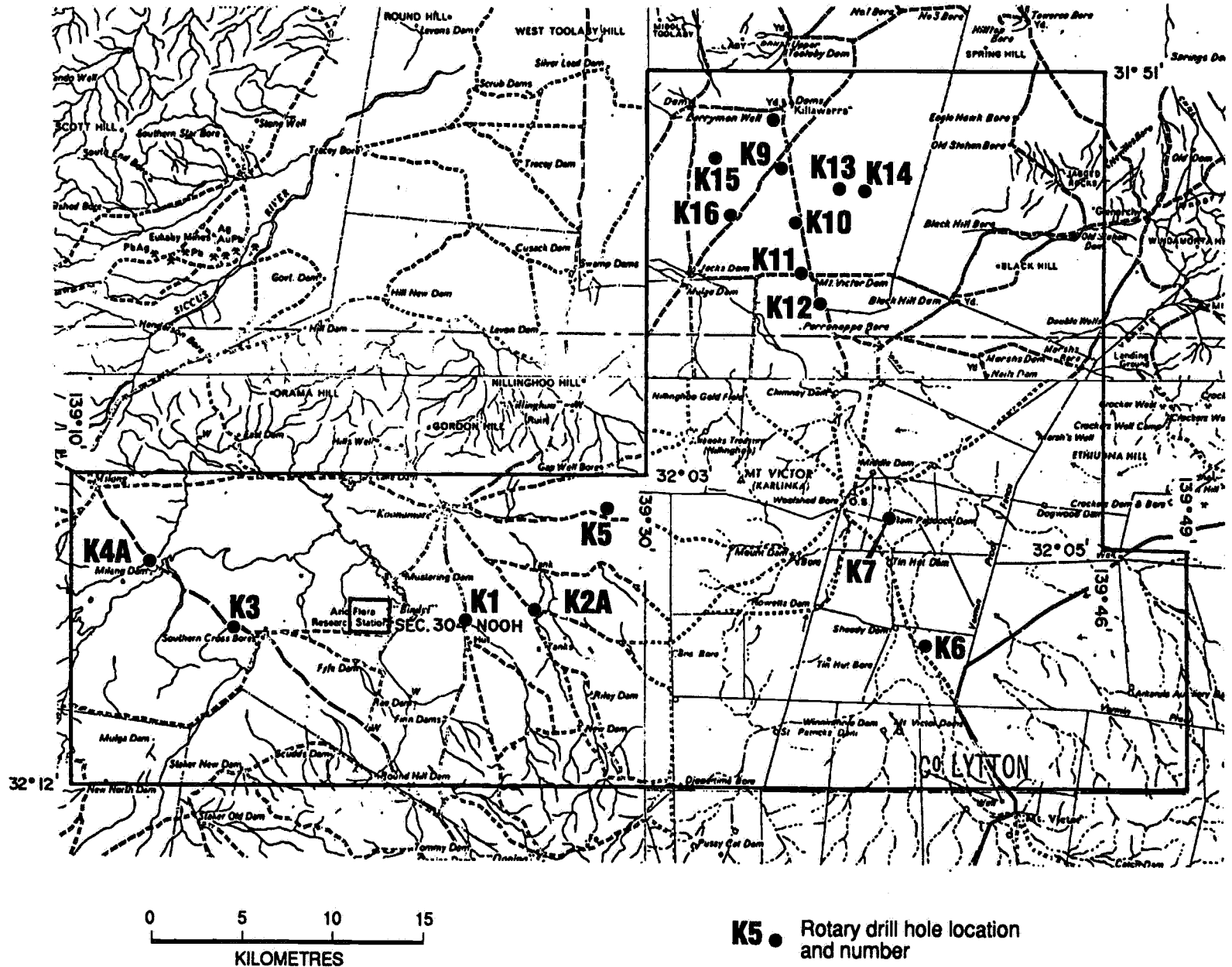


Figure 87

**TENEMENT:** EL 296 (formerly SML 414, 697, Sedimentary Uranium, and EL 89 Southern Ventures; followed by Els 522, 911, 957, 970, 1203, 1352, 1391, 1487, 1684, 1698, 1751)

**AREA:** 571 sq km reduced to 351 sq km on 22/3/78

**COMMENCEMENT DATE:** 23/3/77

**EXPIRY DATE:** 22/3/79

**COMPANY:** MINES ADMINISTRATION PTY LIMITED and TETON EXPLORATION DRILLING CO. PTY LTD.

**ENVELOPE:** 2994, 3683

**REFERENCES:** Burns, S.D., 1980: Exploration Licence 296 (Ethelmer) Relinquishment Report on Relinquished Portion for period 23.3.77 to 22.3.79.

Burns, S.D., 1980: Final Report EL 296 (Ethelmer) Mines Administration Pty Limited (unpublished)

**LOCATION:** Ethelmer

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934, BENAGERIE 6935

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Quaternary sediments over Tertiary Namba and Eyre Formations unconformably overlying predominantly Cambrian red-brown siltstone shale basement.

**EXPLORATION SUMMARY:** Resistivity traversing totalling 89 km on 5 lines (E1 to E5) was completed by Murdoch Geophysics in early 1978. This work was followed by the drilling of 7 rotary holes (E1 to E7) totalling 569 metres in February - March 1978. Cuttings were collected at 1.5 metre intervals and all holes were logged for gamma ray, resistivity and spontaneous potential by Geoscience Associates.

Ashley Geophysics were contracted in December 1978 to investigate the potential for Precambrian mineralisation of the Roxby Downs type in the general area of the Frome Embayment. A report was prepared (not in envelope) and one target was defined.

**MINERALISATION/PROSPECTS:** The licence area is situated on the western flank of the Benagerie Ridge. Previous drilling by Sedimentary Uranium NL (EL 441) in the north-western part of the Exploration Licence had shown no Lower Tertiary sand section.

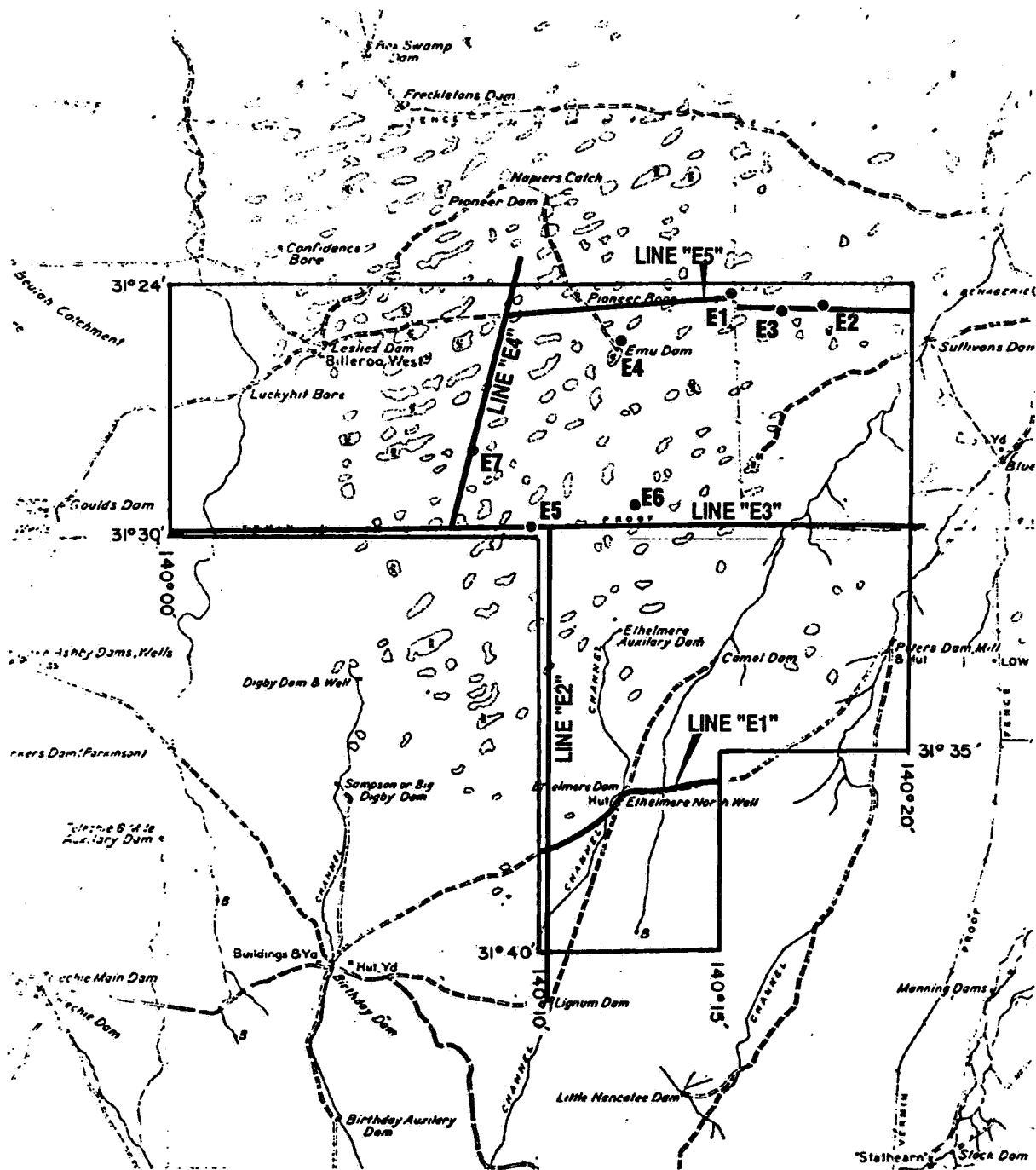
The results of the resistivity survey were not encouraging and the EL was interpreted as being centred largely over the Benagerie Ridge however a number of drill sites were selected in the north-east and central portions of the EL to test the Tertiary section.

The Lower Tertiary sediments appear to have been intersected only in holes E2, E4 and E7 and structure contours suggest that if a palaeochannel exists then it would pass in a north easterly direction through the central north of the EL. The sands in E2 and E4 are light grey to yellowish grey, mainly medium to coarse grained, angular to subrounded, well sorted, quartzose with abundant haematite and limonite staining. No anomalous radioactivity was found in any of the seven holes drilled.

The Upper Tertiary Namba Formation is dominated by light to dark grey clays and silts containing a distinctive 5 to 8 metre thick limestone or dolomite marker bed.

It was concluded that because the Cambrian basement rocks were shallow at depths between 36 and 71 metres and Lower Tertiary sands were totally oxidised the potential for sedimentary uranium concentration was remote.

**DRILLING:** Seven rotary holes (E1 to E7) totalling 529 metres.



● E4 Rotary drill hole location and number

LINE "E1" Resistivity traverse

0 5 10 15  
KILOMETRES

Figure 88

Applicant / Title Holder: Mines Administration Pty Ltd &  
Teton Exploration Drilling Co. Pty Ltd

Licence N° : EL 296

DME\_SA 93-1653



**TENEMENT:** EL 297 (formerly SML 267, Rudd and SML 544, EL 42; followed by ELs 523, 911, 970, 1307, 1352, 1487, 1751)

**AREA:** 753 sq km, reduced to 161 sq km on 22/3/79.

**COMMENCEMENT DATE:** 23/3/77

**EXPIRY DATE:** 22/3/80

**COMPANY:** MINES ADMINISTRATION PTY LIMITED and TETON EXPLORATION DRILLING CO PTY LTD

**ENVELOPE:** 2995, 3684

**REFERENCES:** Ashley, J., 1979: An assessment of the Precambrian Mineral Potential of the Curnamona Area S.A. Ashley Geophysics (unpublished)

Burns, S.D., 1979: Final Report EL 297 Telechie. Mines Administration Pty Limited (unpublished).

**LOCATION:** Telechie

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934

**TARGETS:** Sedimentary uranium, copper, uranium.

**AGE/ROCK UNITS** Western flank of Benagerie Ridge. Quaternary sediments above Tertiary Namba and Eyre Formations resting on Cambrian and Willyama Supergroup basement.

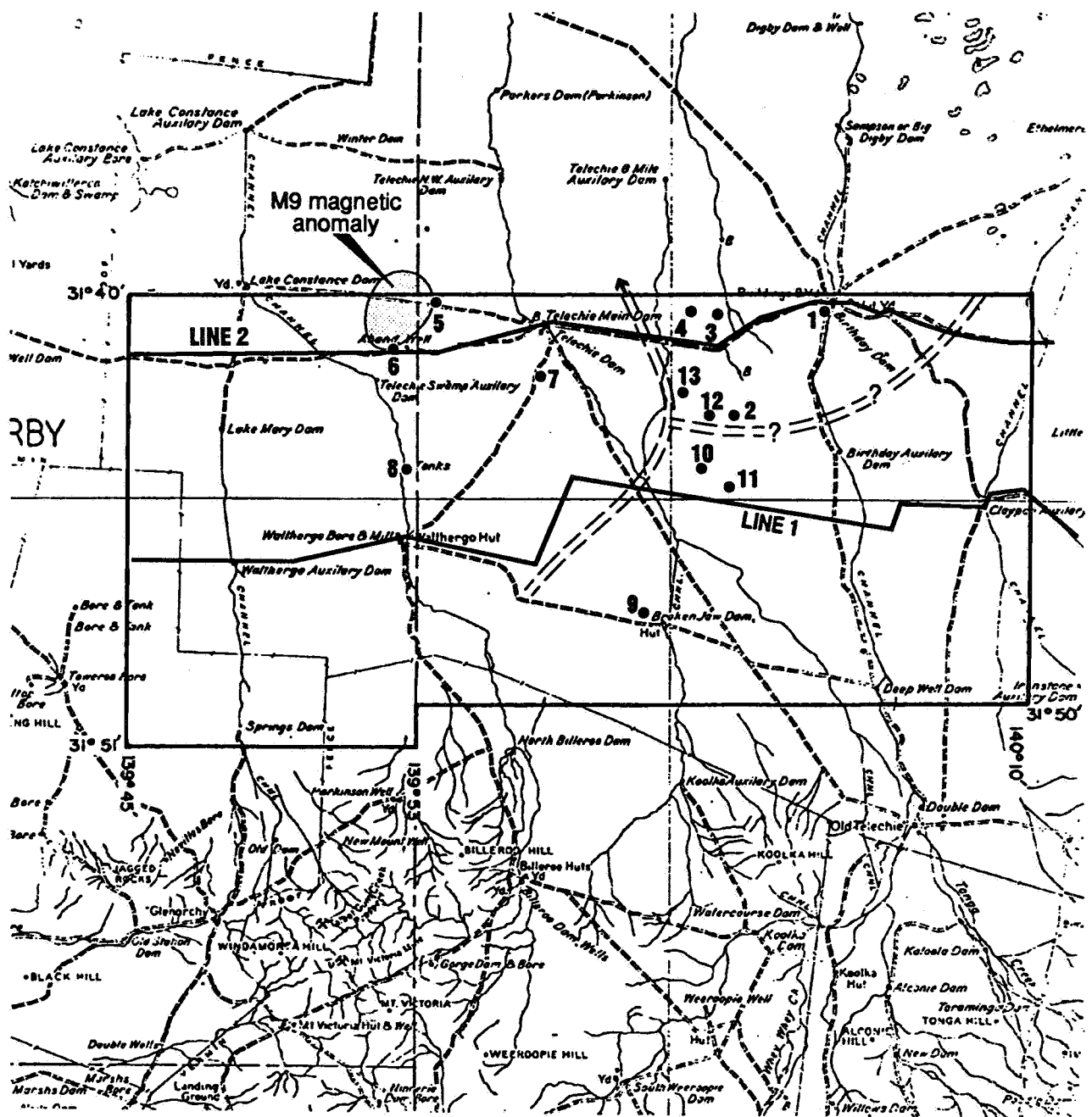
**EXPLORATION SUMMARY:** A reconnaissance resistivity survey was conducted in February 1978 on two long east-west lines totalling 87 km. In March 1979, 13 rotary holes (T1 to T13) totalling 1052.2 metres were drilled to test the most definite north-south trending Lower Tertiary channel interpreted from the resistivity data to be present in the central portion of the EL. Samples were collected at 1.5 metre intervals and all holes were logged with gamma ray, resistivity and spontaneous potential probes. Ashley Geophysics were contracted to assess the Precambrian mineral potential of the Curnamona 1:250 000 sheet area following the discovery of the Olympic Dam copper-uranium deposit on the Stuart Shelf and a comprehensive report was compiled using SADME airborne magnetic and gravity data.

**MINERALISATION/PROSPECTS:** The north-south channel defined by drilling is probably a southerly continuation of the Billeroo West Channel. There is a possible tributary joining it from the north-east near T12 and T13. The channel contains up to 42 metres of Lower Tertiary Eyre Formation sediments. The sands are upward fining light grey - yellow grey and medium to coarse grained near the base with interstitial clay indicative of granitic provenance. There is a trace of carbonaceous material and abundant limonite staining which demonstrates that the sands are oxidized throughout.

No anomalous radioactivity was detected in the holes. Only minor radioactivity was intersected in several holes drilled by Esso in joint venture with Pacminex in 1972. (El 42) however it was restricted to finer grained material in what was most likely weathered basement.

Ashley considered that the Curnamona area had a similar stratigraphic and tectonic setting to the Stuart Shelf and recognized four target areas: M5/G1 zone (mag./gravity anomaly), M9 (mag.), M2 (mag.) and M8 (mag.). The first two were recommended for follow-up ground surveys while the latter two magnetic anomalies were considered too deep (900 to 1000 metres). M9 is at the north end of this EL

**DRILLING:** Thirteen rotary holes (T1 to T13) totalling 1052.2 metres.

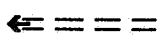


• 10

Rotary drill hole location  
and number (prefix T)

LINE 2

Resistivity traverse



Interpreted palaeochannel

0 5 10 15

KILOMETRES

Figure 89

Applicant / Title Holder: Mines Administration Pty Ltd &  
Teton Exploration Drilling Co. Pty Ltd

Licence N° : EL 297

DME\_SA 93-1654

**TENEMENT:** EL 334 (formerly SML 513, Els 90, 105, 178; followed by ELs 435, 802 1144, 1252)

**AREA:** 486 sq km

**COMMENCEMENT DATE:** 30/6/77

**EXPIRY DATE:** 29/6/78

**COMPANY:** SOUTHERN VENTURES PTY LTD

**ENVELOPE:** 3058

**REFERENCES:** Summary report of the drilling programme carried out for Pan Ocean Oil Ltd during May 1977 on Southern Ventures Pty Ltd's EL 334 Frome Embayment, South Australia. Derry Michener & Booth Pty Ltd.

**LOCATION:** Lake Carnanto.

**1:250 000 SHEET:** CURNAMONA, FROME

**1:100 000 SHEET:** LAKE CHARLES 7035, THURLOOKA 7036

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Tertiary Namba and Eyre Formations on a basement of Cretaceous clays (Marree Subgroup)

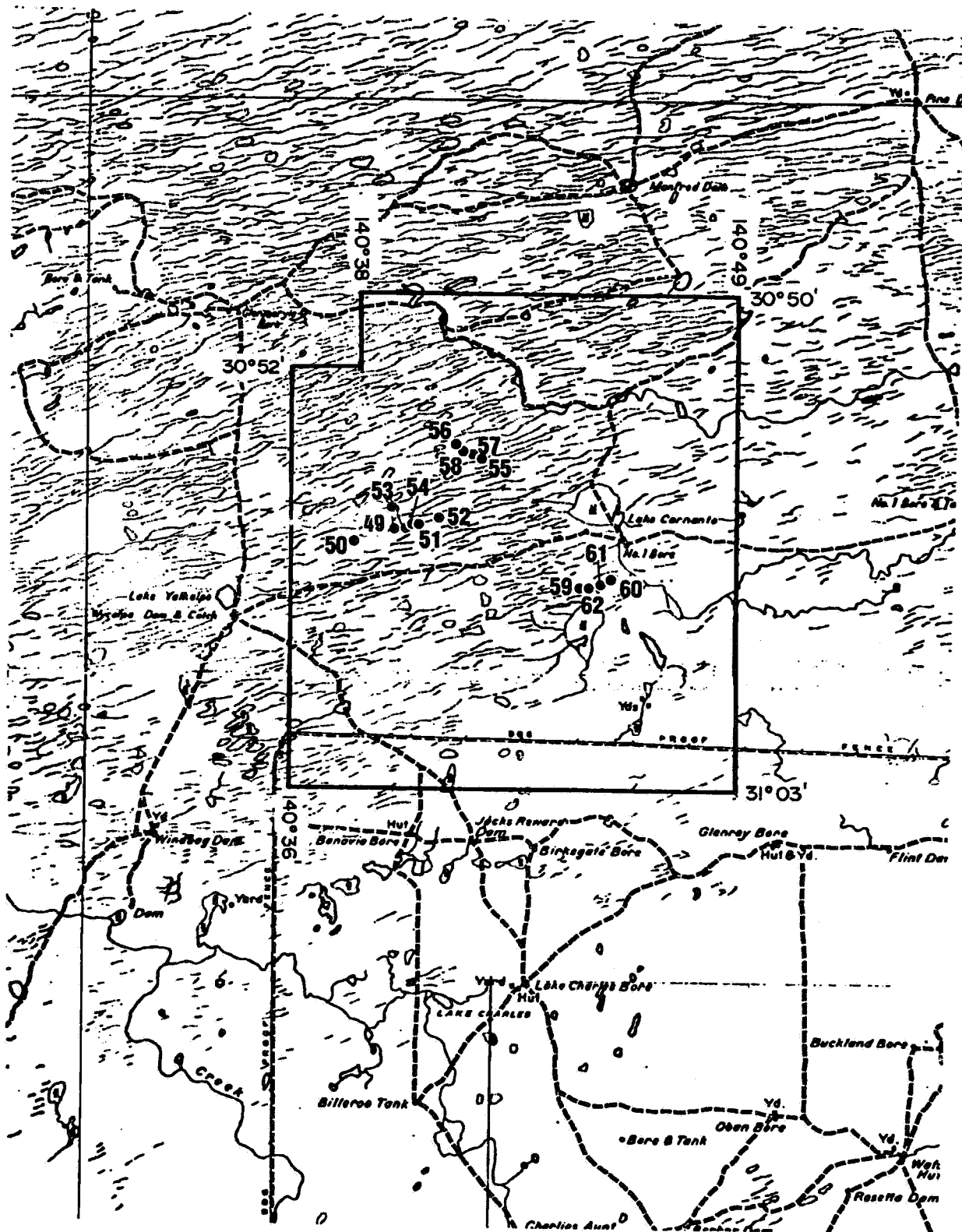
**EXPLORATION SUMMARY:** A rotary drilling programme of 14 holes (FE 49-62) for a total of 1540 metres was completed in May 1977 to test a postulated oxidation front on the western flank of the palaeochannel previously outlined by drilling in two programmes, in September 1974, FE 1-17 for 1954 m, and May 1976, FE 18-48 for 3080 m. Three traverses of holes spaced 175 to 250 metres apart were drilled. All holes were logged for gamma-ray, resistivity and spontaneous potential by Geoscience Associates.

**MINERALISATION/PROSPECTS:** The drilling was directed at an inferred sinuous oxidation front extending over at least 15 km. The location of this front was inferred to be at the interface between a zone where basal sands showed double gamma peaks greater than four times background to the east of the front and single gamma peaks greater than four times background to the west of the front.

As previously the holes showed Quaternary sands overlying a thick monotonous clay sequence (Namba Formation) above the Lower Tertiary Eyre Formation basal sand commencing at about 90 metres depth.

No unequivocal evidence of oxidation of the basal sands was observed although light oxidation stain on sand grains may have been lost by washing or abrasion. Pyrite and ligneous carbonaceous material was noted in FE 61 and 62 but there were no associated gamma peaks. Highest gamma responses in narrow peaks were in FE 51 and 53 with a best of 153 cps being considered to be generally of low order i.e. not anomalous. The pattern of double and single peaks was well maintained but drilling results did not show associated uranium concentration. Because of the lack of encouraging results it was recommended the EL be relinquished.

**DRILLING:** Fourteen rotary holes (FE 49 to 62) totalling 1540 metres.  
Note all drilling on FROME.



50 • Rotary drill hole location and number (prefix FE)

Note: All on FROME

0 5 10 15  
KILOMETRES

Figure 90

Applicant / Title Holder: Southern Ventures Pty Ltd

Licence N° : EL334

DME\_SA 93-1655

**TENEMENT:** EL 337 (formerly SMLs 268 Rudd, 543; EL 45, CSR; followed by ELs 854 CSR, 1738 BHP)

**AREA:** 1490 sq km

**COMMENCEMENT DATE:** 26/7/77

**EXPIRY DATE:** 25/7/78

**COMPANY:** MARATHON PETROLEUM AUSTRALIA, LTD

**ENVELOPE:** 3071

**REFERENCES:** Ellis, G K, 1978. Final Report EL 337 (Wilpena Creek). Evaluation of Results of Drilling Programme June/July 1978. Marathon Petroleum Australia, Ltd (unpublished)

**LOCATION:** Wilpena Creek

**1:250 000 SHEET:** CURNAMONA, PARACHILNA

**1:100 000 SHEET:** CURNAMONA 6834, PASMORE 6934, REAPHOOK 6735,  
**WILLIPPA 6734**

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Quaternary sediments resting on Tertiary Namba and Eyre Formations unconformably deposited on a basement of Cambrian siltstone and mudstone.

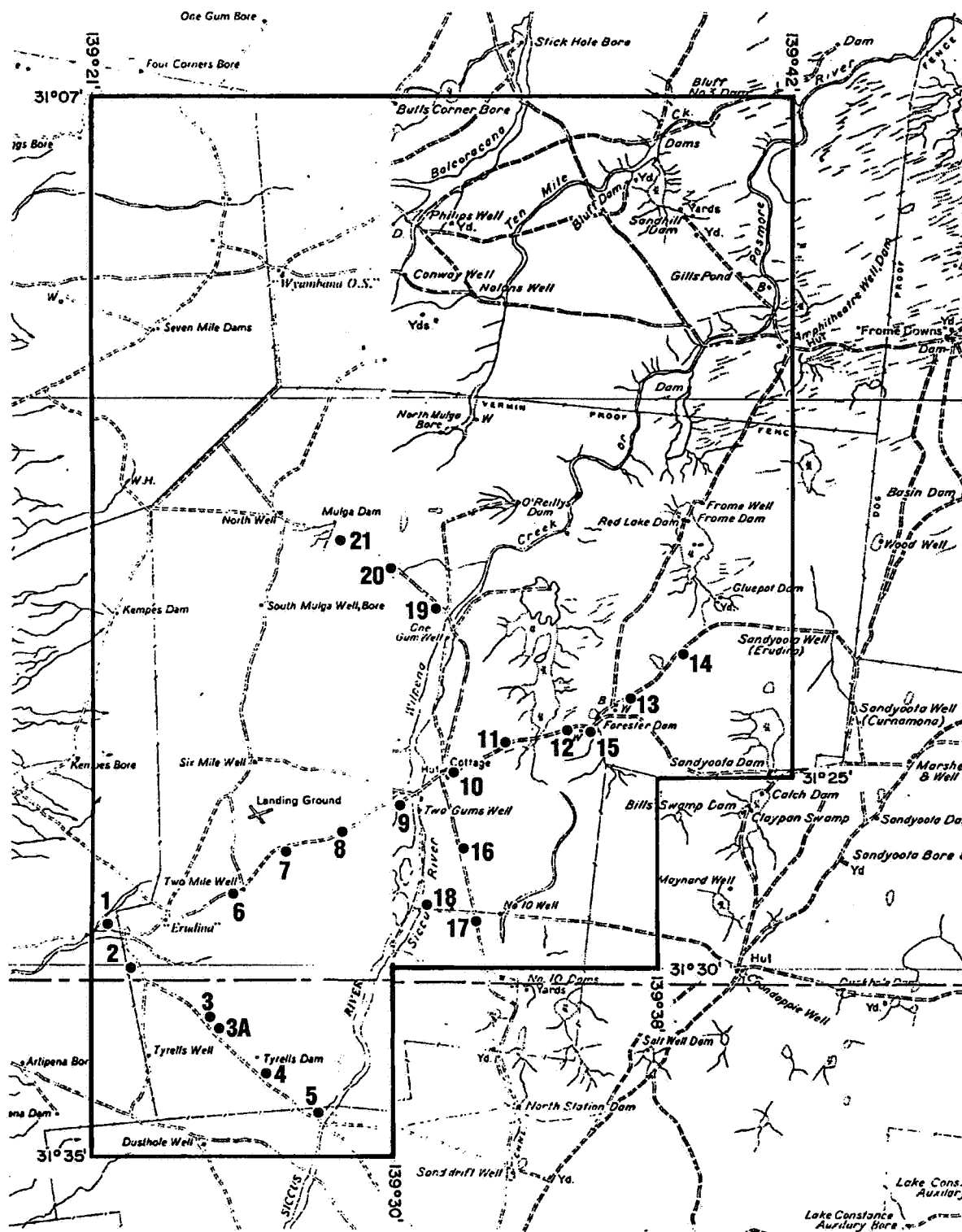
**EXPLORATION SUMMARY:** A 21 hole (WC 1-21) 3251.3 metre, rotary drilling programme was completed in the southern half of the EL in the Erudina Homestead Forester Dam area in June/July 1978 to search for Lower Tertiary palaeochannels prospective for sedimentary uranium and to explore for an extension of the channel located by Esso Australia (holes FD 19, 23 in EL 42) to the south of EL 337. All holes were logged for gamma-ray, resistivity and spontaneous potential by Geoscience Associates and their elevations were measured by a licensed surveyor. Selected cuttings (15 samples) were assayed for Cu, Pb, Zn, Mo, V and U<sub>3</sub>O<sub>8</sub>.

**MINERALISATION/PROSPECTS:** The Lower Tertiary fluvial section is best developed in the southern part of the area for example in WC 4 and WC 5 where the top of this sequence occurs at 150 to 160 metres depth. WC 4 was best developed with 15 metres of light grey sand coarsening towards its base and with humic grain coatings and minor pyrite grains. Further north (WC 1 to WC 9) the fluvial sequence is only poorly developed with silt and minor clay representing a more lacustrine environment while further north again (WC 19 to WC 21) there is no sand section in the Lower Tertiary.

The thick grey clay sequence of the overlying Namba Formation contains a white to cream calcilutite ('limestone') marker bed and very localised sands e.g. WC 3A, 4, 5, and 12. Maps provide a good summary of drilling in the area.

No significant uranium mineralisation was intersected in the drilling and the Lower Tertiary unoxidized sand intercepts were radiometrically 'barren'. The only anomalous radio activity was recorded in carbonaceous clay beds in the carbonate unit of the Namba Formation e.g. WC 14 which showed 1.5 metres at 520 ppm U<sub>3</sub>O<sub>8</sub> from 66.0 to 67.5 metres.

**DRILLING:** Twenty one rotary holes (WC 1 to 21) totalling 3251.3 metres.



5. Rotary drill hole location and number (prefix WC)

0 5 10 15  
KILOMETRES

Figure 91

Applicant / Title Holder: Marathon Petroleum Australia Ltd

Licence N° : EL 337

DME\_SA 93-1656



**TENEMENT:** EL 343 (part of former SMLs 535, 673)

**AREA:** 62 sq km

**COMMENCEMENT DATE:** 11/8/77

**EXPIRY DATE:** 10/8/79

**COMPANY:** ESSO EXPLORATION AND PRODUCTION INC

**ENVELOPE:** 3085

**REFERENCES:** Fraser, N., 1979: Final Report Glenorchy Exploration Licence 343. Esso Australia Ltd (unpublished).

**LOCATION:** Glenorchy

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834

**TARGETS:** Uranium

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** Exploration of the area involved:

- A lithostructural photogeological study at 1:83000 scale by Loxton Hunting & Associates using colour air photographs.
- A detailed helicopter borne radiometric survey using the Exploranium DGRS-1002 system (452 cu. in. crystal) comprising 103 line km at 150 metre spacing and terrain clearance of 50 metres. (The area had previously been flown by Esso-Petrocarb under SML 535).
- Detailed mapping of the Jagged Rocks Prospect at a scale of 1:2000. Assessment of previous exploration of this prospect by SADME in 1955 and EZ-Newmont in 1969.

**MINERALISATION/PROSPECTS:** Three helicopter-radiometric anomalies were selected for ground follow-up:

**Anomaly G57** - higher background in a foliated microgranodiorite with no visible mineralisation - assays up to 140 ppm  $U_3O_8$ .

**Anomaly G53** - small hill of biotite adamellite and leucoadamellite in a broad area of alluvium. Anomalous readings over biotite rich zones - no visible mineralisation - assays up to 61 ppm  $U_3O_8$ .

**Anomaly G54** - Large hill of adamellite and minor microgranodiorite surrounded by alluvium. No visible mineralisation - assays up to 200 ppm  $U_3O_8$ .

None of these anomalies was considered to warrant detailed follow-up.

At Jagged Rocks patchy davidite mineralisation occurs in biotite rich gneiss with a weakly brecciated appearance in two areas separated by 350 metres of alluvium. The 'Jagged Rocks' just to the north of these outcrops are a 100 metre wide mylonite zone of sericite schists. Assays up to 6150 ppm  $U_3O_8$  and 300 ppm  $ThO_2$  were obtained from the eastern area. The helicopter radiometric survey failed to locate outcropping extensions and an overall review including previous drilling concluded the prospect was too small and too low grade to warrant further exploration.



**TENEMENT:** EL 376 (formerly SMLs 118, 209, 2094, 534, 672 part ELs 132; 259; followed by ELs 629, 1308, 1480, 1591)

**AREA:** 149 square km (101 sq km relinquished 4/12/79 for EL 629)

**COMMENCEMENT DATE:** 5/12/77

**EXPIRY DATE:** 4/12/79

**COMPANY:** ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC

**ENVELOPE:** 3197, 3623

**REFERENCES:** Successive Quarterly Reports

**LOCATION:** Boolcoomata Dam ('Calico')

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934

**TARGETS:** Uranium, copper, lead, zinc

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** The principal activity was geological mapping, including petrography and coincident scintillometer traversing. This work was undertaken in three areas: Triangle North (1:5025 mapping over 16 sq km), Kalabity South (1:5025 mapping), and West Wiperaminga (1:20100 mapping over about 42 sq km). Photogeological mapping at 1:83000 scale was completed as part of Esso's coverage of the Olary Province. Scintillometer traversing was most concentrated in the West Wiperaminga area.

A 1:25000 scale geological map of the entire EL area was compiled.

**MINERALISATION/PROSPECTS:** The major geological elements recognised were a central region of granitoid rocks and migmatites comprising the core of the Kalabity Antiform, and metasediments of the Willyama Supergroup which occur along the limbs of the antiform and as remnants within the migmatite complexes. Granitoid units include anatectic biotite granites largely stratabound, intrusive muscovite adamellites and pegmatites.

The major metasedimentary units of the Willyama Supergroup were recognised in decreasing stratigraphic order as:

<b><u>Upper Schist Group</u></b>	Pelitic Formation
	Pelitic - Carbonaceous Formation
<b><u>Curnamona Group</u></b>	Bimba Formation
	Upper Albite Formation
	Mixed Albite - Schist Formation
	Middle Schist Formation
	Lower Albite Formation

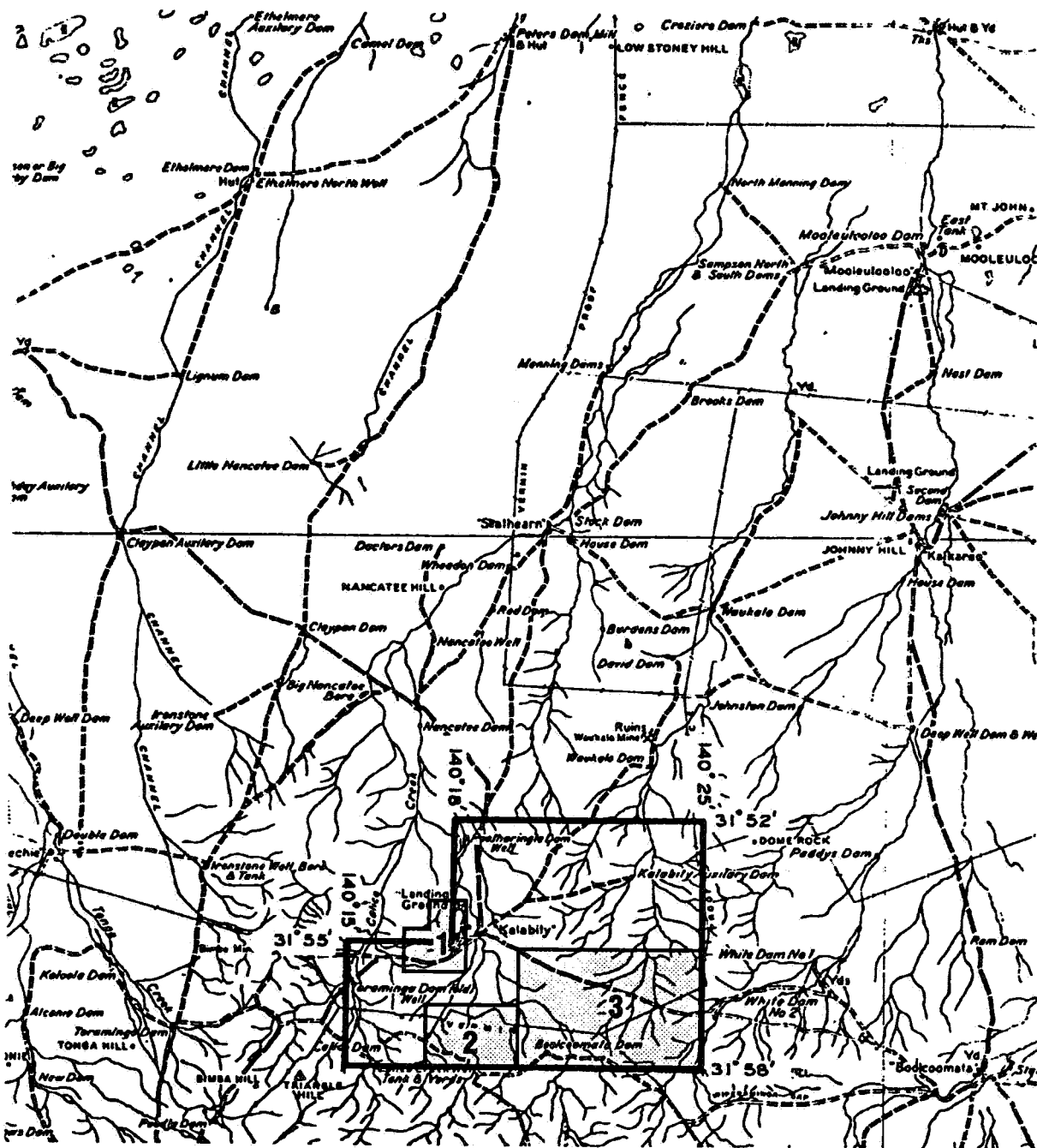
The Lower Albite is a sequence of soda rich metasediments (albite quartz rocks) often containing disseminated pyrite/ haematite with interbeds of quartz-mica schists and quartz-magnetite BIF. The Middle Schist and Mixed Albite Schist contain quartz-mica schist, felspathic schist and siltstones often with disseminated magnetite and occasional interbeds of calcsilicate. The Upper Albite is composed primarily of albite rich metasediments.

The Bimba, up to 100 metres thick, contains widespread stratiform mineralisation often being anomalous in Cu, Pb, Zn, Ag or Co. It contains a variety of chemical, evaporitic, arenaceous, volcanoclastic and tuffaceous sediments. Lithologies include cherty quartzite/sericite schist; quartz-magnetite BIF with calc-silicates and pyritic chlorite schists. Minor copper oxide staining is present often in quartz veins intersecting the chlorite schists at Kalabilty South.

Where recognised the Bimba was checked along its full exposed strike length but no evidence of significant base metal enrichment was found.

The Upper Schists are pelitic metasediments some of which are carbonaceous.

Scintillometer traversing failed to locate any economically significant anomalous readings. Highest readings were recorded over 'regional' adamellites.



### Geological Mapping

- 1 Kalabity South 1:5025
- 2 Triangle North 1:5025
- 3 Wiperaminga West 1:20100



Figure 93

Applicant / Title Holder: Esso Exploration & Production Australia Inc.

Licence N° : EL 376

DME\_SA 93-1658

**TENEMENT:** EL 377 (formerly SMLs 222, 440, 595, 714, ELs 85, 132, 259; followed by ELs 597, 1004, 1412, 1786).

**AREA:** 818 sq km

**COMMENCEMENT DATE:** 21/12/77

**EXPIRY DATE:** 20/12/79

**COMPANY:** CARPENTARIA EXPLORATION COMPANY PTY LTD, MINES ADMINISTRATION PTY LIMITED, TETON EXPLORATION DRILLING CO PTY LTD

**ENVELOPE:** 3203

**REFERENCES:** Successive quarterly reports

Summary Report on Honeymoon Assessment Programme (Phase 1) Minad - Teton Australia (unpublished)

**LOCATION:** Kalkaroo

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934, MULYUNGARIE 7034

**TARGETS:** Sedimentary uranium.

**AGE/ROCKS UNITS:** Quaternary sediments above Tertiary Namba and Eyre Formations resting unconformably on basement of Cretaceous clays and Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** Some 115 additional holes were drilled on a 30 x 60 m pattern over the Honeymoon uranium deposit with each hole logged by Geoscience Associates for spontaneous potential, resistivity and gamma-ray. All samples (some composited) were analysed for uranium, carbon, sulphur, porosity, permeability, size distribution, elemental scan and bulk density. Push-pull tests have confirmed amenability to insitu leaching and Amdel completed continuous solvent extraction studies.

**MINERALISATION/PROSPECTS:** The Honeymoon uranium deposit is on the margins of the sinuous Yarramba palaeochannel (Paleocene to Eocene). Three sand units are identified (Upper, Middle, Basal) separated by two clay lenses. The units unconformably overlie Cretaceous clay. The Basal sandstone has a thickness from zero on the south side to 22.9 m (H-89) on the north side. Average pyrite content is 6.26%. Carbon assays on composite bottom hole samples showed an average of 0.28% with a range from 0.11% to 0.66%. Excellent permeability and porosity for in situ mining purposes were found. The deposit is a roll front type with a reducing environment causing precipitation of uranium. Average grade for the deposit is 0.18% eU<sub>3</sub>O<sub>8</sub> with average thickness of 4.3 m (at a cut off of 0.12 m% eU<sub>3</sub>O<sub>8</sub>). The contained uranium was estimated at 3400 tonnes eU<sub>3</sub>O<sub>8</sub>. Overall the deposit is in radiochemical equilibrium.

**DRILLING:** 99 rotary holes totalling 12,452.7 metres (H series)  
 16 core holes totalling 1894 meters (suffix 'C').  
 Total 115 rotary holes some partly cored for 14346.7 metres.

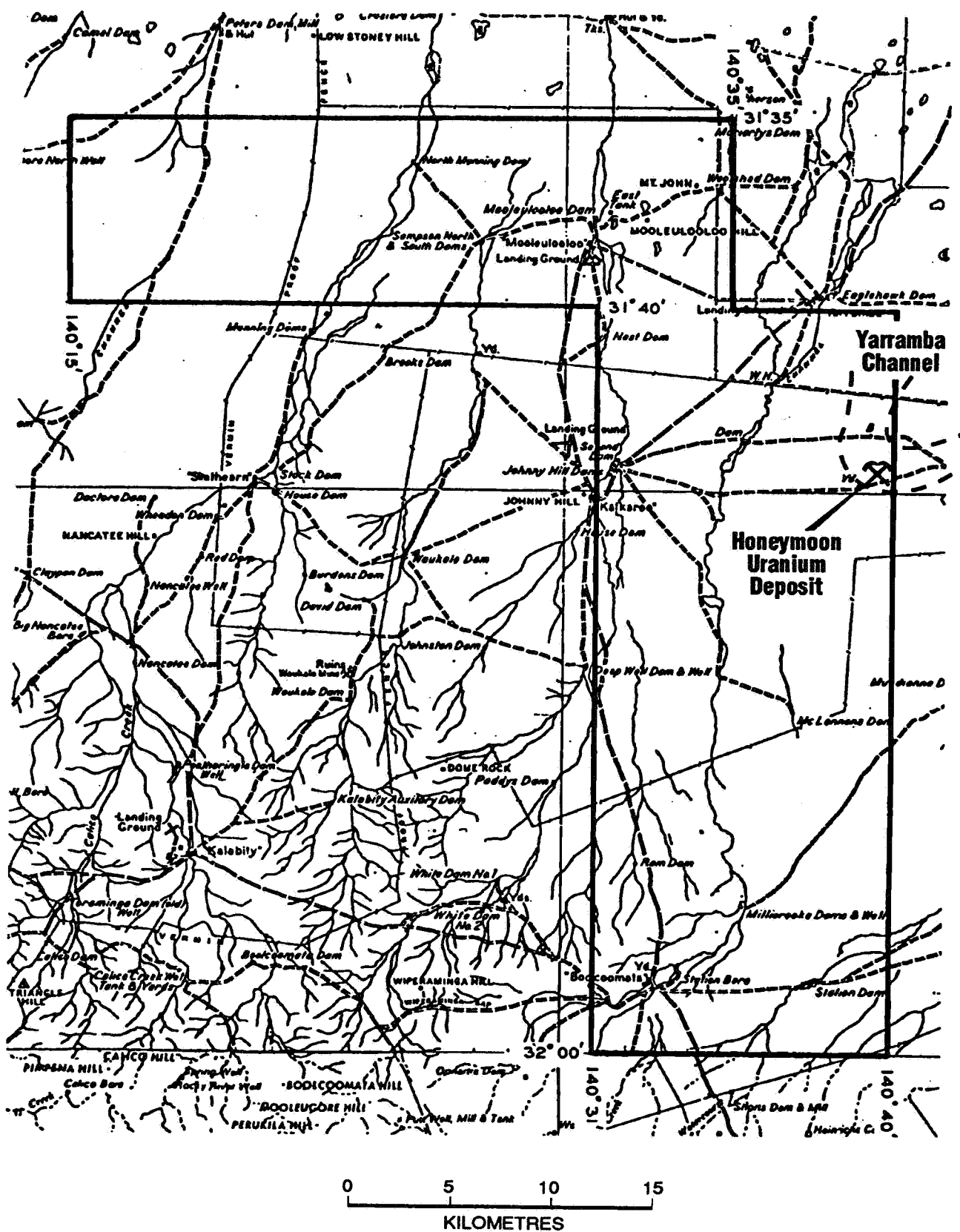


Figure 94

Applicant / Title Holder: Carpentaria Exploration Company Pty Ltd - 49%, Mines Administration Pty Ltd - 25.5%, & Teton Exploration Drilling Co. Pty Ltd - 25.5%  
 Licence N° : EL 377

DME\_SA 93-1659

<b><u>TENEMENT:</u></b>	EL 385 (formerly SMLs 513, 514, ELs 66; followed by ELs 549, 957, 1391, 1684, 1693, 1860)
<b><u>AREA:</u></b>	440 sq km
<b><u>COMMENCEMENT DATE:</u></b>	26/1/78
<b><u>EXPIRY DATE:</u></b>	25/4/79
<b><u>COMPANY:</u></b>	OILMIN NL, TRANSOIL NL, PETROMIN NL
<b><u>ENVELOPE:</u></b>	3314
<b><u>REFERENCES:</u></b>	Successive quarterly reports.
<b><u>LOCATION:</u></b>	Lake Yantawena
<b><u>1:250 000 SHEET:</u></b>	CURNAMONA
<b><u>1:100 000 SHEET:</u></b>	BENAGERIE 6935, LAKE CHARLES 7035
<b><u>TARGETS:</u></b>	Copper, uranium
<b><u>AGE/ROCK UNITS:</u></b>	Tertiary and Cretaceous sediments resting on Precambrian basement on the eastern side of the Benagerie Ridge.

**EXPLORATION SUMMARY:** Application for the EL was lodged because it was perceived that the area had potential in the basement for Olympic Dam type mineralisation. After a review of regional geophysical data an area of 55 sq km in the east of the licence area was selected for ground geophysical and track-etch surveys. A grid of east-west lines 0.8 km apart was surveyed with stations at 0.4 km on lines being the basis of gravity, magnetic, radiometric and track-etch surveys (192 sample cup sites).

**MINERALISATION/PROSPECTS:** Interpretation of the data acquired from these surveys led to the following conclusions: -

**Gravity:** There is a very restricted high adjacent to Mercers Gate but it is considered the gravity pattern does not directly relate to mineralisation.

**Magnetics:** A general north-south trend is evident with a low in the eastern half of the area which may reflect a basement depression and an increasing gradient towards the west i.e. towards the Benagerie Ridge. Results do now show a pattern directly relating to mineralisation.

**Radiometrics:** Total count readings vary only very slightly throughout the area with no discernible pattern.

**Track Etch:** 13 cups or 7% of the 192 total returned significantly high readings but without developing a specific pattern or any coincidence with other anomalous results.

It was concluded that there was no indication of potential of Olympic Dam type mineralisation but suggestions were made that scout drilling for sedimentary uranium should be considered. The licence was relinquished without any drilling being undertaken.



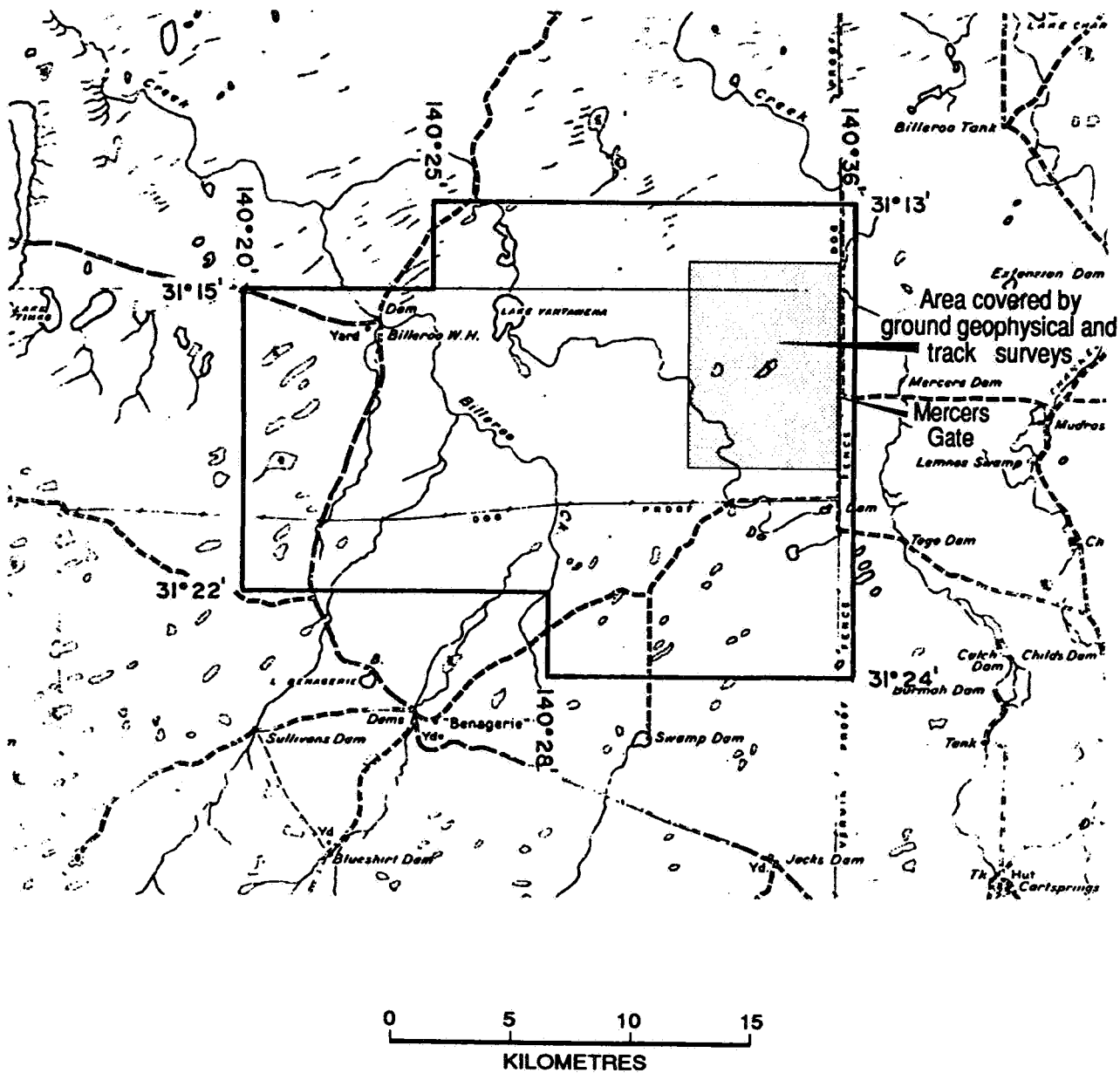


Figure 95

Applicant / Title Holder: Oilmin N.L., Transoil N.L. and Petromin N.L.

Licence N° : EL 385

DME\_SA 93-1660

**TENEMENT:** EL 411 (formerly SMLs 267, 268, 514, 543, 544, ELS 42, 45, 59, 109, 227 CSR; followed by ELs 722; 1065, 1487, 1698)

**AREA:** 2490 sq km

**COMMENCEMENT DATE:** 20/6/78

**EXPIRY DATE:** 19/6/80

**COMPANY:** CSR LIMITED

**ENVELOPE:** 3329

**REFERENCES:** Ashley, J., 1978 : An assessment of the Precambrian Mineral Potential of the Curnamona Area S.A. Ashley Geophysics (unpublished).  
Flook, M., 1981: EL 722 Billeroo West Exploration Drilling Billeroo Channel 1980. Mines Administration Pty Limited (unpublished)

**LOCATION:** Billeroo West

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, PASMORE 6835, KALABITY 6934; BENAGERIE 6935

**TARGETS:** Sedimentary uranium; copper, gold, uranium in basement.

**AGE/ROCK UNITS:** Quaternary cover on Tertiary Namba and Eyre Formations resting on basement in vicinity of Goulds Dam of Cambrian micaceous siltstone.

**EXPLORATION SUMMARY:** Exploration was undertaken in joint venture with Mines Administration Pty Limited and Teton Exploration Drilling Co. Pty. Ltd. as managers. The programme involved sedimentary uranium search in the Billeroo Channel (Goulds Dam) and exploration for Olympic Dam style mineralisation over magnetic anomalies in the basement. Work on both these avenues continued into the term of EL 722. Reconnaissance resistivity traverses (B10-17, BX1 incl. 15A and 16A) were completed by Murdoch Geophysics both in the northern (Frome Downs) sector of the EL as well as with the objective of locating the northern and southern extremities of the Billeroo Channel (for line locations see EL 722). Commencing March 1979 at Goulds Dam four partly cored holes (GD1C-4C) totalling 501.4 metres (80.33 cored) were drilled to determine the amenability of the mineralisation to in situ leaching. Three additional open holes GD 1 to GD 3 totalling 395.6 metres were drilled for the same purpose. In April - June 1980 on the Goulds Dam deposit 83 open holes (?) totalling 10987 metres and 7 partly cored holes (?) totalling 884 metres were drilled over an accurately levelled 60 metre by 30 metre grid covering 0.7 square kilometres (logs and plans not in envelope) 28 rotary holes (BW 188 to BW 215) totalling 3498.9 metres were drilled in June 1980 to explore the projected northern extremity of the Billeroo channel in the area east of Frome Downs (for detail see EL 722). All holes were logged with gamma, resistivity and spontaneous potential probes and some with neutron and accurately surveyed and levelled. Some analyses for  $U_3O_8$  were undertaken by Amdel notably on cores.

Basement exploration involved deep resistivity soundings by Murdoch over regional magnetic anomalies (traverse BX, B 14, B 16A) and a comprehensive report by Ashley Geophysics drawing comparisons between the geology/geophysics of the Stuart Shelf and the Curnamona Nucleus. Geoex Pty. Ltd. were contracted to complete magnetic/gravity surveys over basement anomalies M1, M2, M8.

**MINERALISATION/PROSPECTS:** Early tests on core showed that permeability was satisfactory for in situ leaching as was pyrite content with overall average content less than 1%.

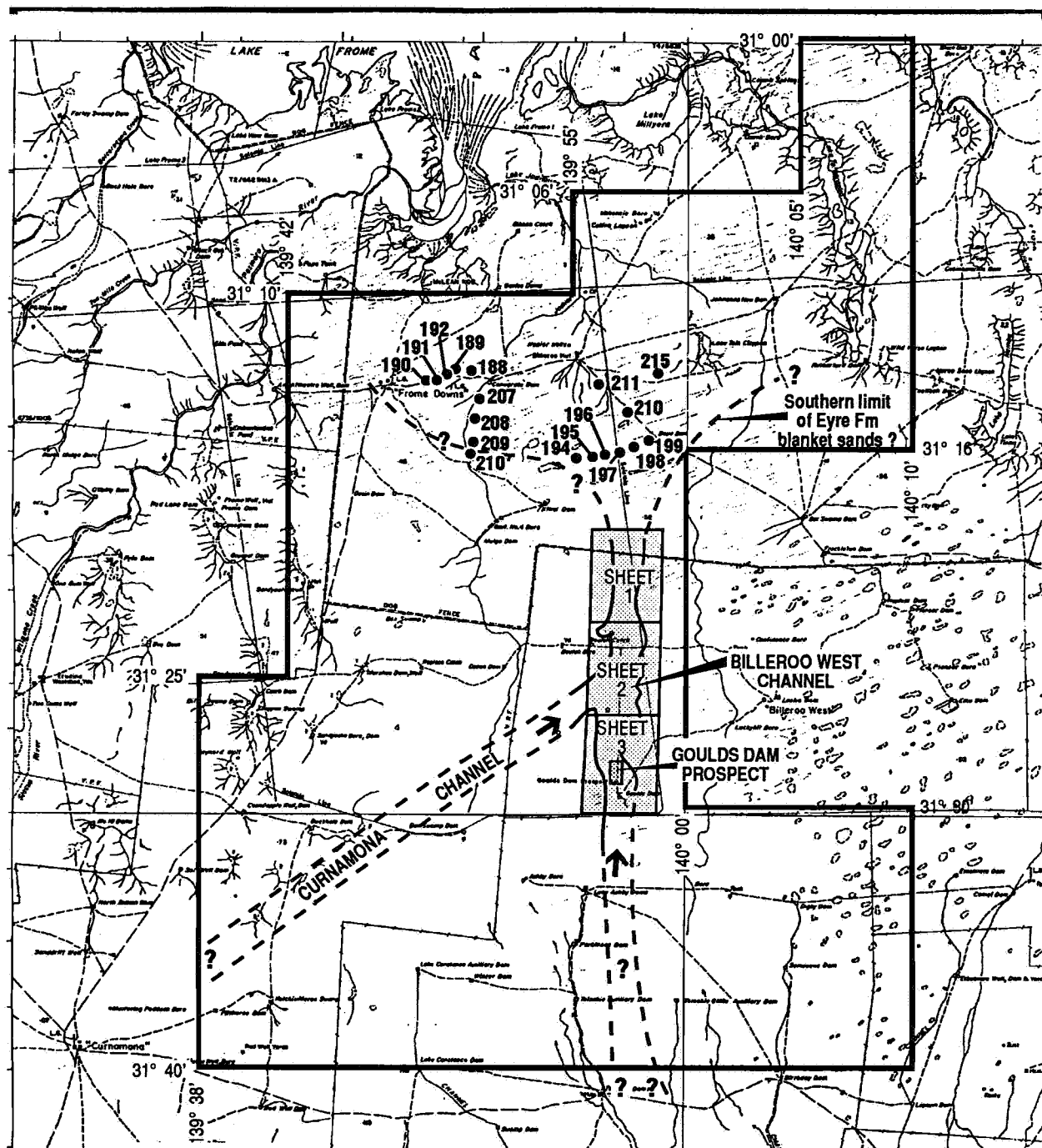
Resistivity surveys failed to locate any new channels other than possible paths for the known Billeroo and Curnamona channels.

The northern course of the channel was found to be difficult to locate past the vermin proof fence and in the south a possible course was located 2 km east of Parkinson Dam.

The results of most drilling are well described by Flook (1981) under follow-on EL 722 (same Env. 3329), although the reports provide no information, drill logs or plans, on the April-May 1980 drilling of the Goulds Dam deposit. Lower Tertiary sands in the Frome Downs area were found to be 'blanket sands' with no evidence of oxidation or redox interfaces. Sands are mature and typically reduced with abundant pyrite and humic matter with more abundant micaceous and lignitic silts indicating flood plain environment with meandering channels and back swamps.

Ashley (1978) concluded there was potential for Olympic Dam style mineralisation in the Curnamona area as there are similar geophysical signatures at one and possible two sites in EL 411. These include M1 where the magnetic anomaly is similar to Olympic Dam although there is a smaller gravity anomaly; M2 a magnetic anomaly with an estimated depth of about 2000 meters and no significant associated gravity anomaly; and possibly M8. A drill hole BWM1-1 was precollared to test the M1 anomaly (no detail provided in envelope see EL 722). Deep resistivity soundings showed estimated depth to basement of 1200 metres on traverse B14 while the remaining two traverses gave inconclusive results.

**DRILLING:** 114 rotary holes totalling 14881.5 metres and 11 partly cored holes totalling 1385.4 metres.  
Total 125 rotary holes for 16266.9 metres.



208. Rotary drill hole location and number prefix - BW (June 1980, 10 holes not plotted) Channel interpretations after Flook (1981)

SHEET 1

1:10000 plans of drill hole locations in Flook (1981)

0 5 10 15 20 25  
KILOMETRES

For location of resistivity traverses - see EL722

Figure 96

Applicant / Title Holder: CSR Limited

Licence N° : EL 411

DME\_SA 93-1661

<u>TENEMENT:</u>	EL 412 (formerly SMLs 279, 415, 580, 696; ELs 98, 238, followed by ELs 721, 1060, 1382, 1783).
<u>AREA:</u>	1972 sq km
<u>COMMENCEMENT DATE:</u>	4/7/78
<u>EXPIRY DATE:</u>	3/7/80
<u>COMPANY:</u>	SEDIMENTARY URANIUM N.L.
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATION:</u>	East Kalkaroo (Mulyungarie)
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	LAKE CHARLES 7035, MULYUNGARIE 7034
<u>TARGETS:</u>	
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CONFIDENTIAL ENVELOPE
<u>MINERALISATION/PROSPECTS:</u>	

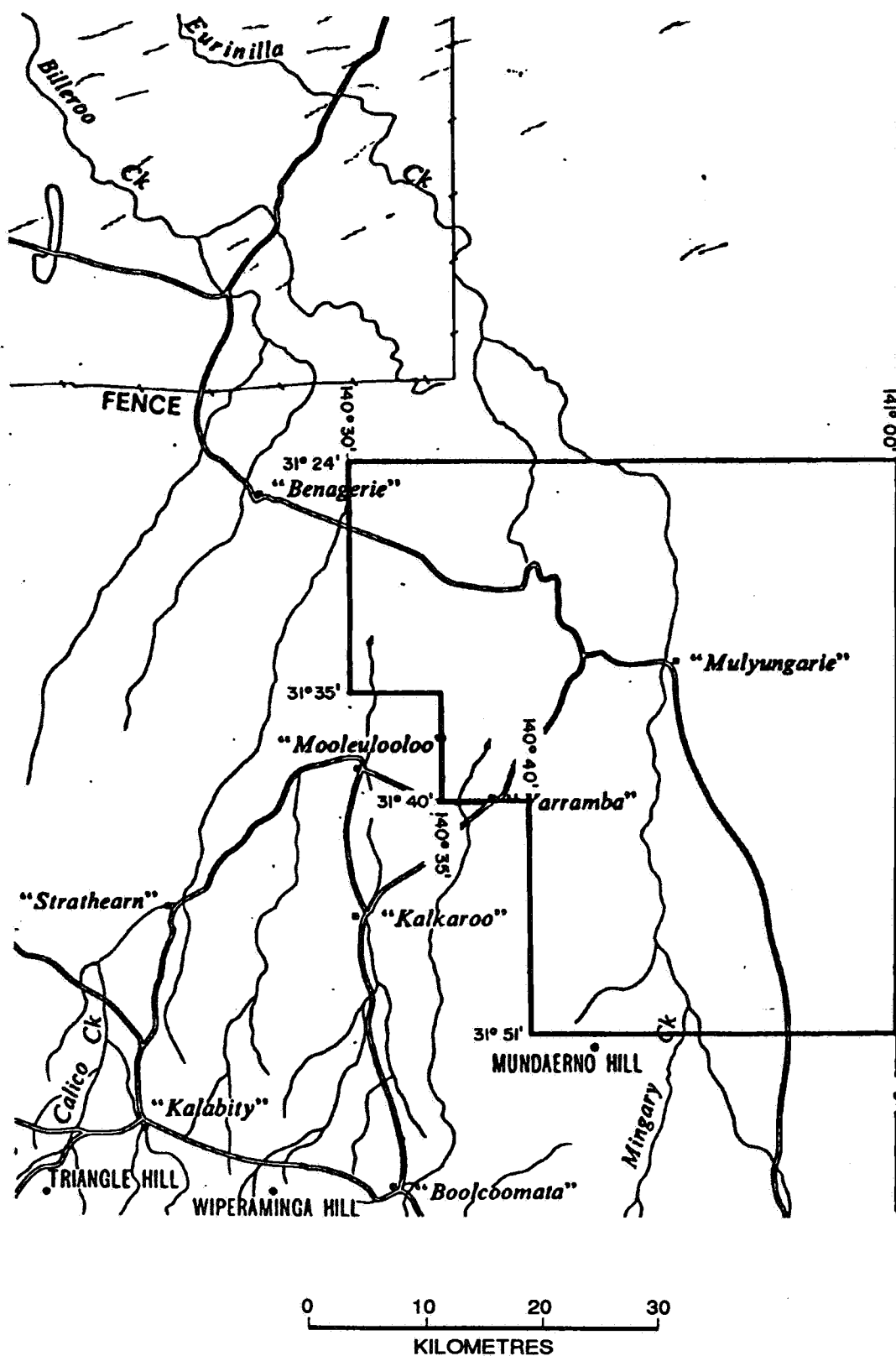


Figure 97

Applicant / Title Holder: Sedimentary Uranium N.L.

Licence N° : EL 412

DME\_SA 93-1662

<b><u>TENEMENT:</u></b>	EL 423 (formerly SMLs 118, 151, 172, 209, 209A, 210, 210A, 222, 269, 440, 534, 535, 562, 595, 672, 673, 677, 714 ELs 62, 85, 132, 259; followed by ELs 794, 1119, 1497, 1861)
<b><u>AREA:</u></b>	822 sq km
<b><u>COMMENCEMENT DATE:</u></b>	6/10/78
<b><u>EXPIRY DATE:</u></b>	5/10/80
<b><u>COMPANY:</u></b>	CARPENTARIA EXPLORATION COMPANY PTY LTD
<b><u>ENVELOPE:</u></b>	3365
<b><u>REFERENCES:</u></b>	Successive quarterly and annual reports.
<b><u>LOCATION:</u></b>	Kalabity
<b><u>1:250 000 SHEET:</u></b>	CURNAMONA
<b><u>1:100 000 SHEET:</u></b>	CURNAMONA 6834, KALABITY 6934, MULYUNGARIE 7034
<b><u>TARGETS:</u></b>	Base metals and uranium (1979 only)
<b><u>AGE/ROCK UNITS:</u></b>	Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** Exploration was carried out by Esso Australia Ltd in joint venture with Carpentaria Exploration Company Pty Ltd and was focussed on the base metal and radiometric potential of the Bimba Formation. Mapping at 1:25 000 covered the entire EL and detailed mapping including rock chip sampling at 14 named prospects was completed. Ground geophysics (IP, SIROTEM, magnetics, radiometrics) was completed over most prospects and some downhole geophysics (radiometrics, mise a la masse, IP) was also completed. Drilling (RAB, percussion and diamond) exceeded 18 000 metres.

**MINERALISATION/PROSPECTS:** The prime target for base metal exploration was a sulphide bearing sedimentary unit designated the Bimba Formation. This unit occurs in a sequence of highly metamorphosed, complexly folded Palaeoproterozoic sedimentary rocks and is intermittently exposed along a considerable strike length around the north south trending Kalabity antiform (an expanded description of Esso's geological setting can be found in the entry for EL 376). Gossanous outcrop of the Bimba Formation was found to be anomalous in copper (500 to 7000 ppm), lead up to 1.4%, zinc to 7 900 ppm and gold to 4 ppm (at Wiperaminga). Fourteen line kilometres of IP was completed and was useful in defining the Bimba Formation except for interference from overlying Pelitic Carbonaceous Formation. Similarly SIROTEM (11 kilometres) was affected by graphite but Crone pulse EM (45.55 line km) appeared to discriminate between sulphide-rich and graphitic units. 500 line km of helicopter borne spectrometer surveying located 55 anomalies but preliminary follow-up at Dome Rock and Ironstone Well gave 370 ppm and 530 ppm  $U_3O_8$  respectively in rock chips. 121 percussion holes (KPI-121) generally returned values of less than 0.2% Cu with occasional assays greater than 1% Cu. The best intercept was 4 m averaging 3.38% Cu in KP 106 at Mt Howden. Fourteen diamond cored holes (KDI-14) were drilled with similar results, the best interval being 7 m averaging 5.38% from 268 metres in KD 9. This interval contained secondary copper minerals. Weathering and oxidation of sulphides in the El is deep and has penetrated to a vertical depth in excess of 250 metres in the Telechie area.

**DRILLING:**

RAB drilling : 896 holes totalling 4604 metres

Rotary percussion drilling : 121 holes totalling 9887 metres

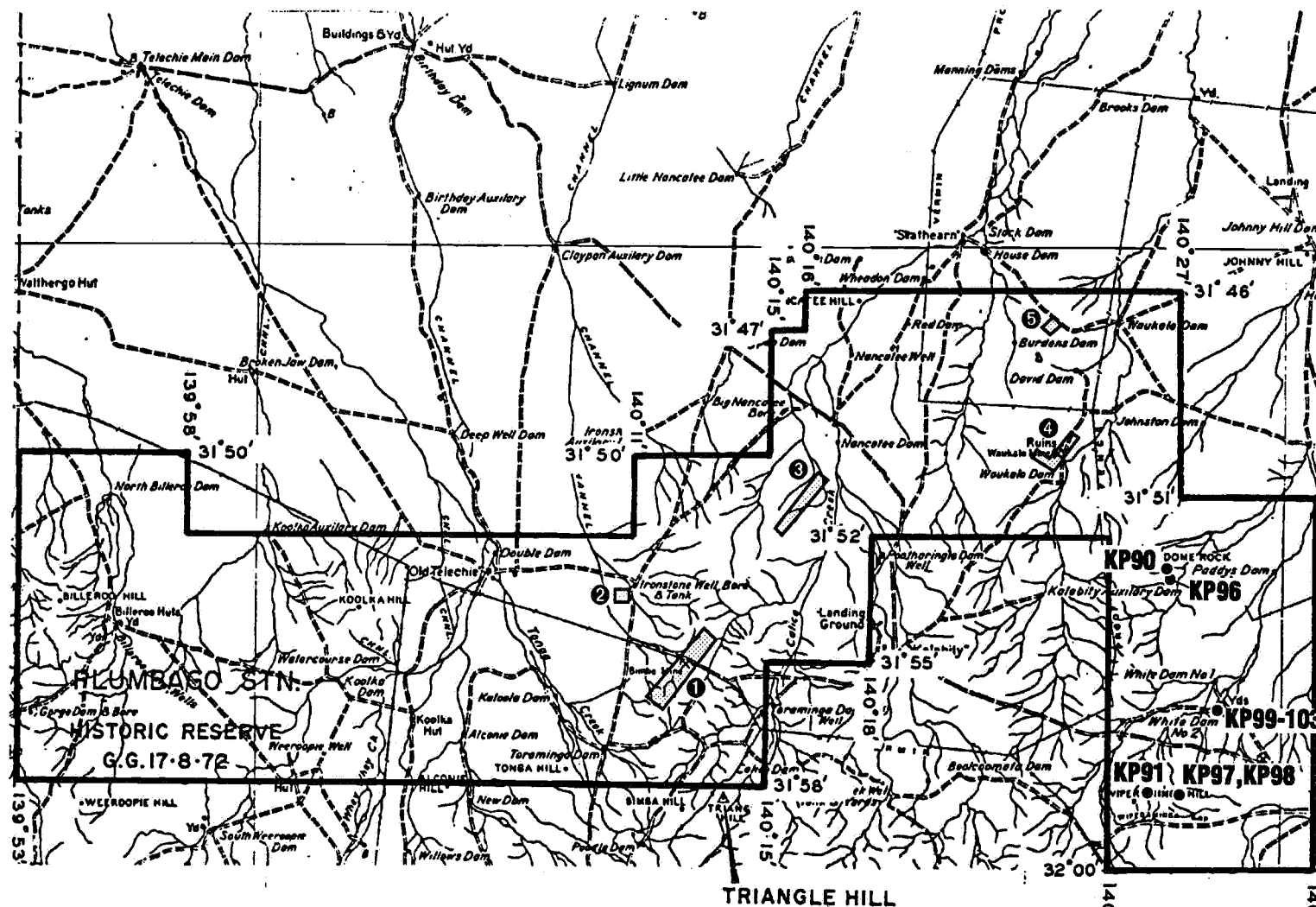
Diamond core drilling : 14 holes totalling 3566.63

Prospects drilled have included: Mt Howden/Toraminga/Telechie: 63 percussion, 13 diamond; Ironstone Well: 9 percussion; Calico Creek: 16 percussion, 1 diamond; Eagle Well: 4 percussion; Burdens Dam: 5 percussion; Waukaloo: 10 percussion; Dome Rock: 7 percussion; Wiperaminga: 3 percussion.



**Applicant / Title Holder:** Carpentaria Exploration Company Pty Ltd

**Figure 98**



**Drilled areas:**

① Mt Howden	63	percussion (KP Series), 13 diamond (KD1-5, 7-14)
② Ironstone Well	9	" (KP81,82, 85-89, 120, 121)
③ Calico Creek	16	" (KP18-31, 47, 116), 1 diamond (KD6)
④ Waukaloo	10	" (KP37-46)
⑤ Burdens Dam	5	" (KP32-36)

**Note: 896 shallow holes not shown**



**TENEMENT:** EL 430 (formerly SMLs 244, 531; related to EL 559, followed by EL 1471)

**AREA:** 1369 sq km

**COMMENCEMENT DATE:** 13/11/78

**EXPIRY DATE:** 12/11/80

**COMPANY:** Commonwealth Aluminium Corporation Limited

**ENVELOPE:** 3405

**REFERENCES:** Chaku, S K., 1980: Final Report EL 430, Lake Frome Commonwealth Aluminium Corporation Limited (unpublished)

**LOCATION:** Lake Frome

**1:250 000 SHEET:** CURNAMONA, FROME

**1:100 000 SHEET:** PASMORE 6835, FROME 6836

**TARGETS:** Trona (sodium carbonate)

**AGE/ROCK UNITS:** Thin Quaternary lake sediments overlying Tertiary (Miocene) Willawortina and Namba Formations.

**EXPLORATION SUMMARY:** From a review of South Australian Tertiary stratigraphy and playa lakes it was concluded that there was considerable similarity between the Miocene Stratigraphy in South Australia and the Wilkins Peak member (the world's largest trona producing formation) in the Green River Basin, USA. This prompted application for ELs 430 and 559.

Nine reverse circulation holes totalling 576 metres (CF 1 to CF 9) were drilled into the bed of Lake Frome. Holes were logged with gamma, spontaneous potential and resistivity probes where possible. Samples were collected at 2 metre intervals and carefully logged for the presence of evaporite minerals. Bulk samples were composited over 10 metre intervals for trace element analysis. Samples were collected from all aquifers. Ph and conductivity were measured and water was analysed for Cu, F, Mn, Fe, Sr, B, Li, U, V.

**MINERALISATION/PROSPECTS:** The drilling intersected 4 to 5 metres of unconsolidated lake sediments overlying Millyera Formation equivalents in the east and, in the west, the clastics of the Willawortina Formation up to 41 metres thick (CF 7) and pinching out to the east. Underlying this unit is the upper member of the Namba Formation consisting of light grey to greenish-grey clays with interbeds of dolomite/palygorskite clays. These rocks are disconformably underlain by the lower member of the Namba Formation only part of which was intersected. This member consists of grey silty to sandy clays with interbeds of dark grey possibly carbonaceous clays.

At least 2 to 3 aquifers were intersected in each hole. Trace element chemistry of the waters showed them to be chloride-rich, with low carbonate, sulphate and halide contents. All aquifers were remarkably constant in trace element composition. All values for Li, Sr, B, Br were consistently low. Uranium within the brines/aquifers ranged from 6 to 38 mg/l and was consistently higher in the deeper aquifers e.g. CF 6, 7.

It was concluded that there was an overall lack of evaporitic minerals in the Miocene sediments, only continental carbonates. The absence of penecontemporaneous volcanism may account for the lack of trona deposition.

**DRILLING:** Nine reverse circulation holes (CF 1 to CF 9) totalling 576 metres. One hole (CF1, 60 m) drilled on CURNAMONA.



**TENEMENT:** EL 435 (formerly SMLs 266, 513; 663, EL 40 Chevron; ELs 66, 90, 105, 178, 334, Southern Ventures; followed by EL 802, 1144, 1252, 1695; related to ELs 549, 957)

**AREA:** 2436 sq km

**COMMENCEMENT DATE:** 30/11/78

**EXPIRY DATE:** 12/11/80

**COMPANY:** MARATHON PETROLEUM AUSTRALIA, LTD

**ENVELOPE:** 3421

**REFERENCES:** Ellis, G.K., 1980: Technical Report Exploration Licence 435 (Lake Carnanto) for Period 30 November 1978 to 29 November 1980. Marathon Petroleum Australia, Ltd. (unpublished).

**LOCATION:** Lake Carnanto

**1:250 000 SHEET:** CURNAMONA, FROME

**1:100 000 SHEET:** BENAGERIE 6935, LAKE CHARLES 7035, COONARBINE 6936, THURLOOKA 7036

**TARGETS:** Sedimentary uranium, base metals.

**AGE/ROCK UNITS:** Quaternary overlying Tertiary Namba and Eyre Formation resting on a basement of Cretaceous Marree Formation clays and Cambrian? mudstone and shale (in south central part).

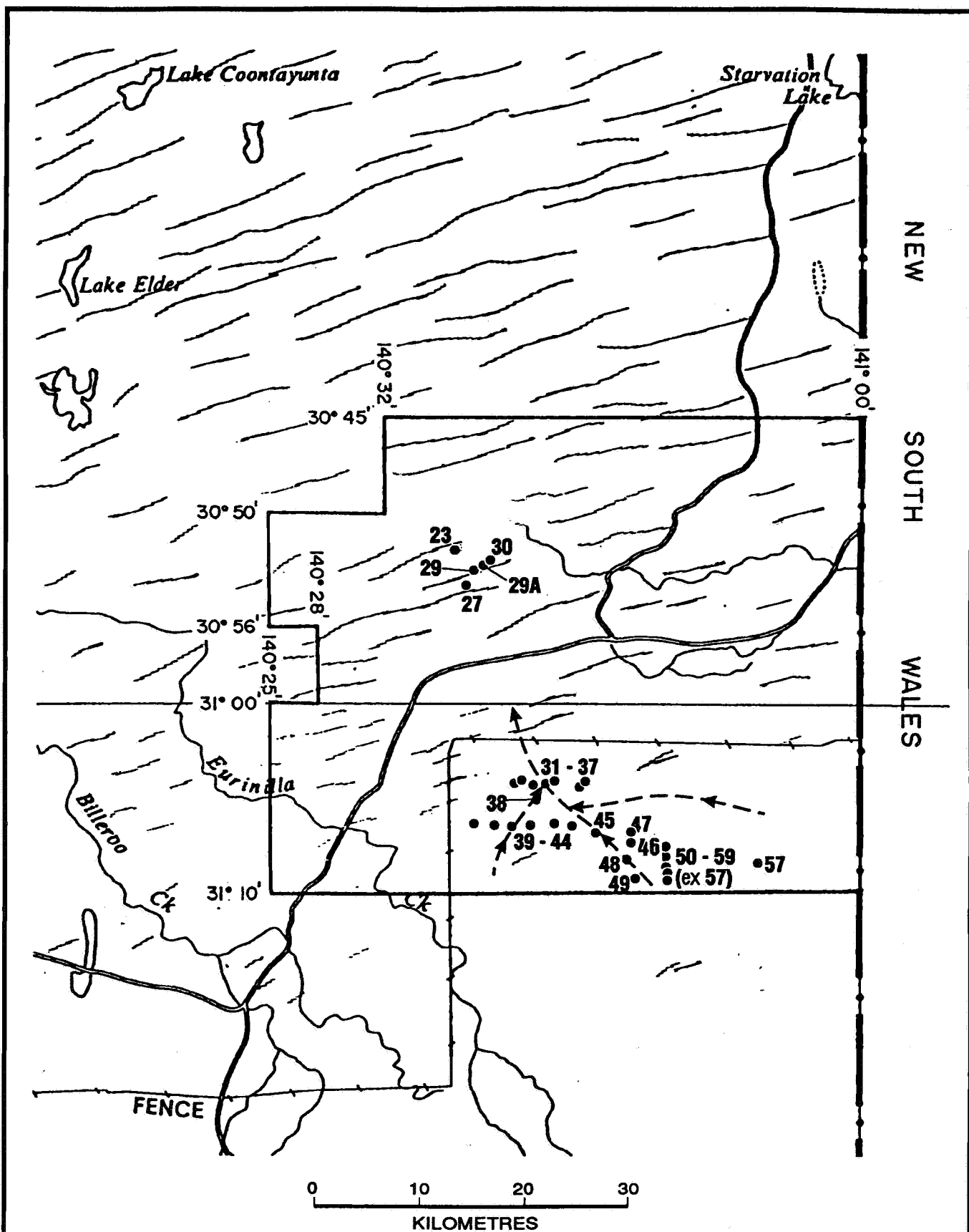
**EXPLORATION SUMMARY:** The licence was acquired with the objection of discovering a blanket or roll front type sedimentary uranium deposit and to follow-up the low grade mineralisation found by Chevron in QDH 2 and 3 and Southern Ventures in FE 44.

A 31 hole, 2561 metre rotary drilling programme was completed in January - February 1979 (LC 1 to LC 30), a second campaign of 15 holes totalling 1820 metres in October - November 1979 (LC 31 to LC 45) and a third campaign of 14 holes (LC 46 to 59) totalling 1326 metres in July 1980. All holes were logged with gamma, spontaneous potential and resistivity probes and the collars were accurately surveyed. Selected cuttings were analysed for Cu, Pb, Zn, Mo, V, Se, ThO<sub>2</sub> and U<sub>3</sub>O<sub>8</sub>. Water samples from two bores were analysed.

**MINERALISATION/PROSPECTS:** Minor uranium mineralisation was encountered in the vicinity of Chevron drill holes QDH 2 and 3 and Southern Ventures hole FE 44 however it is very thin, low grade and of limited extent. The best intersection was in LC 18 in which two 0.4 metre intervals of 200 to 250 ppm eU<sub>3</sub>O<sub>8</sub> were intersected at 23.6 and 27.6 metres in carbonaceous pyritic sandy and silty clays.

Low grade mineralisation was also discovered Lower Tertiary Eyre Formation sands in LC 56, 6.3 km east-south-east of Lake Charles Bore. The best interval was 180 ppm U<sub>3</sub>O<sub>8</sub> over 2 metres. The significance of this mineralisation is yet to be determined (see EL 802, Env 3421).

**DRILLING:** Sixty rotary holes (LC 1 to LC 59, incl. LC 29A) totalling 5707 metres. Note 29 holes totalling 3146 metres on CURNAMONA.



47 • Rotary percussion hole  
(prefix LC) 1 to 5959

Note : LC1 to 22 on FROME are not plotted

← - - - - - Approximate axis of  
palaeochannel

Figure 100

Applicant / Title Holder: Marathon Australia Ltd

Licence N° : EL 435

DME\_SA 93-1665

07/2/85

**TENEMENT:** EL 450 (formerly EL 263 followed by ELs 848, 1175)

**AREA:** 2205 sq km

**COMMENCEMENT DATE:** 12/3/79

**EXPIRY DATE:** 12/3/79 to 11/3/81 (EL 450)  
20/7/81 to 19/7/83 (EL 848)  
16/9/83 to 16/11/83 (EL 1175)

**COMPANY:** ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC

**ENVELOPE:** 3447, 4301

**REFERENCES:** Annual Report of Exploration to March 12, 1980. EL 450 South Australia.  
Exploration Licence 450, Plumbago. Final Report for Period Ending March 12, 1981.  
  
Exploration Licence 450, Plumbago Relinquishment Report for the Crockers and Radium Hill area, March 12, 1981.  
Esso Australia Ltd.

**LOCATION:** Plumbago

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934, OLARY 6933, MINGARY 7033

**TARGETS:** Copper, lead, zinc, uranium

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** Following on from the intensive uranium exploration under EL 263 work in EL 450 over the same large area was primarily directed towards the discovery of stratiform base metal deposits by geological mapping at varying scales, gossan prospecting and detailed grid follow-up with magnetics, Crone Pulse EM, percussion and limited diamond drilling. In early 1979 there was some carryover of the uranium exploration in the Mount Victoria area (Curnamona 1:25000) and at Radium Hill from EL 263. The Crockers and Radium Hill areas were relinquished on expiry of EL 450 in applying for EL 848 and ultimately EL 1175. Env 4301 is an excellent summary to work in these areas.

Focus of base metal exploration was on mapping the Bimba Suite, a distinctive sulphidic unit containing calc-silicate rocks and pyrite albite rocks within a pyritic quartz-sericite-feldspar schist. Esso estimated the strike length of this strongly folded unit within EL 450 to be between 70 and 200 km and at least 160 km in the Olary Province, perhaps 500 km. Most outcropping Bimba was mapped at 1:25000 scale followed by high quality 1:10000 scale (for extent of mapping see attached tabulation). Prospects, exclusive of Weekeroo Inlier, selected for detailed work were Putts North, Ameroo Hill and Perryhumuck Mine area (see drilling summary).

Uranium exploration was 1:1000 mapping and radiometrics at Windamerta North and South, Talbot Gum Prospect, underground mapping at Crockers Main Eastern; 1:25000 mapping at Radium Hill; and extensive helicopter grid flying (200 metre spaced lines at 60m terrain clearance) of all sulphide-graphite bearing sequence ie. Bimba and Pelitic Suites (see plan 3447 (III)-1).

Rock chip sampling at Perryhumuck Mine in 1979 showed up to 5.1 ppm Au in ironstone outcrop. This led to rock chip sampling with gold emphasis of Perryhumuck, Walter Outalpa, Walparuta Barite, Green and Gold, McDonald Hill, Faugh-a-Ballagh, Ameroo Hill South and Mount Bull. Best results were obtained at Perryhumuck (6.7 ppm Au), Green and Gold (4.65 ppm Au) and McDonald Hill (2.5 ppm Au). Follow-up involved Crone EM, magnetics and one diamond drill hole (PHD1) at Perryhumuck Mine and Crone EM survey between Green and Gold and McDonald Hill mines.

The Weekeroo Inlier programme involved stream sediment sampling with 514 sample locations mostly - 20 mesh, being collected at 6 to 7 per sq km over entire inlier and analysed for Cu, Pb, Zn, Ni, Co, Mn, Ba, As, Ag, Cd,  $P_2O_5$ . Maps for Cu, Pb and Zn. Interpretation and rock chip sampling (55 samples) notably of calc-silicates (Bimba?) near Dead Horse Corner led to selection of anomalies, all but one on the eastern side at Woolshed, Weekeroo North-East, Walparuta Bore, Walparuta Prospect, and Dead Horse Corner Prospect for follow-up with UTEM surveys, mapping and some magnetics. Percussion drilling followed at Weekeroo North-East, Walparuta Mine and Dead Horse Corner (one hole at each, see work and drilling summaries) to test UTEM anomalies.

The latest work was RAB drilling in the south-eastern EL; 113 holes for 2086m on three lines at Milky Dam to test a covered magnetic low defined by magnetic traverses; 12 holes for 522.5 on one line south of Wompinie and 13 holes for 158m on one line near Shorts Dam to test magnetic highs.

Bottom hole samples were analysed for Cu, Pb, Zn, Ag, Co, Mn, As, Ba,  $P_2O_5$ .

Twenty four stream sediment samples were collected north-west of Ameroo Hill.

No exploration was undertaken during the short term of EL 1175.

**MINERALISATION/PROSPECTS:** Annual Report March 12, 1980 contains a good description of Willyama geology and exploration techniques. Accent was on Bimba suite which was mapped in detail at Putts North. Probable Bimba at Ameroo Hill. The top of Bimba is generally defined by the first appearance of graphite in the sequence, and the base, though less well defined is often marked by the change from magnetite in the Upper Albite suite to iron sulphides (pyrite, pyrrhotite) in Bimba rocks. Magnetic data can thus be employed to define the base of Bimba and the overlying Pelitic Suite.

The grid helicopter radiometrics in mid-1979 showed 10 anomalies warranting follow-up principally in Putts Well area. Nine were located, explored and discounted for further investigation. Bimba gossans are usually anomalously radioactive due to scavenging (up to 400 ppm  $U_3O_8$ ) while the graphitic schists of the Pelitic Suite contain presumably syngenetic uranium in the range 50-150 ppm. Drilling at Putts failed to show primary uranium below Bimba gossans. Crone PEM was completed after drilling and showed no anomalies.

Drilling of gossans at Putts North intersected a range of pyritic (locally up to 35%) rock types in the Bimba - Upper Albite interval with relatively long intervals of low grade Zn eg. PP8, 7m at 0.42% Zn in pyritic epidote-diopside-albite rock; PP6, 49m at 0.24% Zn in pyrite-quartz-albite rock; PP7 13m at 0.22% Pb and 29m at 0.19% Zn in Bimba. Samples were assayed for Cu, Pb, Zn, Ag, Co, Ba. Highest 1m intervals Cu 0.26% in PP2, Pb 0.62% in PP7, Zn 0.59% in PP8, Ag 11 ppm in PP6. PP6 showed 30m at 0.14% Pb (very anomalous).

Overall lead values are very anomalous in the Bimba at Putts North.

Ameroo Hill gossans showed up to 3.8% Cu, 0.16% Pb, 0.31% Zn, 40 ppm Ag. Drilling showed AP1 with 8m at 0.37% Zn in Bimba pyritic (up to 25%) biotite albite rock and AP2 with best 9m at 0.37% Zn in predominantly albite-calcite-pyrite rock (pyrite up to 50-80%). AP3 showed best 0.13% Cu over one metre in magnetite-quartz-barite rock. Assayed for Cu, Pb, Zn, Ag, Ni, Co, Mn, As, Au, Ba. Highest values in Bimba at AP1 & 2 Cu 440 ppm, Pb 380 ppm, Zn 9500 ppm, Ag 3 ppm, Ba 20%. Note no gold detected in any samples.



PHD1 at Perryhumuck Mine intersected 3.6m of massive magnetite with 5-10% pyrite/pyrrhotite assaying 0.13% Cu including 0.9m at 0.18% Cu, 0.2 g/t Au. Note no reproduction of surface Au values (19 samples with up to 6.7 g/t Au, 0.41% Cu). Fresh rock from dump showed best 0.6 g/t.

Green and Gold Mine in 19 rock chip samples yielded up to 4.65 g/t Au, best Cu 1.94%, Zn <200 ppm, best Ag 2 ppm, best Pb 46 ppm while McDonald Hill Mine showed Au up to 2.5 g/t and Cu to >1% in 10 samples. Crone EM between two mines showed only weak conductor extending throughout grid. No drilling resulted.

Drilling of UTEM anomalies in Weekeroo Inlier intersected graphitic biotite schists with disseminated pyrite at Walparuta and Dead Horse Corner and biotite-sericite-garnet schist with pyrite and some graphite at NE Weekeroo. All holes showed weak metal values. Calc-silicate rocks (possibly Bimba) were mapped and sampled between Walparuta and Dead Horse Corner. No attempt was made to follow up stream geochemistry with soils.

The 1:25000 mapping and data review for Radium Hill lead to the conclusion it was a vein-type uranium deposit for which the ore potential was not only short of Esso's objectives but also in areas which were too deep.

The overall programme was well executed with particular emphasis on high quality 1:5000 to 1:25000 geological mapping in order to unravel the lithostratigraphy and structure of the Willyama rocks especially at the levels of the Bimba and Upper Albite suites. Envelope 4301 provides excellent summary of uranium exploration at Crockers Well and Radium Hill.

## DRILLING:

### Percussion Drilling

<u>Prospect</u>	<u>Holes Nos</u>	<u>Number</u>	<u>Metres</u>
Putts North	PP1-9	9	869
Ameroo Hill	AP1, 2, 3	3	305
North-East Weekeroo	NEWP1	1	180
Walparuta Mine Area	WPP1	1	230
Dead Horse Corner	DHP1	1	180
SUB-TOTAL		<u>15</u>	<u>1764</u>

Diamond Drilling

Perryhumuck Mine	PHD1	1	180
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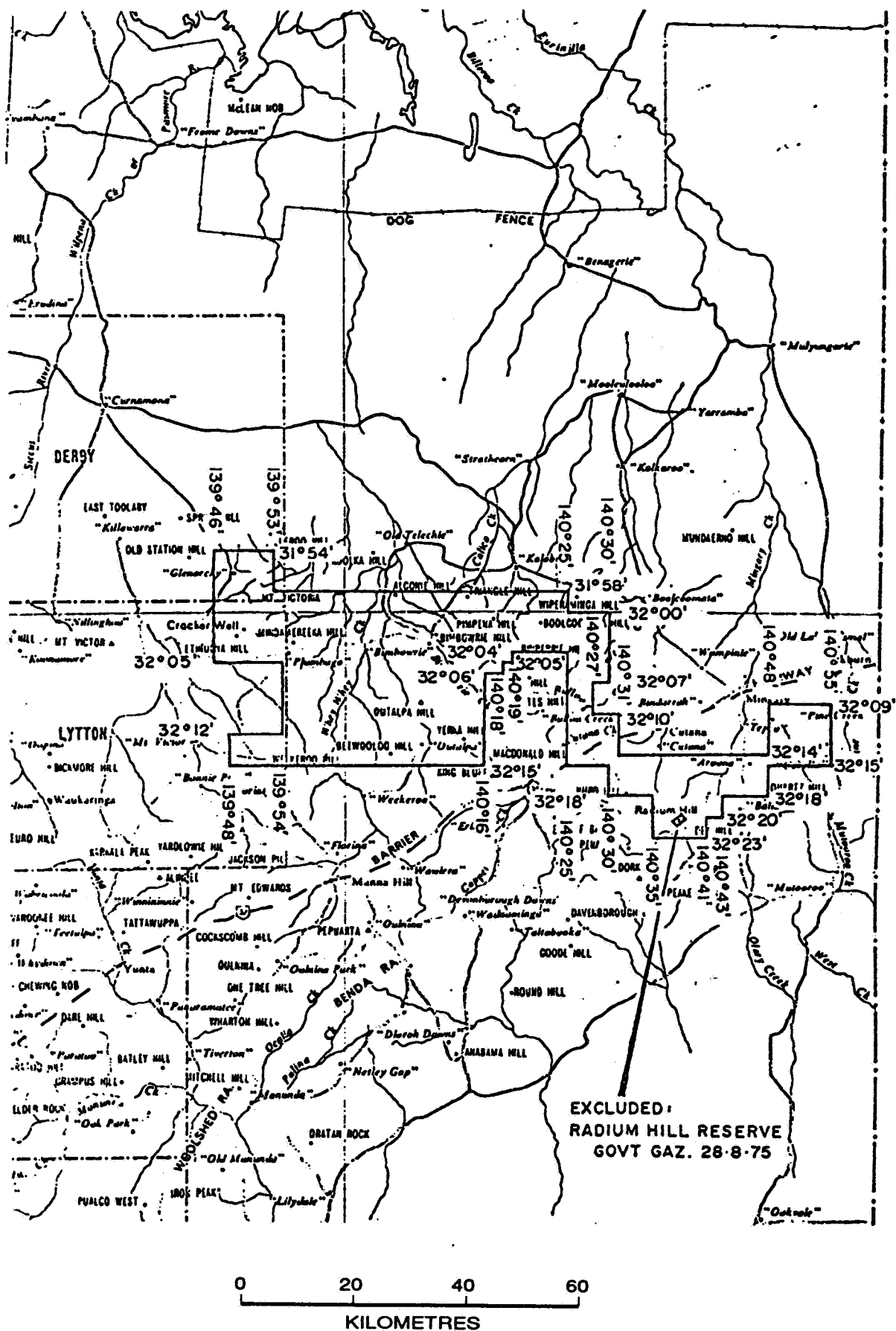
COMBINED TOTAL

15 percussion holes totalling 1764 metres.  
1 diamond drill hole 180 metres.

RAB Drilling

<u>Prospect</u>	<u>No of Holes</u>	<u>Metres</u>
Milky Dam	113 (3 lines)	2086
South of Wompinie	12 (1 line)	522.5
Near Shorts Dam	13 (1 line)	158
TOTAL	<u>138</u> holes for	<u>2766.5</u> metres

Note all drilling is on OLARY.



**Applicant / Title Holder:** Esso Exploration and Production Aust. Inc.

**Licence N° : EL 450**

**DME SA 93-1666**

**TENEMENT:** EL 457 (followed by EL 848)

**AREA:** 1527 sq km

**COMMENCEMENT DATE:** 13/3/79

**EXPIRY DATE:** 29/3/81

**COMPANY:** ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC

**ENVELOPE:** 3448

**REFERENCES:** Robinson, P, 1981: Exploration Licence 457-Wompinie Final Report for the Period ended March 30, 1981. Esso Australia Limited.

**LOCATION:** Mingary

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** MINGARY 7033, MULYUNGARIE 7034, OLARY 6933

**TARGETS:** Copper, lead, zinc, uranium

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** Geology involved 1:83000 photogeology as part of the Willyama study, 1:25000 mapping of most of the EL and gossan search. Thirteen low-order radiometric anomalies from SADME airborne survey were selected for ground follow-up. Two zones with gossan outcrops were selected for detailed appraisal.

**Shorts Dam:** Helicopter spectrometry (60m height, 200m spaced lines) over 16 sq. km; 7400m x 1000m grid followed by 1:10000 geology (22.5 sq. km); collection of 47 gossan samples assayed for Cu, Pb, Zn, Ag, Co, Ni, Au, Bi, Ba, U<sub>3</sub>O<sub>8</sub> and ThO<sub>2</sub>; magnetics on 200m x 25m stations; 10 850m of Crone Pulse EM; 3 traverses of McPhar VHEM; test gravity survey over 500m x 1000m area; collection and analysis of 216 soil samples and the drilling of 12 percussion holes totalling 1153m (SP1 to SP12, deepest 174m) and 8 shallower RAB type holes totalling 62m (SR1 to SR8) with assays for Cu, Pb, Zn, Ag, Au, Ni, Co, Mn, Ba.

**Wompinie Prospect:** 5000m x 1500m grid followed by 1:10000 geology; gossan sampling; magnetics on 200m x 25m stations; and 23 km of Crone Pulse EM on 100m spaced lines.

**MINERALISATION/PROSPECTS:** Follow-up of radiometric anomalies showed only two could be related to detectable anomalies on the ground, a radioactive gossan at Shorts Dam and an epidote quartzite 4.5 km WSW of Oonarttra Well. At Shorts Dam tightly folded gossans occur in several lines throughout the grid with assays up to 0.19% Cu, 870 ppm Zn, 350 ppm Co, 200 ppm Pb, 4 ppm Ag, 285 ppm U<sub>3</sub>O<sub>8</sub>, no Au. EM showed well defined anomalies and drilling intersected, massive to semi-massive iron sulphides (pyrrhotite/pyrite) within minor chalcopyrite and sphalerite in calc-silicates/albitites of Suite 2 (Bimba Fm). Best intervals were 8m at 0.23% Cu (SP11), 7m at 0.18% Cu (SP9), 6m at 0.24% Zn (SP8) and 5m at 0.27% Co (SP4). SP12 showed 20m of strong sulphides with 11m at 0.14% Cu. Mapping showed Suite 1 (Pelitic-Carbonaceous), Suite 2 (Bimba), and Suite 3 (Upper Albite) common north of Barrier Highway but only Suite 4 south of this line.

At Wompinie Prospect "gossan" samples showed up to 510 ppm Zn but values for other elements including Au were low. The ironstones were not drilled because EM showed no anomalies and there was paucity of sulphide boxworks in the gossan. A strong magnetic anomaly at the south end of the grid about 3km south-west of Wompinie HS was not drilled.

DRILLING: 12 percussion holes at Shorts Dam in 1979 (SP1-12) totalling 1153 metres. 8 very shallow percussion holes at Shorts Dam (SR1-8) totalling 62 metres.

Note all drilling is on OLARY.

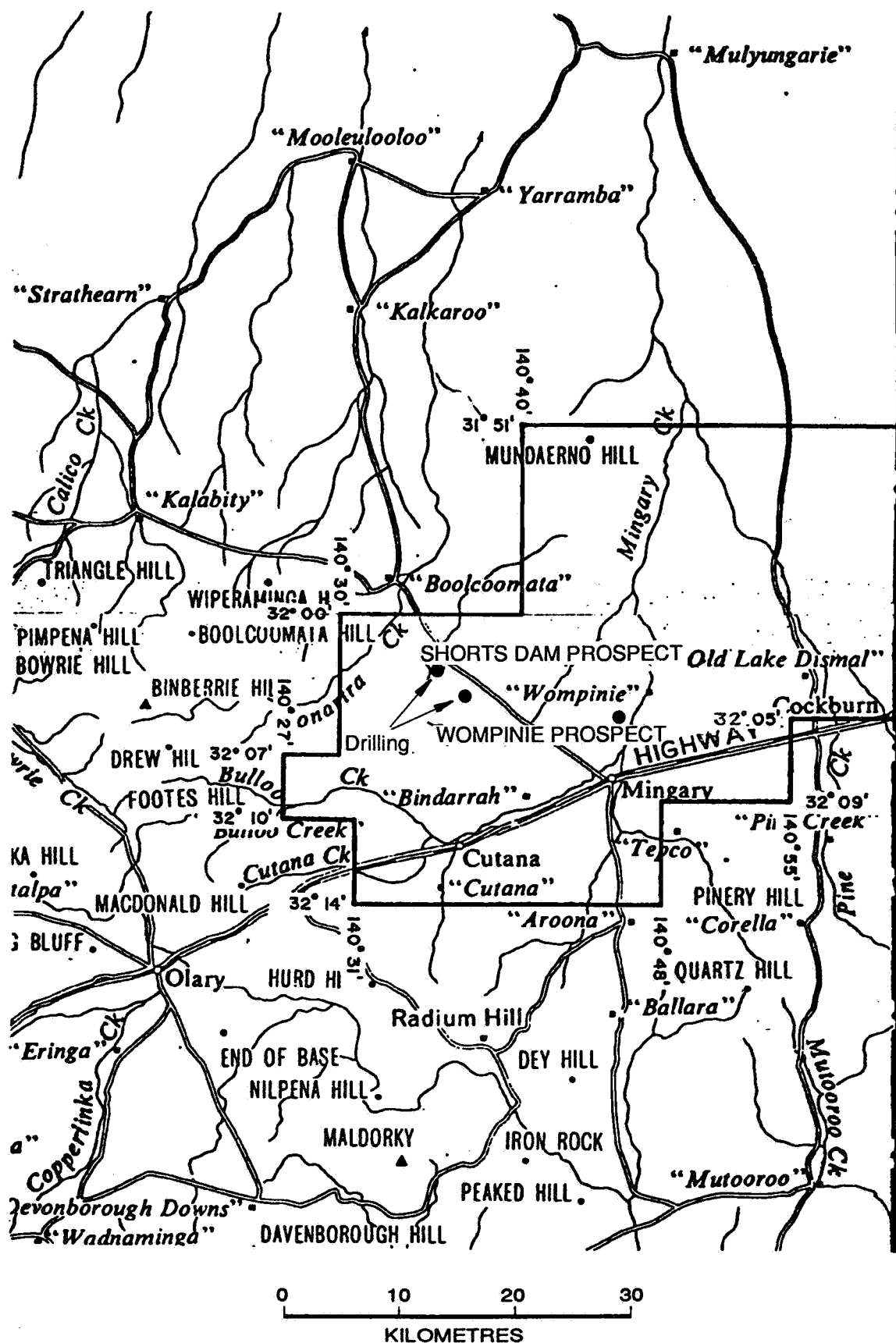


Figure 102

Applicant / Title Holder: Esso Exploration and Production Australia Inc.

Licence N° : EL 457

DME\_SA 93-1667

**TENEMENT:** EL 463 (formerly SMLs 244, 589; followed by EL 1471).

**AREA:** Initially 721 sq km reduced to 279 sq km

**COMMENCEMENT DATE:** 12/4/79

**EXPIRY DATE:** 11/4/80

**COMPANY:** MATFOR MINING PTY LTD

**ENVELOPE:** 3542

**REFERENCES:** Braithwaite, J C., 1980; Report on Lake Frome Attapulgit

**LOCATION:** Lake Frome South

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** PASMORE 6835, BENAGERIE 6935

**TARGETS:** Palygorskite (attapulgit)

**AGE/ROCK UNITS:** Tertiary (Miocene) Namba Formation

**EXPLORATION SUMMARY:** Attapulgit was initially described by Barnes, Olliver and Spencer in SADME Rept Bk 78/96 and early samples showed promise. The mineral is associated with dolomite in the Miocene Namba Formation. Four samples were collected from four backhoe trenches E, F, G and H in the southern part of the licence east of Gibsons Catch. The samples were forwarded to a laboratory at Nelson NZ where analyses of moisture, absorptive capacity and rheology in broad accord with API standards (test report enclosed).

**MINERALISATION/PROSPECTS:** The green palygorskite clay layer with a minimum thickness of 8 metres was best developed near Jadiaura Creek and towards Lake Tom Claypan.

Testwork showed the rheology of the clay was appreciably below the API standard, achieving only half the required viscosity.

It was concluded the attapulgit was generally of low grade.

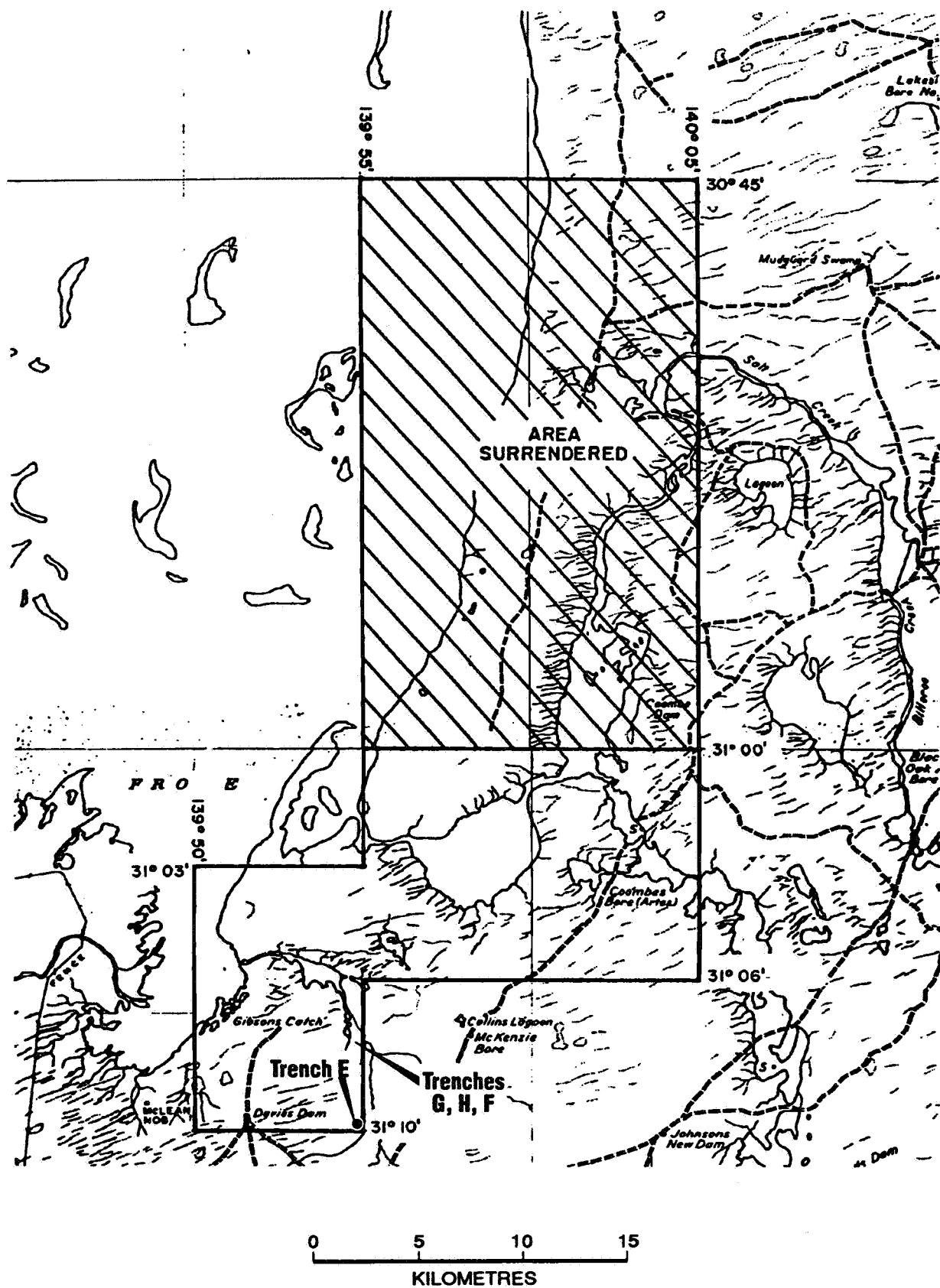


Figure 103

Applicant / Title Holder: Matfor Mining Pty Ltd

Licence N° : EL 463

DME\_SA 93-1668



**TENEMENT:** EL 522 (formerly SMLs 414, 697 Sedimentary Uranium, EL 89 Southern Ventures, EL 296 Minad-Teton; followed by EL 911, 1203 Minad-Teton, 1487, 1684, 1648).

**AREA:** 351 sq km

**COMMENCEMENT DATE:** 27/8/79

**EXPIRY DATE:** 26/8/81

**COMPANY:** MINES ADMINISTRATION PTY LIMITED AND TETON EXPLORATION DRILLING CO PTY LTD

**ENVELOPE:** 3614

**REFERENCES:** Curtis, J.L. and Moore, M.G., 1982: Proterozoic Basement Exploration 1979-82 EL 911 Lake Namba Area (Billeroo Creek) Mines Administration Pty Limited (unpublished).

**LOCATION:** Ethelmere

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935

**TARGETS:** Copper, gold, uranium

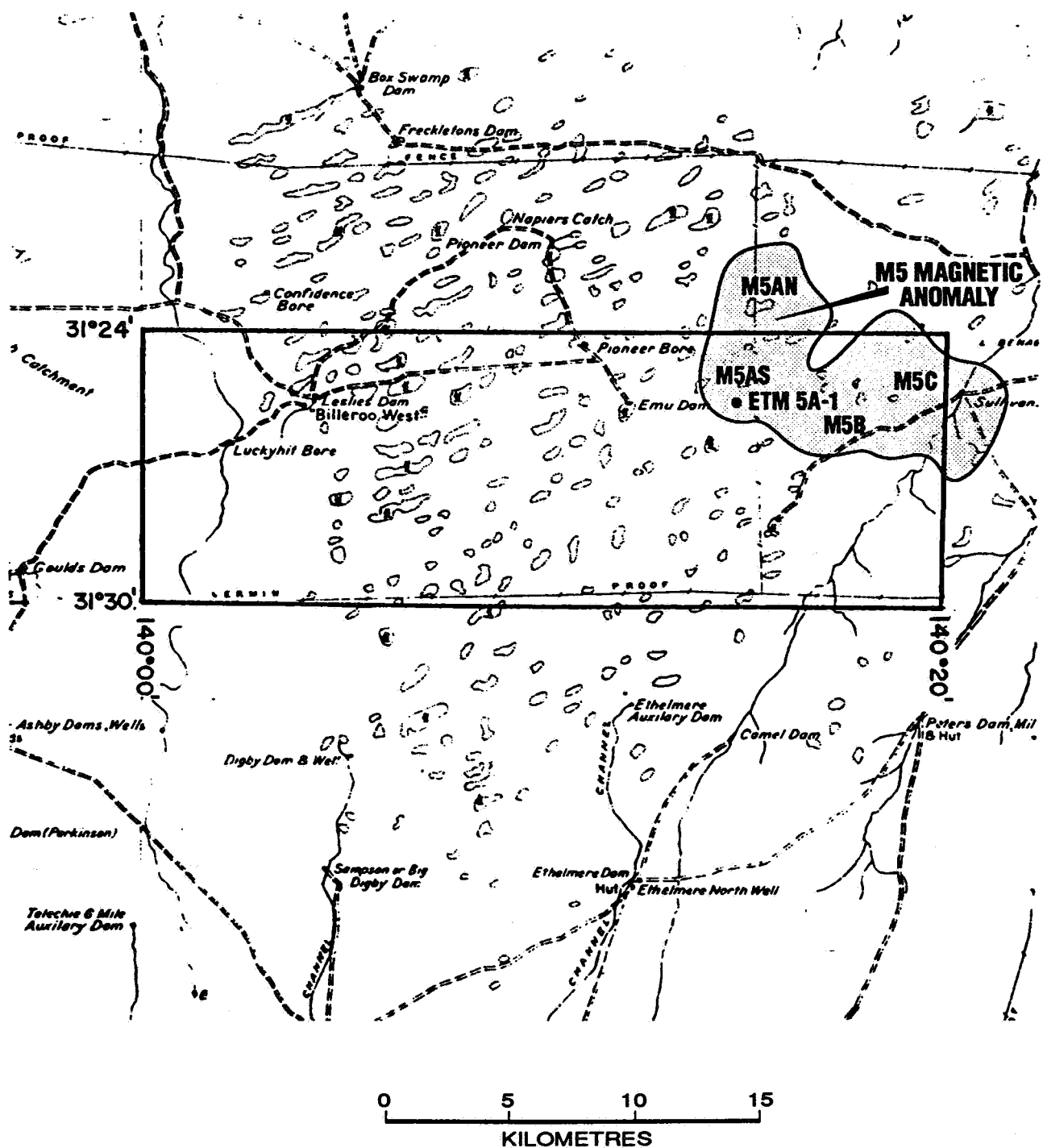
**AGE/ROCK UNITS:** Cainozoic sediments, principally Tertiary Namba Formation, overlying Adelaidean sediments unconformably resting on Mesoproterozoic acid volcanics.

**EXPLORATION SUMMARY:** Geoex Pty Ltd were contracted between August and October 1979 to define airborne magnetic anomaly M5 by gridding, ground magnetic and gravity surveys. This anomaly between Emu and Sullivan Dams was covered with seven 1 to 2 km spaced lines with two supplementary infill lines totalling 60 km. Magnetic readings were taken at 100 metre spacing along lines with gravity stations at 200 metres. The ground detail lead to differentiation into four individual anomalies M5A north, M5A south, M5B, M5C. Diamond drill hole ETM 5A-1 was drilled vertically to 541.5 metres in April-May 1981 to test the interpreted shallowest anomaly M5A south about 4 km east of Emu Dam. The hole was open to 83 metres. It was logged with gamma, neutron, spontaneous potential, resistivity and uncontrolled density probes from surface to 490 metres. Systematic magnetic susceptibility and density measurements were made on core samples and there was limited geochemical sampling of the core : 5 samples of basement volcanics were analysed for Cu, Pb, Zn, Co, U, Mo, Sn, W, Ce, Nb, Y, Zr, Fe, Ti, Na, K, Si and Al. Petrological descriptions of core are provided.

**MINERALISATION/PROSPECTS:** Ground magnetic data corresponded well with the airborne anomaly. The diamond drillhole intersected 76 metres of Cainozoic rocks, principally Tertiary Namba Formation, followed by 369 metres of Adelaidean rocks of the Upper Umberatana and Wilpena Groups before intersecting an angular unconformity at 444.6 metres and penetrating massive pink rhyolite? ('Benagerie Volcanics') believed to be Mesoproterozoic. The rocks consisting of sodic and potash feldspar plus quartz show alteration in the form of ubiquitous ultrafine haematite, patchy pervasive magnetite, and minor pyrite and marcasite. Geochemical values were not anomalous. Magnetic susceptibility measurements showed volcanics by virtue of their magnetite content had a thirty fold contrast with the overlying sediments thus explaining the cause of the magnetic anomaly while SG measurements showed there was insufficient density contrast to explain the 0.3 to 3.5 mgal residual bouguer anomaly associated with the magnetic anomaly.

DRILLING: One diamond drillhole (ETM5A-1) to 541.5 metres.

ETM 5 on Cornamona



ETM 5A - 1 • Diamond drillhole

Figure 104

Applicant / Title Holder: Mines Administration Pty Ltd and  
Teton Exploration Drilling Co. Pty. Ltd

Licence N° : EL 522

DME\_SA 93-1669

**TENEMENT:** EL 523 (formerly SML 267 Rudd; SML 544, EL 42 Pacminex (Esso); EL 297 Minad-Teton; followed by EL 911, 1203, Minad-Teton 1487, Placer).

**AREA:** 161 sq. km.

**COMMENCEMENT DATE:** 27/8/79

**EXPIRY DATE:** 26/8/81

**COMPANY:** MINES ADMINISTRATION PTY LIMITED, TETON EXPLORATION DRILLING CO PTY LTD

**ENVELOPE:** 3615

**REFERENCES:** Dodds, A.R; 1980: Report on a Magnetic Field and Gravitation Field Survey Lake Frome S.A. for Mines Administration Pty Limited, Geoex Pty Ltd. (unpublished)

**LOCATION:** Telechie

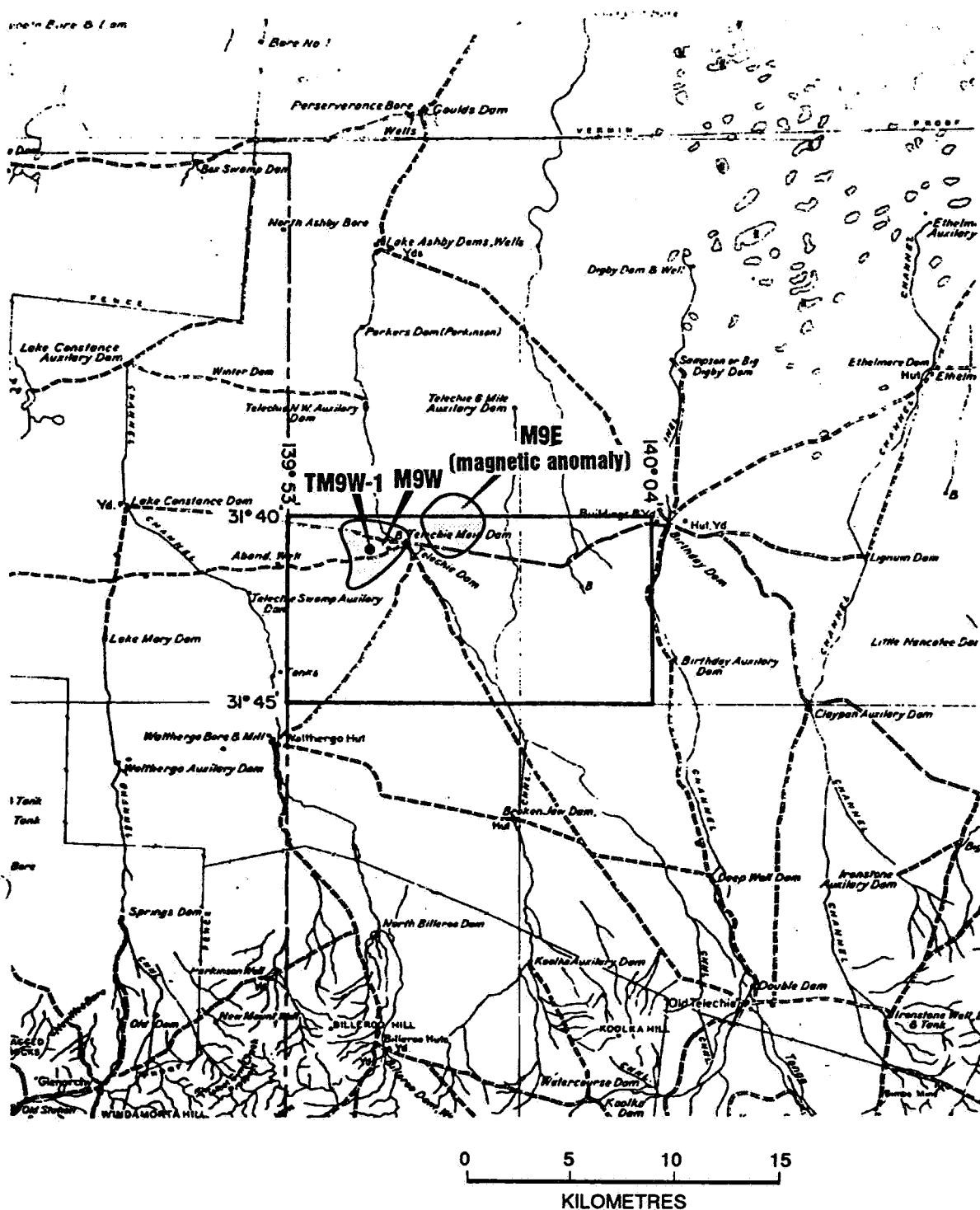
**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934

**TARGETS:** Copper, gold, uranium.

**AGE/ROCK UNITS:** Quaternary and Tertiary sediments resting on Precambrian basement.

**EXPLORATION SUMMARY:** Interest in this EL centred around basement magnetic anomaly M9 initially selected by Ashley in 1978 (see EL 411). This was one of four anomalies selected for ground definition in August - October 1979 by Geoex Pty Ltd by gridding on thirteen 500 to 1000 metre spaced lines (44 line km) and completing magnetic surveys at 100 metre station spacing and gravity at 200 metre station spacing. The initial survey of M9 lead to a follow up survey with more detail in 1981 again by Geoex. The latter survey differentiated the original circular anomaly into two bullseye anomalies, eastern (M9E) and western (M9W), the latter interpreted to have a source 400 metres or more shallower than the former, the original depth estimate from the initial survey having been 1150 to 1500 metres. A decision was made to test M9W with a drill hole to an estimated depth of 600 metres in the latter stages of the EL term (August 1981) when the hole was precollared to 135 metres (for follow - on details see EL 911, Env 3614).



TM9W-1 • Diamond drillhole

Figure 105

Applicant / Title Holder: Mines Administration Pty Ltd and  
Teton Exploration Drilling Co Pty Ltd  
Licence N° : EL 523

DME\_SA 93-1670

580927.44

**TENEMENT:** EL 549 (formerly SMLs 414, 513, 514; ELs 66, 87, 385; followed by ELs 957, 1391, 1608, 1684, 1693).

**AREA:** 1521 sq km

**COMMENCEMENT DATE:** 13/11/79

**EXPIRY DATE:** 12/11/81

**COMPANY:** MARATHON PETROLEUM AUSTRALIA, LTD

**ENVELOPE:** 3713

**REFERENCES:** Ellis, G.K., 1981: Technical Report Exploration Licence 549 (Benagerie) for Period 13 November 1979 to 12 November 1980 Marathon Petroleum Australia, Ltd (unpublished).

Yeaton, J.W., 1981: Technical Report Exploration Licence 549 (Benagerie) for Period 13 November 1980 to 12 November 1981 Marathon Petroleum Australia, Ltd (unpublished).

**LOCATION:** Benagerie

**1:250 000:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935, LAKE CHARLES 7035

**TARGETS:** Sedimentary uranium initially then copper, gold uranium.

**AGE/ROCK UNITS:** Eastern flank of the Benagerie Ridge. Quaternary sediments above Tertiary Namba and Eyre Formations (especially in the eastern part) resting on a basement of Cretaceous clays in the east and Proterozoic slate/metasiltstone in the west.

**EXPLORATION SUMMARY:** The eastern portion of EL 549 and adjoining EL 679 was a joint venture with the Oilmin Group. Between November 1979 and July 1980 there were three rotary drilling campaigns totalling 100 holes (BE 1 to BE 100) and 9196 metres to test for sedimentary uranium in Tertiary palaeochannels. All holes were logged with gamma, spontaneous potential and resistivity probes and collars were accurately surveyed. Selected cuttings were analysed for Cu, Pb, Zn, As, Mo, V, Se, Ag, Au, Co, Ni, S, ThO<sub>2</sub> and U<sub>3</sub>O<sub>8</sub>. A similar programme of 61 rotary holes (BE 101 to BE 161) totalling 6022 metres was completed in July-August 1981.

**MINERALISATION/PROSPECTS:** The Lower Tertiary "blanket sands" are light grey brown coarse to very coarse grained, and subrounded to rounded. They are 20 to 30 metres thick and commence between 70 and 80 metres below surface. A north-south palaeochannel was found in the western part of the EL but it contained no uranium. Uranium mineralisation was discovered in palaeochannel sands in the north-eastern part of the EL in carbonaceous pyritic fluvial sand of the Eyre Formation in association with an iron redox interface ("roll-front"). The mineralisation occurs at depths between 80 and 90 metres as thin (mostly less than one metre) higher grade zones generally surrounded by thicker low grade mineralisation. The more significant intersections were in holes BE 40, 42, 43, 52, 55, 56, 72, 74, 110, 123, 125, 135 and 159 with highest grades being 1 metre at 0.25% eU<sub>3</sub>O<sub>8</sub> in BE 135 and 3 metres at 0.12% eU<sub>3</sub>O<sub>8</sub> in BE 125 from 87.9 metres. Geochemical analyses of bottom hole samples showed strongly pyritic intervals in slates of BE 7 in the south-west of the EL near Benagerie H.S. with up to 2000 ppm Cu, 60 ppm Mo and BE 37 with up to 1900 ppm Cu, 760 ppm Pb and 130 ppm Zn. Other holes with anomalous metal values in Proterozoic basement included

BE 6 (20 ppm Ag), BE 39 (350 ppm Cu), and Be 61 (530 ppm Cu, 130 ppm Zn). All these assays were over one metre intervals near the bottom of hole although BE 7 showed abundant pyrite and anomalous copper geochemistry from 120 to near 144 metres.

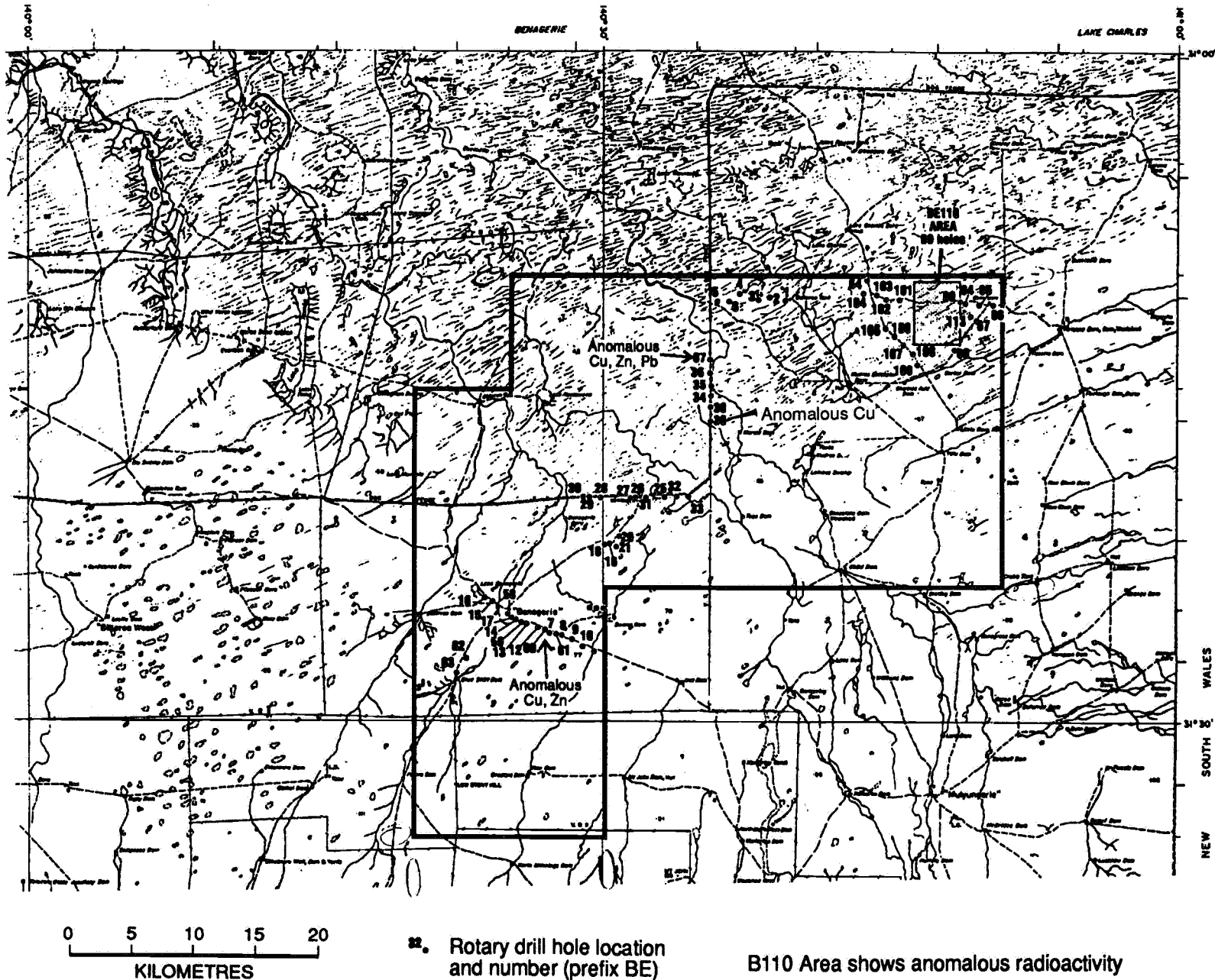
DRILLING: 161 rotary holes (BE 1 to BE 161) totalling 15218 metres.

Licence N° : EL 549

Applicant / Title Holder: Marathon Petroleum Australia Ltd

DME\_SA 93-1671

Figure 106





**TENEMENT:** EL 559 (formerly SMLs 244, 503, 589; followed by EL 1683; adjoins EL 430)

**AREA:** 1352 sq km

**COMMENCEMENT DATE:** 13/11/79

**EXPIRY DATE:** 12/11/80

**COMPANY:** COMMONWEALTH ALUMINIUM CORPORATION LIMITED

**ENVELOPE:** 3692

**REFERENCES:** Chaku, S.K., 1980: Final Report EL 559. Lake Frome North, Commonwealth Aluminium. (unpublished).

**LOCATION:** Lake Frome North

**1:250 000 SHEET:** CURNAMONA, FROME (principally)

**1:100 000 SHEET:** PASMORE 6835, FROME 6836, COONARBINE 6936

**TARGETS:** Trona (sodium carbonate)

**AGE/ROCK UNITS:** Thin Quaternary lake sediments overlying Tertiary (Miocene) Willawortina and Namba Formations.

**EXPLORATION SUMMARY:** From a review of South Australian Tertiary stratigraphy and playa lakes it was concluded that there was considerable similarity between the Miocene stratigraphy in South Australia and the Wilkins Peak Member (the world's largest trona producing formation) in the Green River Basin U.S.A. This prompted application for ELs 559 and 430.

On ELs 430/559 nine reverse circulation (CF 1 to CF 9) were drilled into the bed of Lake Frome. CF 9 is situated near but west of the southern boundary of EL 559 otherwise all holes were within EL 430. Holes were logged with gamma, spontaneous potential and resistivity probes where possible. Samples were collected at 2 metre intervals and carefully logged for the presence of evaporite minerals. Bulk samples were composited over 10 metre intervals for trace element analysis. Water samples were collected from all aquifers, Ph and conductivity were measured and the water was analysed for Cu, F, Mn, Fe, Sr, B, Br, Li, U, V.

**MINERALISATION/PROSPECTS:** The drilling intersected 4 to 5 metres of unconsolidated lake sediments overlying Millyera Formation equivalents in the east, and in the west clastics of the Willawortina Formation up to 41 metres thick (CF 7) and pinching out to the east. Underlying this unit is the upper member of the Namba Formation consisting of light grey to greenish grey clays with interbeds of dolomite/palygorskite clays. These rocks are disconformably underlain by the lower member of the Namba Formation only part of which was intersected. This member consists of grey silty to sandy clays with interbeds of dark grey possibly carbonaceous clay.

At least 2 to 3 aquifers were intersected in each hole. Trace element chemistry of the waters showed them to be chloride rich with low carbonate, sulphate and halide contents. All aquifers were remarkably constant in trace element composition. All values for Li, Sr, B, Br were consistently low. Uranium within the brines/aquifers ranged from 6 to 38 mg/l and was consistently high in the deeper aquifers eg CF 6, 7.

It was concluded there was an overall lack of evaporite minerals in the Miocene sediments, only continental carbonates. The absence of penecontemporaneous volcanism may account for the lack of trona deposition.

For drill statistics see EL 430.

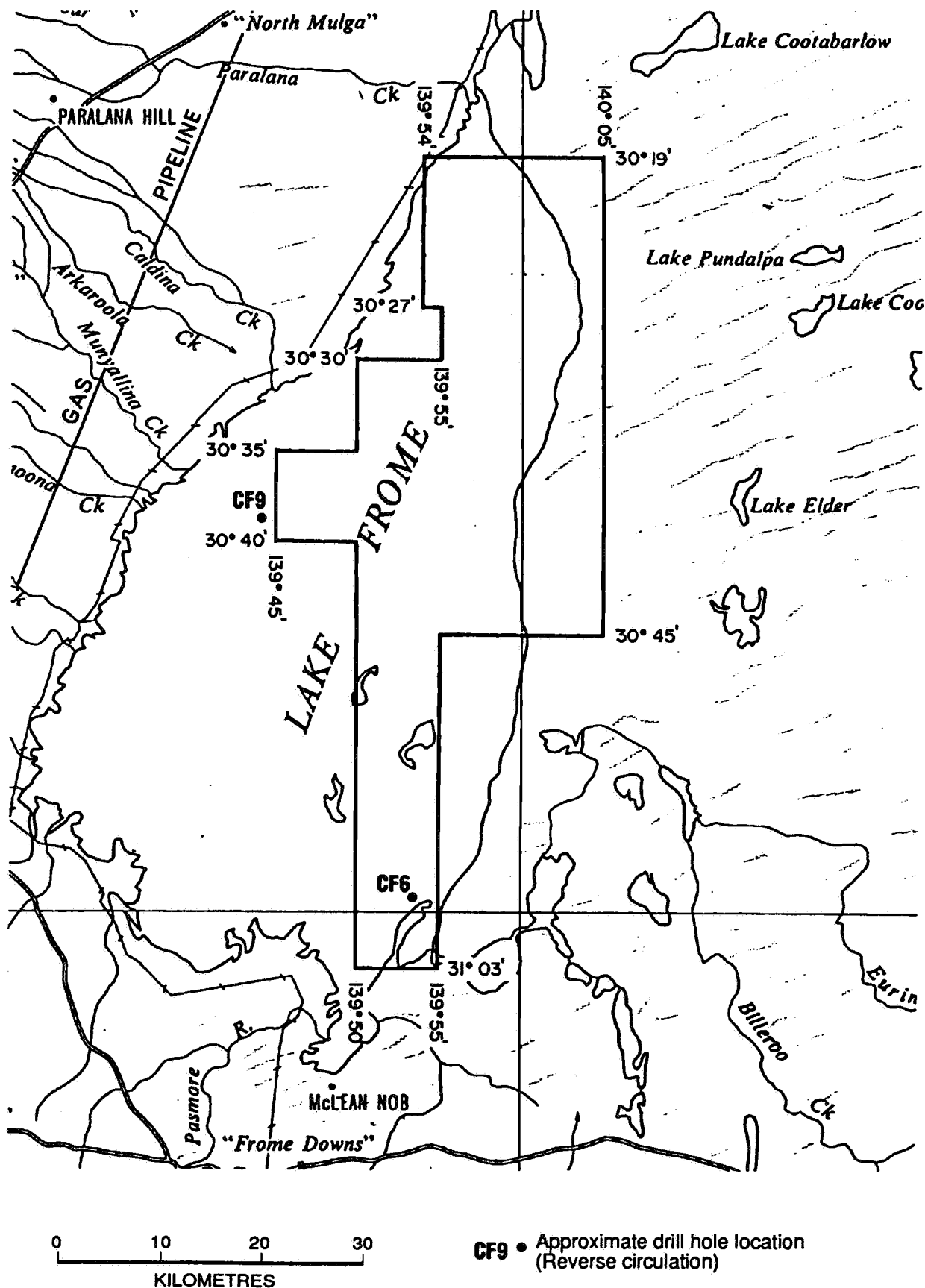


Figure 107

Applicant / Title Holder: Commonwealth Aluminium Corporation Ltd

Licence N° : EL 559

DME\_SA 93-1672

**TENEMENT:** EL 597 (formerly SMLs 222, 440, 595, 714, ELs 85, 132, 259, 377; followed by 1004, 1412, 1786).

**AREA:** 818 sq km

**COMMENCEMENT DATE:** 13/3/80

**EXPIRY DATE:** 12/3/82

**COMPANY:** CARPENTARIA EXPLORATION COMPANY PTY LTD, MINES ADMINISTRATION PTY LIMITED, TETON EXPLORATION DRILLING CO PTY LTD.

**ENVELOPE:** 3203

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Kalkaroo

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934, MULYUNGARIE 7034

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Quaternary sediments above Tertiary Namba and Eyre Formations resting unconformably on basement of Cretaceous clays and Palaeoproterozoic Willyama Supergroup.

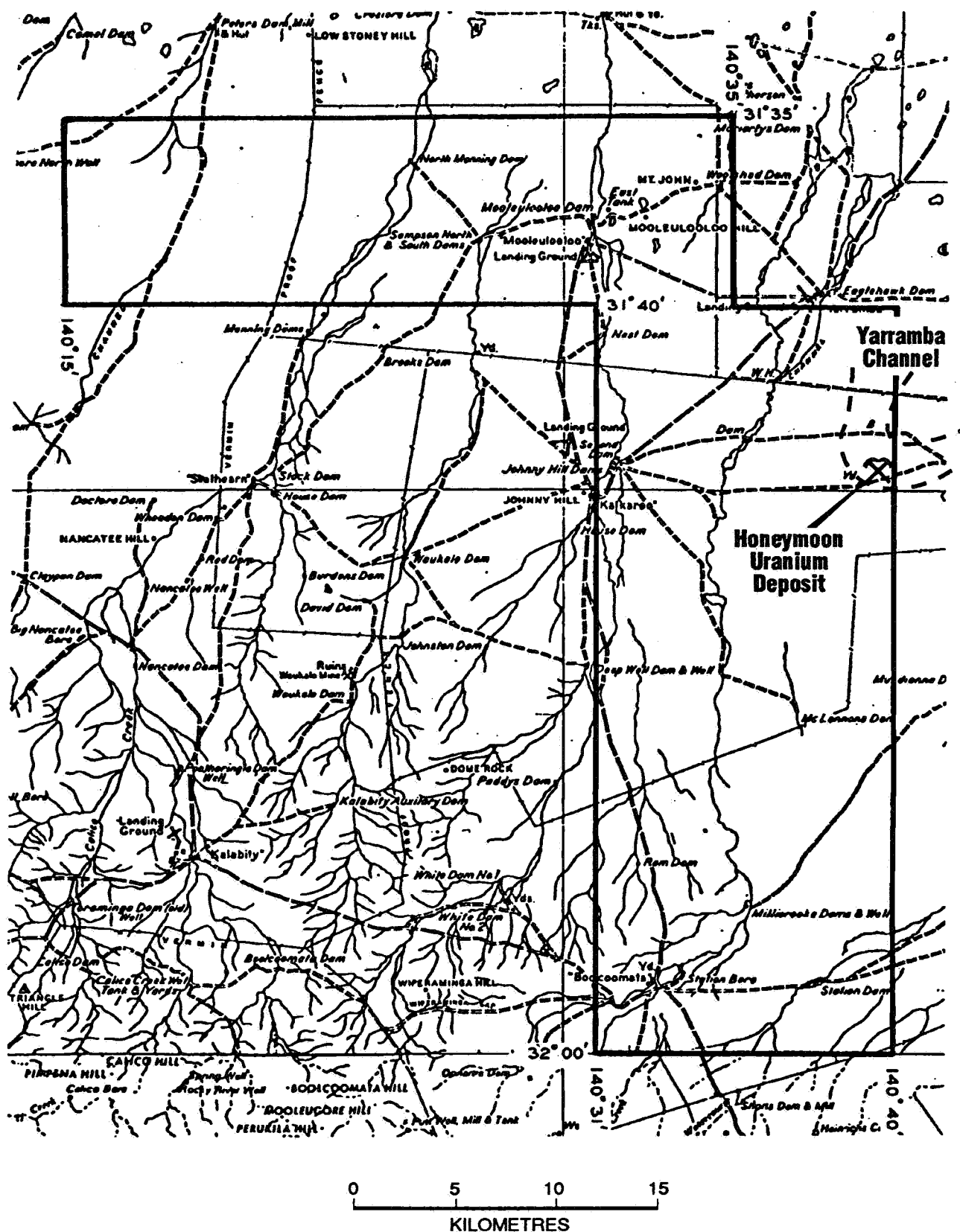
**EXPLORATION SUMMARY:** Following pattern drilling and in situ tests (see EL 377) further geological studies, metallurgical work, preliminary plant designs, hydrological studies and environmental studies were completed. A draft and final EIS were released and the proposed project was found to be environmentally acceptable.

Three Retention Leases covering Honeymoon were granted. Construction of a pilot plant and pilot well field commenced. An IP survey to evaluate the potential of this method to define redox interfaces was completed. Forty seven pilot holes drilled as an experimental well field were probed with gamma, resistivity, spontaneous potential and neutron probes.

**MINERALISATION/PROSPECTS:** A description of the Honeymoon uranium deposit is provided under EL 377.

**DRILLING:** Forty-seven rotary holes in a pilot well field were drilled for a total of 5488 metres.

## ~~ADDENDUM~~ A



**Figure 108**

**Applicant / Title Holder:** Carpentaria Exploration Company Pty Ltd - 49%, Mines Administration Pty Ltd - 25.5%, & Teton Exploration Drilling Co. Pty Ltd - 25.5%

**Licence N° :** EL 597

**DME SA 93-1673**

07-256185

**TENEMENT:** EL 614 (formerly SML 514 ELs 59, 66, 69, 127, 171, 217; followed by EL 911, 1203, 1487, 1684, 1698)

**AREA:** 983 sq km

**COMMENCEMENT DATE:** 17/4/80

**EXPIRY DATE:** Surrendered 26/10/81 in favour of EL 911

**COMPANY:** MINES ADMINISTRATION PTY LIMITED AND TETON EXPLORATION DRILLING CO PTY LTD

**ENVELOPE:** 2683

**REFERENCES:** Summary Report 1980 Drilling Programme EL 614 Lake Namba South Australia. Mines Administration Pty Limited (unpublished)

**LOCATION:** Lake Namba

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935

**TARGETS:** Sedimentary uranium, copper, gold, uranium.

**AGE/ROCK UNITS:** Quaternary cover on Tertiary Namba and Eyre Formations resting on a basement varying from Proterozoic quartz feldspar porphyry to Cambrian siltstone/shale and Cretaceous clays of Marree Formation. Area is on west flank of Benagerie Ridge.

**EXPLORATION SUMMARY:** A drilling programme consisting of 23 holes (LN 27 to 49) on three east-west traverses and totalling 1415.6 metres was completed in July 1980 to test a pronounced bend in the central section of the Lake Namba Channel. Holes were spaced broadly at 500 metres on sections, sampled at 1.5 metres, surveyed and levelled, and logged with gamma-ray, resistivity, spontaneous potential and neutron probes.

Ground magnetic and gravity surveys were completed by Geoex Pty Ltd over M10, a prominent circular airborne magnetic anomaly in the north-west corner of the licence. This showed there were two magnetic anomalies, the eastern one showing a 0.5 to 1 mgal gravity anomaly. Precollaring of a hole (104 metres percussion) into Cambrian rocks to test the eastern anomaly was completed in early 1982 in preparation for diamond coring (see EL 911). The western anomaly was in adjacent EL 722.

**MINERALISATION/PROSPECTS:** Interpretation based on this drilling led to the recognition of two distinct fluvial channels, Lake Namba and Lake Tinko which join in the northern part of the licence area near Billeroo Creek. Lower Tertiary sedimentation (Eyre Formation) in both channels is represented by a Lower sand unit deposited by north flowing braided streams. This is followed by a Middle Unit of clay/silt often carbonaceous and marked by anomalous radioactivity. The Upper Unit of interbedded sands and clay considered to have been deposited by broad inter-connected valleys with mature meandering rivers is interpreted as equivalent to the 'blanket sands' of probable reworked Mesozoic provenance, which thicken to the north.

**Lake Tinko Channel:** In the northern part the basal sand is very silty and clayey with abundant carbonaceous matter and humic staining, i.e. fresh. To the south the sand wedges out indicating all or part of it has been removed by erosion.

Lake Namba Channel: The basal sands are well-defined and restricted to a channel deeply scoured into the Proterozoic acid volcanic basement.

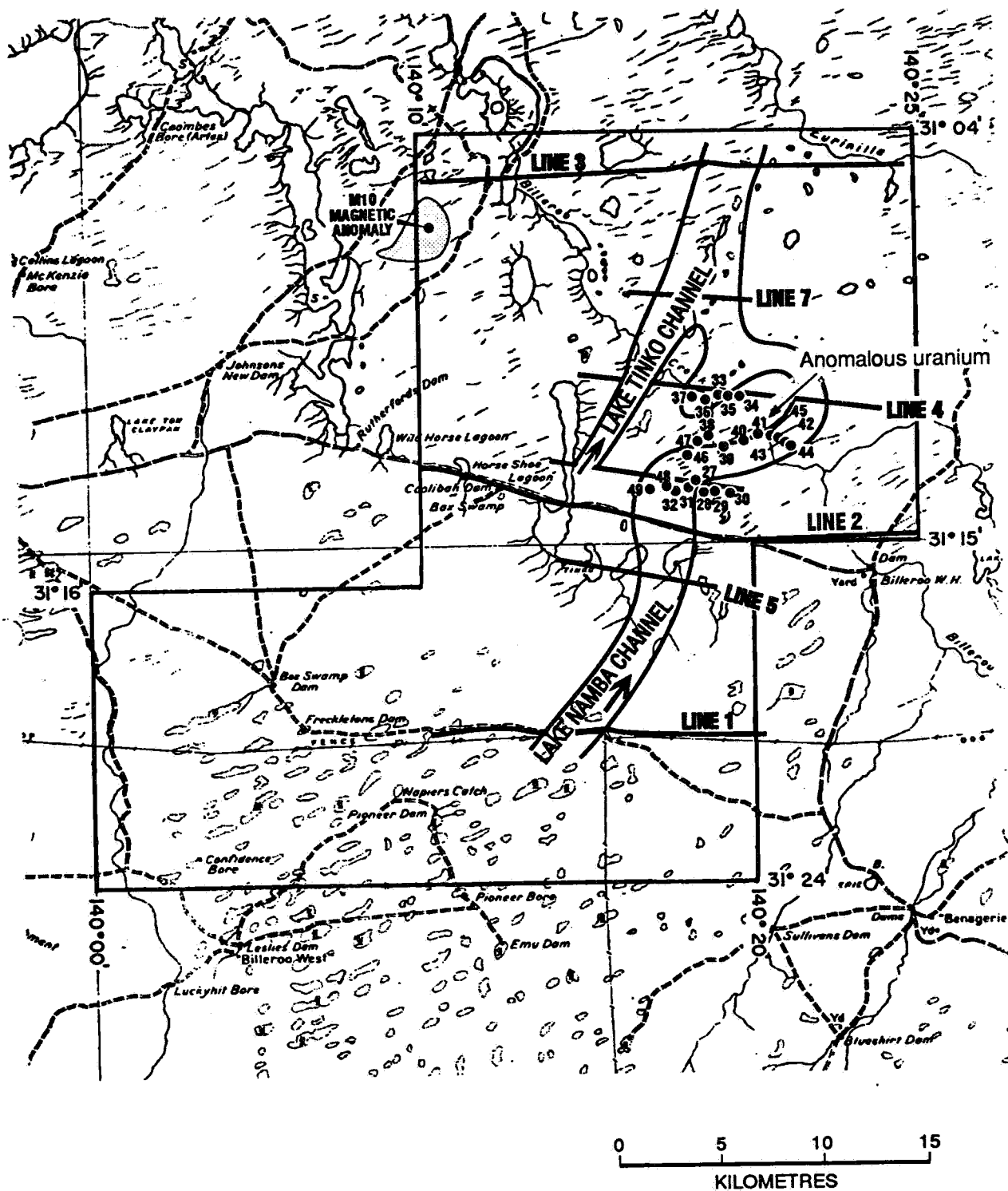
No significant redox trends and associated mineralisation characteristic of roll-fronts were found and the immaturity of basal sands indicate that the distances involved for mechanisms of transport and deposition of uranium would be too short. The acid volcanics were considered a less favourable source rock (av 18 ppm U) than the Willyama Supergroup.

The basal sand is essentially unoxidised but a very thin zone of moderate to strong oxidation lies close to the channel banks in vicinity of LN 23, 24 and 16 (resistivity Lines 6 and 2) notably in the Upper Sand Unit.

Very low grade uranium was intersected in the thin fine grained lignitic pyritic silt and clay in the basal sand unit where the maximum peak recorded was 500 cps in LN 41. The fine grained Middle Unit is distinguished by higher levels of gamma activity but not of economic interest. The Upper Unit was not found to be anomalous.

The drilling of magnetic anomaly M 10 was in recognition of geological similarities of this area with the Stuart Shelf e.g. correlation of acid volcanics with Gawler Range Volcanics.

DRILLING: Twenty-three rotary holes (LN 27 to 49) totalling 1415.6 metres.




- 44. Rotary drill hole location and number (prefix LN)
- LINE 1** Resistivity traverse EL217
-  Paleochannel

Figure 109

Applicant / Title Holder: Mines Administration Pty Ltd &  
Teton Exploration Exploration Drilling Co. Pty Ltd

Licence N° : EL 614

DME\_SA 93-1674



<u>TENEMENT:</u>	EL 629 (formerly SMLs 118, 209, 209A, 534, 672, ELs 62, 132, 376; followed by ELs 1308, 1480, 1591)
<u>AREA:</u>	47 sq km
<u>COMMENCEMENT DATE:</u>	20/5/80
<u>EXPIRY DATE:</u>	19/5/81
<u>COMPANY:</u>	ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC
<u>ENVELOPE:</u>	3197
<u>REFERENCES:</u>	No report specifically relating to EL 629 could be found.
<u>LOCATION:</u>	Kalabity
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	KALABITY 6934
<u>TARGETS:</u>	Copper, lead, zinc uranium
<u>AGE/ROCK UNITS:</u>	Palaeoproterozoic Willyama Supergroup.
<u>EXPLORATION SUMMARY:</u>	Refer to EL 376 for a description of exploration and geology for this licence.

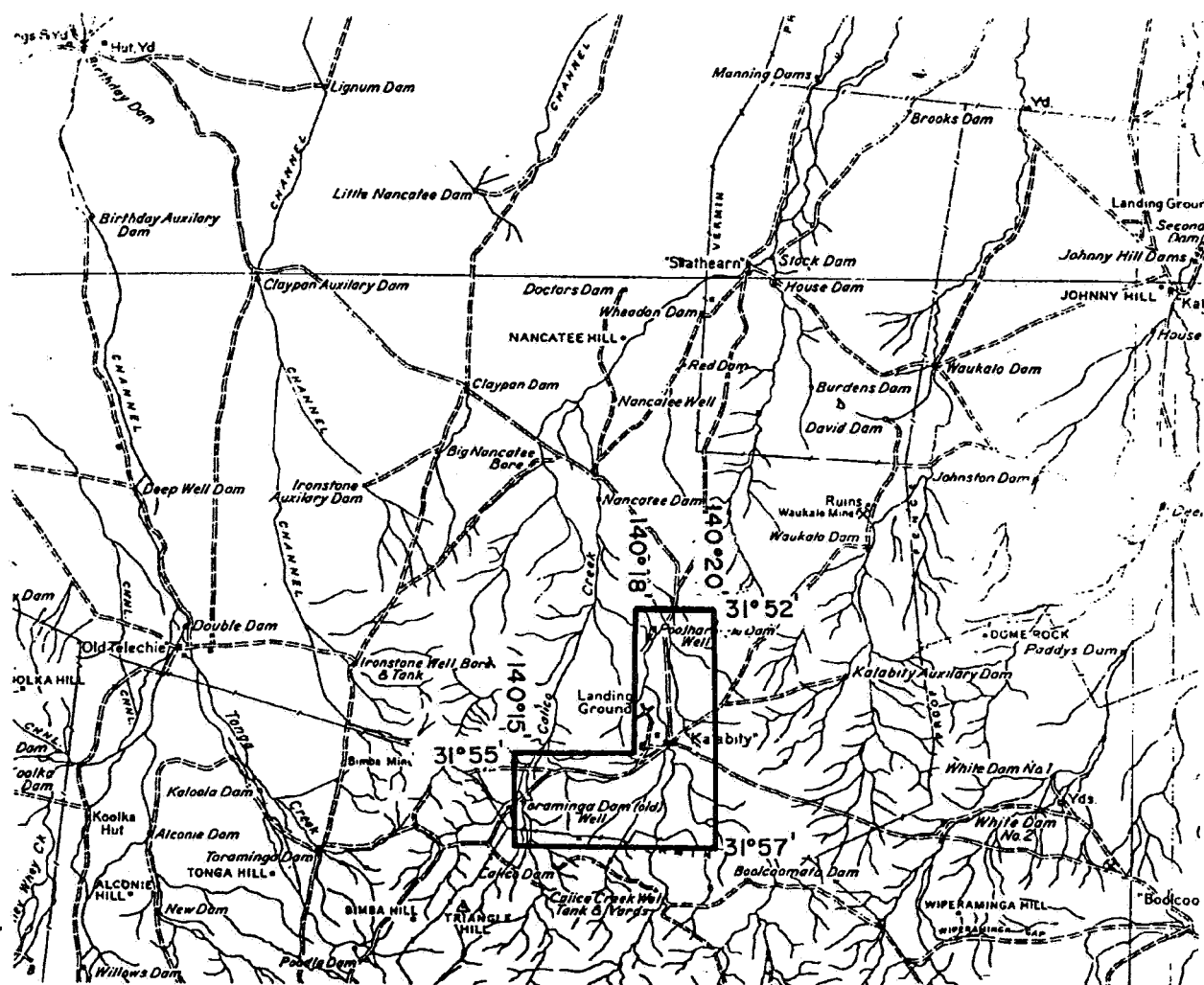


Figure 110

**Applicant / Title Holder:** Esso Exploration Production Australia Inc.

**Licence N° :** EL 629

DME\_SA 93-1675

**TENEMENT:** EL 679 (formerly SMLs 266, 513, ELs 43, 174; followed by ELs 957, 1391).

**AREA:** 370 sq km

**COMMENCEMENT DATE:** 28/7/80

**EXPIRY DATE:** 27/7/81

**COMPANY:** WESTERN NUCLEAR AUSTRALIA LIMITED; OILMIN N.L., TRANSOIL N.L., PETROMIN N.L.

**ENVELOPE:** 4011

**REFERENCES:** Successive quarterly report

**LOCATION:** Furlough Dam (Mulyungarie)

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** MULYUNGARIE 7034

**TARGETS:** Copper, gold, uranium.

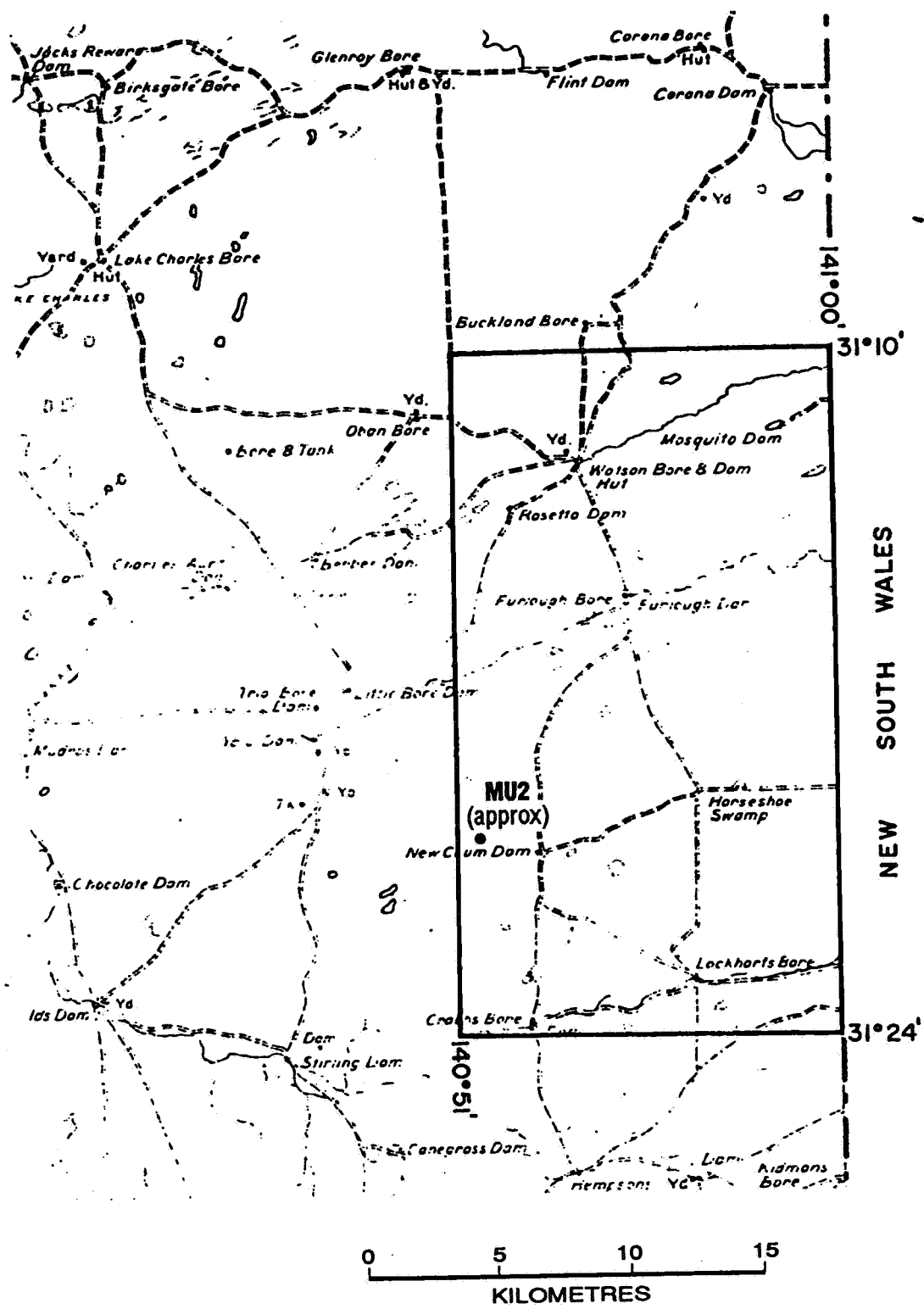
**AGE/ROCK UNITS:** Mesozoic and younger sediments overlying Cambrian and Neoproterozoic (Adelaidean) sedimentary rocks resting unconformably on Willyama Supergroup.

**EXPLORATION SUMMARY:** Exploration of this area and the eastern portion of the adjacent EL 549 was in joint venture with Marathon Petroleum. Gravity and ground magnetic surveys were conducted in May -June 1980 by Austral Geophysics on 800 metre spaced east-west lines with stations spaced at approximately 400 metres. A diamond drillhole MU 2 in the New Chum Dam area was drilled vertically to 614.49 metres in September - December 1980 to test one of these gravity peaks. The core was sampled by cutting 2.5 cm lengths of core every one metre and bagging half core over 5 metre intervals. Samples were analysed for a wide range of elements by semi-quantitative spectrographic analysis at Amdel. The hole was logged with gamma, resistivity, spontaneous potential and neutron probes.

**MINERALISATION/PROSPECTS:** Five separate gravity highs bounded by 2.0 milligal contours were defined by the gravity survey with peaks of 2.6 and 2.7 milligals.

No log of drillhole MU2 is provided. The summary log shows 0-100 metres: Mesozoic and younger sediments; 100 - 206.5 metres: Cambrian limestone, shale and siltstone; 206.5 - 546.5 metres: Adelaidean Wilpena and Umberatana Group sediments; 546.5 - 614.69 metres: dark grey and red banded metasiltstone or Willyama Supergroup with scattered pyrite. No significant metal values were present in the spectrographic analyses.

**DRILLING:** One diamond drill hole, MU 2, to 614.5 metres.



**MU2 ●** Diamond drillhole and number

Figure 111

**Applicant / Title Holder:** Western Nuclear Australia Ltd (50%),  
Oilmin N.L., Transoil N.L., Petromin N.L. (16 2/3% ) each

**Licence N° :** EL 679

DME\_SA 93-1676

<u>TENEMENT:</u>	EL 721 (formerly SMLs 279, 415, 580, 696; ELs 98, 238, 412; followed by ELs 1060, 1382, 1763)
<u>AGE:</u>	1972 sq km
<u>COMMENCEMENT DATE:</u>	8/9/80
<u>EXPIRY DATE:</u>	7/9/82
<u>COMPANY:</u>	SEDIMENTARY URANIUM N.L.
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATIONS:</u>	East Kalkaroo (Mulyungarie)
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET</u>	MULYUNGARIE 7034, LAKE CHARLES 7035
<u>TARGETS:</u>	
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CONFIDENTIAL ENVELOPE

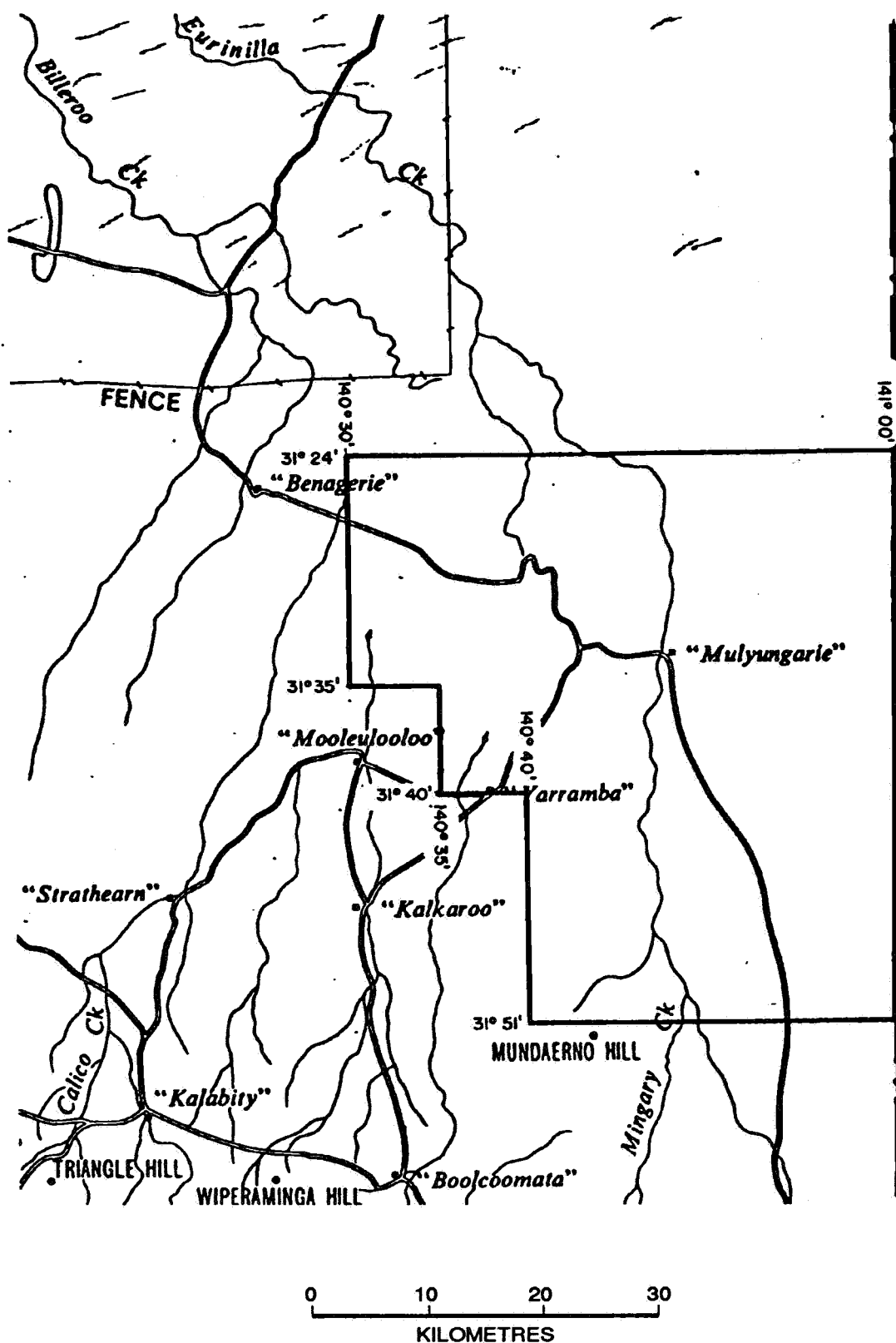


Figure 112

Applicant / Title Holder: Sedimentary Uranium N.L.

Licence N° : EL 721

DME\_SA 93-1677

07/15/85

**TENEMENT:** EL 722 (formerly SMLs 267, 268, 514, 543, 544, ELs 42, 45, 59, 109, 227, 411; followed by ELs 1065, 1487, 1698)

**AREA:** 2490 sq km

**COMMENCEMENT DATA:** 15/9/80

**EXPIRY DATE:** 14/9/82

**COMPANY:** CSR LIMITED

**ENVELOPE:** 3329, 6131

**REFERENCES:** Flook, M., 1981: EL 722 Billeroo West Exploration Drilling Billeroo Channel 1980. Mines Administration Pty Limited (unpublished).

Curtis, J.L. and Moore, M., 1982. Proterozoic Basement Exploration 1979-82 EL 722 Billeroo West, CSR Limited (unpublished).

**LOCATION:** Billeroo West

**1:250 000 SHEET:** CURNAMONA

**1:100 000:** CURNAMONA 6834, PASMORE 6835, KALABITY 6934, BENAGERIE 6935.

**TARGETS:** Sedimentary uranium; copper, gold, uranium in basement.

**AGE/ROCK UNITS:** Quaternary cover on Tertiary Namba and Eyre Formations resting on a basement in vicinity of Goulds Dam of Cambrian micaceous siltstone.

**EXPLORATION SUMMARY:** Exploration was conducted in joint venture with Minad-Teton as managers and was a direct continuation of the programme conducted under EL 411. This programme involved sedimentary uranium search in the Billeroo palaeochannel and exploration for Olympic Dam style mineralisation over airborne magnetic anomalies in the basement. 122 rotary holes (BW 215B, BW 216 to 336) totalling 15,542 metres were drilled in September-October 1980 on east-west probes spaced at 500 metres with holes at 200 to 300 metre centres to explore the Billeroo Channel and its northerly projection between the Goulds Dam deposit and the vermin proof fence, covering about 10 km in a north-south direction. All holes were logged with gamma, resistivity, spontaneous potential and neutron probes and sampled at 2 metre intervals from the top of the Eyre Formation. Collars were accurately surveyed and levelled. Resource estimates were made for the mineralisation defined by this and previous drilling north of the Goulds Dam deposit. The report by Flook (1981) provides an excellent description of the Billeroo palaeochannel and its uranium mineralisation.

Two of the three basement magnetic anomalies selected by Ashley (1978) (M1, M2 and M8) under EL 411 were defined by gridding, ground magnetics and gravity using Geoex Pty Ltd as contractors (see also EL 411).

At Anomaly M1 situated 20 km east-north-east of Frome Downs H.S. five 1 km spaced north-south grid lines and two in-fill lines (total 60 km) were surveyed with magnetics at 100 metre spaced readings and gravity with 200 metre spaced stations. A SIROTEM survey was also undertaken by Geoex over anomaly M1 at surface and downhole without detecting conductors and Robertson Research completed a Landsat photolineament study of the Frome Embayment. Diamond drill hole BWM 1A-1 situated 3 km NNE of Box Swamp Dam was drilled vertically to 600 metres in the period December 1980 to April 1980 (precollared to 83 metres in

drilled vertically to 600 metres in the period December 1980 to April 1980 (precollared to 83 metres in September 1980) to test anomaly M1A. The hole was logged with gamma, spontaneous potential, resistivity neutron and density (partly) probes, six samples were examined petrographically, 72 quarter core samples were analysed largely for Cu, Pb, Zn, Co, U, Mo, Sn and W, and the magnetic susceptibility and density of the core was regularly measured.

At anomaly M2, one km spaced north-south grid lines 5 to 8 km long with 3 x 4 km infill lines (total 70 km) were traversed with magnetics at 100 metre stations and a gravity survey at 200 metre station intervals.

Seven 1 km spaced 5 km long grid lines and 3 x 3 km long in-fill lines (total 43 km) at M8 were subjected to magnetic and gravity surveys with the same specifications as for M1 and M2.

Very little work was done in the last year of the licence.

**MINERALISATION/PROSPECTS:** The report by Flook (1981) states that the Billeroo channel had been defined over 40 km. It is 5 to 8 km wide with average depth to the top of 90 metres and to the bottom of 130 metres with a gradient of 1.5 to 2.5 metres per km. The basal sand of the Eyre Formation averages 2 km wide and can be more than 20 metres thick. The Eyre Formation can be divided into Upper, Middle and Lower members. Most uranium mineralisation is confined to the Lower Sand and Middle Clay with best grades in the centre of the channel where basal sands are thickest.

The drilling north of the Goulds Dam deposit, which was directed towards discovering orebodies amenable to solution mining, defined a narrow more or less continuous zone of low grade uranium mineralisation with patchy higher grades extending for 4 km north of Goulds Dam. It is associated with a north-south lateral redox interface in the basal sand which can be traced for 7.5 km north of Goulds Dam with yellow oxidized sands to the east and grey slightly pyritic sands to the west and north. There is a typical roll front zonation across the interface.

The resource estimate from 18 holes in the terminal redox zone of the channel excluding Goulds Dam deposit was 3700 tonnes of  $U_3O_8$  within the 0.12 GT contour (0.041% cut-off) with average grade 0.122%  $U_3O_8$  over a mean thickness of 1.27 metres. Highest calculated grade was 0.227%  $U_3O_8$  over 0.7 metres in BW 305. The remainder were less than 0.2%  $eU_3O_8$ . The typical mineralised intervals have grade/thickness multiples 3 to 6 times less than in the Goulds Dam deposit. The total resource estimate was 4000 to 5000 tonnes  $U_3O_8$  including 1000 tonnes at the Goulds Dam Prospect. This uranium is largely associated with the fine grained generally pyritic silt and clay facies within the Lower Sand Member. It was concluded there was low potential for discovering mineralised zones of higher tenor than Goulds Dam and that very little of the uranium is likely to be recoverable by solution mining. In the Frome Downs area the basal sands are more mature than further south "blanket" sands in flood plain environment (reduced with pyrite and humic staining).

Magnetic anomaly M2 north-east of Curnamona H.S. was modelled to have a broad flat -topped source at 2000 to 2500 metres depth and consequently too deep to warrant a drill test.

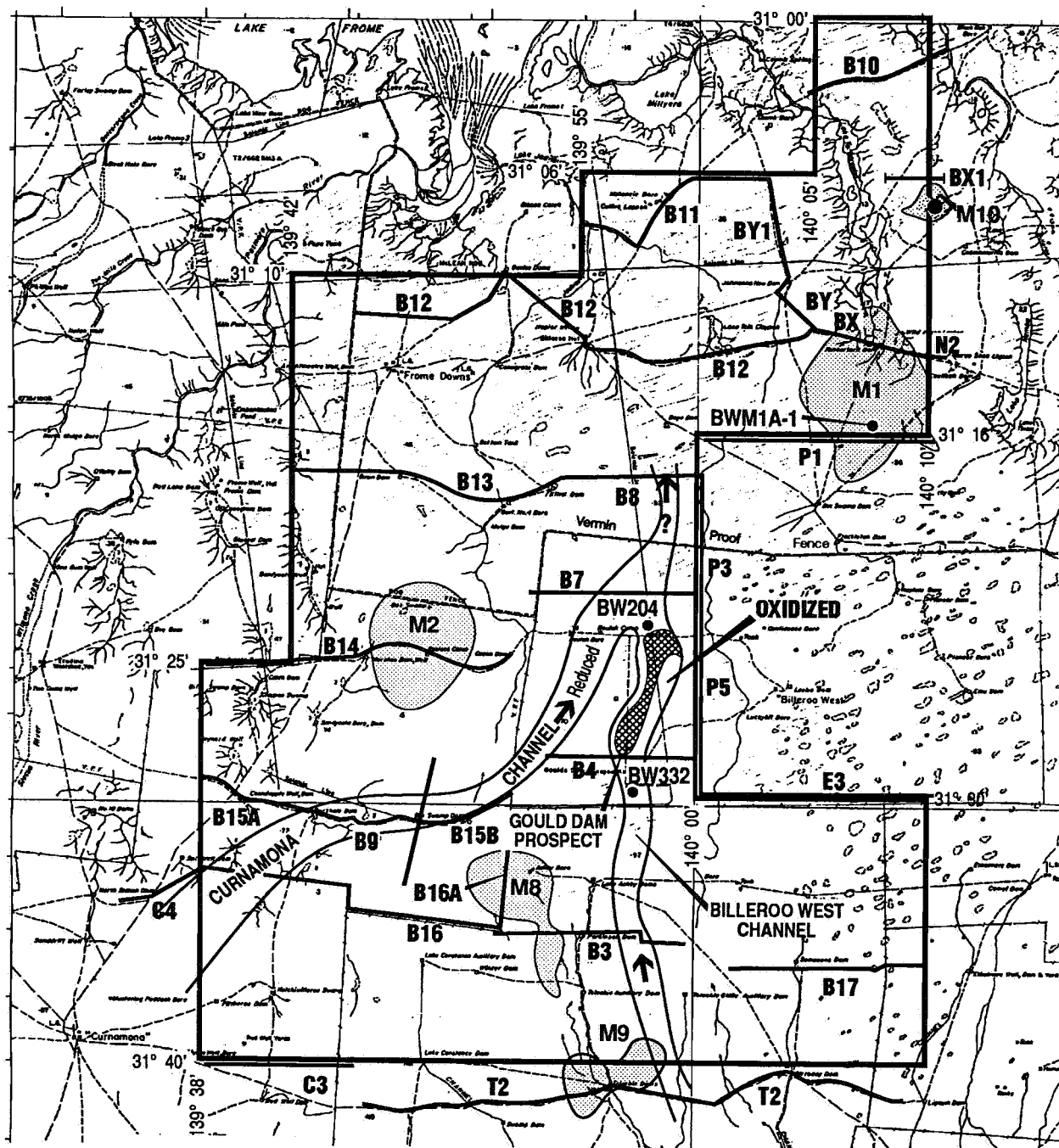
Similarly M8 was modelled as having a depth to top of greater than 1500 metres and hence too deep to warrant consideration.

BW M1A-A was drilled on M1A a 1400 nT anomaly which is the shallower of three which coalesce to form M1. There is good correspondence with the airborne anomaly and a marked coincident bouguer gravity ridge associated with the main magnetic anomaly. The hole intersected 80 metres of Tertiary and Mesozoic, 44 metres of Cambrian and 245 metres of horizontal Adelaidean sediments (Upper Umberatana and Wilpena Groups) with an unconformity at 391.4 metres above fine grained orange - pink banded unmetamorphosed acid volcanics (tuffs, breccia lavas) which show limited variation to 600 metres ('Benagerie Volcanics'). The volcanics contain sodic and potash feldspar and quartz, ultrafine haematite and patchy pervasive magnetite,



with pyrite trace galena and chalcopyrite in scattered sulphide - carbonate - fluorite veinlets. Magnetic susceptibility of the basement volcanics showed a 500 fold contrast with overlying sediments thus explaining the magnetic anomaly however SG measurements showed insufficient density contrast to explain the bouguer anomaly. Highest assays in the volcanics were 350 ppm Pb over 0.34 metres and 100 ppm Cu over 0.5 metres but remaining base metal values in 60 samples were less than 100 ppm.

DRILLING: 122 rotary holes (B215B, 216 to 336) totalling 15542 metres. One vertical diamond drill hole BWM1-1 to 600 metres cored from 83 metres.



- Magnetic anomaly  
 Rotary drillhole  
 Diamond drill hole  
 Resistivity traverse 1974-5, 1979  
(refer 3329(II) - 1)

0 5 10 15 20 25  
KILOMETRES

Figure 113

Applicant / Title Holder: CSR Limited

Licence N° : EL 722

DME\_SA 93-1678

**TENEMENT** EL 794 (formerly SMLs 118, 151, 172, 209, 209A, 210, 210A, 222, 269, 440, 534, 535, 562, 595, 672, 673, 677, 714, ELs 47, 62, 85, 132, 259, 423; followed by ELs 1119, 1497, 1861)

**AREA:** 822 sq km

**COMMENCEMENT DATE:** 12/2/81

**EXPIRY DATE:** 11/2/83

**COMPANY:** CARPENTARIA EXPLORATION COMPANY PTY LTD

**ENVELOPE:** 3365

**REFERENCES:** Successive quarterly and annual reports.

**LOCATION:** Kalabity

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934, MULYUNGARIE 7034

**TARGETS:** Copper, lead, zinc.

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** Exploration by Esso in joint venture with Carpentaria continued through to 8/2/83 when Esso withdrew. Attention focussed on the Bimba Formation at Toraminga, Mt Howden, Nancatee and Waukaloo using detailed Pulse EM surveys, ground magnetics and drilling. Tentative correlations between rocks in the western portion of the EL and the Kalabity anticline showed that the Bimba was less well defined in the west. Other work attempted to clarify relationships between Dome Rock and Dome Rock South quartz magnetite horizons using ground magnetics. Ultra violet lighting of all RAB, percussion and core samples failed to detect significant fluorescence.

**MINERALISATION/PROSPECTS:** A sedimentary sulphide-bearing unit (Bimba Formation) in a sequence of highly metamorphosed complexly folded Palaeoproterozoic sedimentary/volcaniclastic rocks was tested at Toraminga, Mt Howden, Nancatee and Waukaloo. PEM testing at these prospects covered 22 km, zero, 8 km and 13.85 km respectively. 593 RAB holes were drilled on Toraminga, Nancatee and Waukaloo followed by six diamond holes to test anomalous geochemistry (1.92% Pb) and geophysical targets. Bottom RAB hole samples were analysed for Cu, Pb, Zn. The core holes intersected anomalous copper (eg 3 m at 1.86% Cu in KD 15, 1.1 m at 3.17% Cu in KD 16, 4 m at 1.48% Cu in KD 17 and 1.4 m at 1.65% Cu in KD 18) and pyrite/pyrrhotite mineralisation as well as carbonaceous metasediments which were considered to be the source of PEM conductors. Core holes were drilled on Telechie (KD15-18), Tooraminga (KD19) and Waukaloo (KD20).

**DRILLING:** RAB: 593 holes totalling 12,705 metres.  
Diamond: 6 holes (KD 15-20) for 2,014.8 metres.

SCHEDULE A

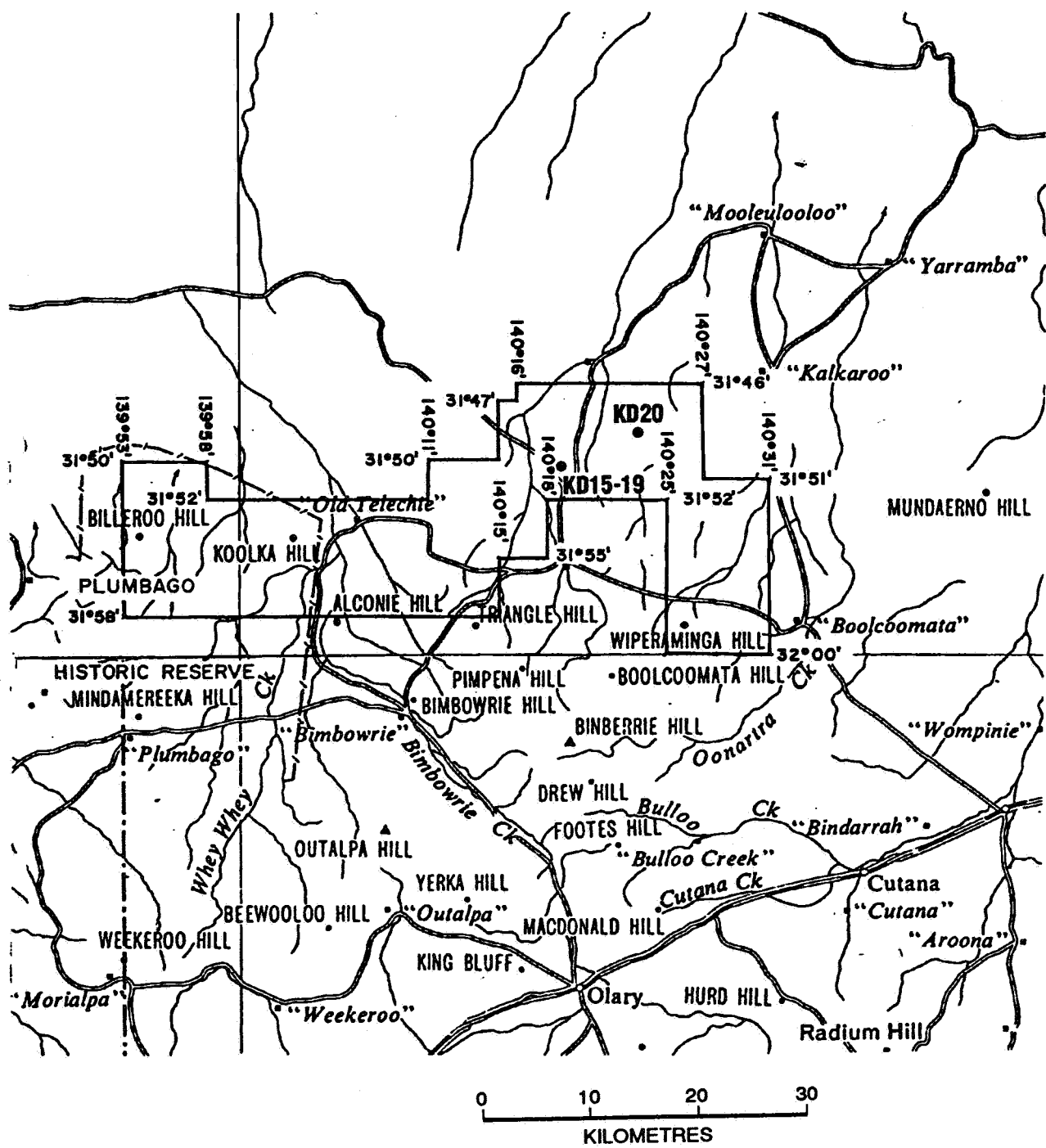


Figure 114

Applicant / Title Holder: Carpentaria Exploration Company Pty Ltd

Licence N° : EL 794

DME\_SA 93-1679

**TENEMENT:** EL 802 (formerly SMLs 266, 513 663, EL 40 Chevron; ELs 66, 90, 105, 178, 334 Southern Ventures; EL 435 Marathon; followed by 1144, 1252, 1695; related to ELs 549, 957).

**AREA:** 2436 sq km reduced to 1561 sq km

**COMMENCEMENT DATE:** 12/2/81

**EXPIRY DATE:** 11/2/82

**COMPANY:** MARATHON PETROLEUM AUSTRALIA, LTD

**ENVELOPE:** 3421, 4697

**REFERENCES:** Yeaton, J.W., 1981: Technical Report Exploration Licence 802 (Lake Carnanto) for Period 11 November 1980 to 11 November 1981.

Anderson, D.C. 1983: Technical Report Exploration Licence 802 (Lake Carnanto) for Period February 12, 1982 to February 11, 1983.

**LOCATION:** Lake Carnanto

**1:250 000 SHEET:** CURNAMONA, FROME

**1:100 000 SHEET:** BENAGERIE 6935, LAKE CHARLES 7035, THURLOOKA 7036, COONARBINE 6936.

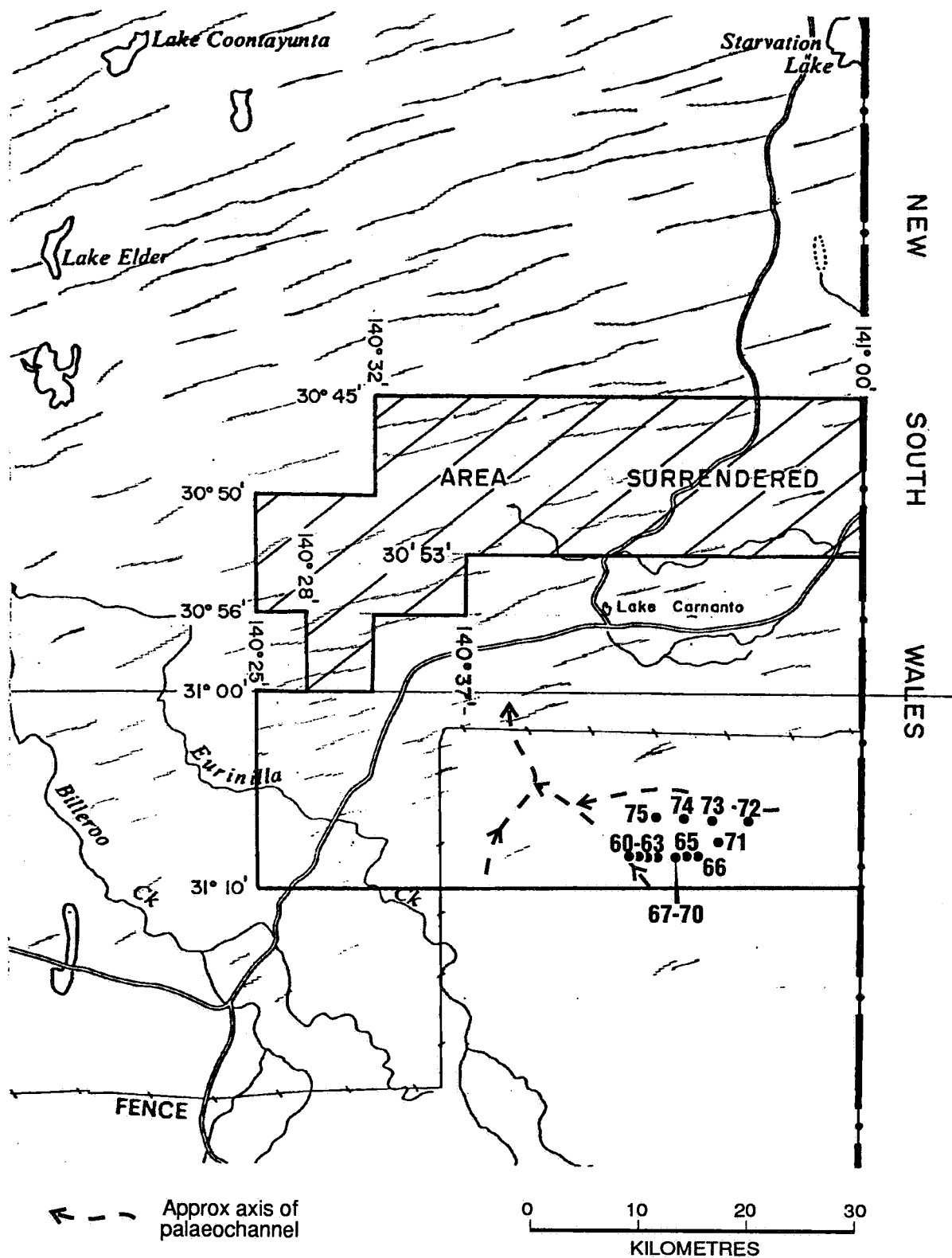
**TARGETS:** Sedimentary uranium, base metals.

**AGE/ROCK UNITS:** Quaternary overlying Tertiary Namba and Eyre Formations resting on a basement of Cretaceous Marree Formation clays with local Cambrian ? mudstone and shale.

**EXPLORATION SUMMARY:** Following on from the drilling under EL 435, 5 rotary holes (LC 60 to LC 64) totalling 586 metres were drilled in July 1981 followed by a palaeogeographic study of the south-eastern Frome Embayment using all available company drilling information. A further 11 holes (LC 65 to LC 75) totalling 1012 metres were drilled in June 1982 to test for extensions to previously discovered uranium mineralisation located in EL 957 to the south. All holes were logged with gamma, spontaneous potential and resistivity probes. Collars were accurately surveyed and selected cuttings were assayed for Cu, Pb, Zn, Mo, V, Se, ThO<sub>2</sub> and U<sub>3</sub>O<sub>8</sub>.

**Mineralisation/PROSPECTS:** No significant uranium bearing intervals were intersected. It was concluded that mineralisation appears to be controlled by a series of permeable windows allowing uraniferous solutions to migrate downward to the favourable Lower Tertiary sands, that a uraniferous geochemical cell did not move down the channel, and that EL 802 holds a "low potential for an economic sandstone uranium deposit" in the fluvial blanket sands of the Eyre Formation.

**DRILLING:** Sixteen rotary holes (LC 60 to LC 75) totalling 1598 metres.



75• Percussion hole (prefix LC)  
(60 to 75, exc. 64)

Refer to EL 435 for previous Marathon drillholes.

Figure 115

Applicant / Title Holder: Marathon Petroleum Australia Ltd

Licence N° : EL 802

**TENEMENT:** EL 848 (formerly ELs 263 450, followed by EL 1175)

**AREA:** 3155 sq km

**COMMENCEMENT DATE:** 20/7/81

**EXPIRY DATE:** 19/7/83

**COMPANY:** ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC

**ENVELOPE:** 3447

**REFERENCES:**

**LOCATION:** Olary Area

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** KALABITY 6934, MULYUNGARIE 7034, WINNININNIE 6833, MINGARY 7033

**TARGETS:** Copper, lead, zinc, uranium

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** For exploration details see EL 450



DME\_SA 93-1681



**TENEMENT:** EL 854 (formerly SMLs 244, 268, 503, 531, 543, 544, 589, ELs 45, 168, 337, 430, 463, 559; followed by ELs 1471, 1683, 1738)

**AREA:** 2729 sq km

**COMMENCEMENT DATE:** 20/7/81

**EXPIRY DATE:** 19/7/82

**COMPANY:** CSR LIMITED

**ENVELOPE:** 4339

**REFERENCES:** Tonkin, D.G., 1982: Final Report on Exploration of EL 854 Erudina Station - South Australia. CSR Limited (unpublished).

**LOCATION:** Erudina Station

**1:250 000 SHEET:** CURNAMONA, PARACHILNA

**1:100 000 SHEET:** CURNAMONA 6834, PASMORE 5835, BENAGERIE 6935, REAPHOOK 6735, WILLIPPA 6734.

**TARGETS:** Copper, lead, zinc.

**AGE/ROCK UNITS:** Quaternary and Tertiary sediments overlying Cambrian (Arrowie Basin).

**EXPLORATION:** The exploration concept envisaged base metal mineralisation associated with geophysical anomalies and basement highs related to a postulated hinge zone separating Adelaidean shelf sediments from the Adelaide Geosyncline.

To identify areas of shallower basement (say less than 400 metres) a low level airborne magnetic and radiometric survey (4300 line km) was flown over the northern part of the area by Georex Pty Ltd. in 1982 on east-west lines spaced at 0.3 km and mean terrain clearance of 90 metres.

A Landsat lineament study was undertaken by Robertson Research.

**MINERALISATION/PROSPECTS:** It was concluded from interpretation of the data from the airborne magnetic survey that there were no magnetic anomalies with sources at less than about 550 metres depth and that consequently prospective basement rocks were at depths too great to be considered economically attractive.

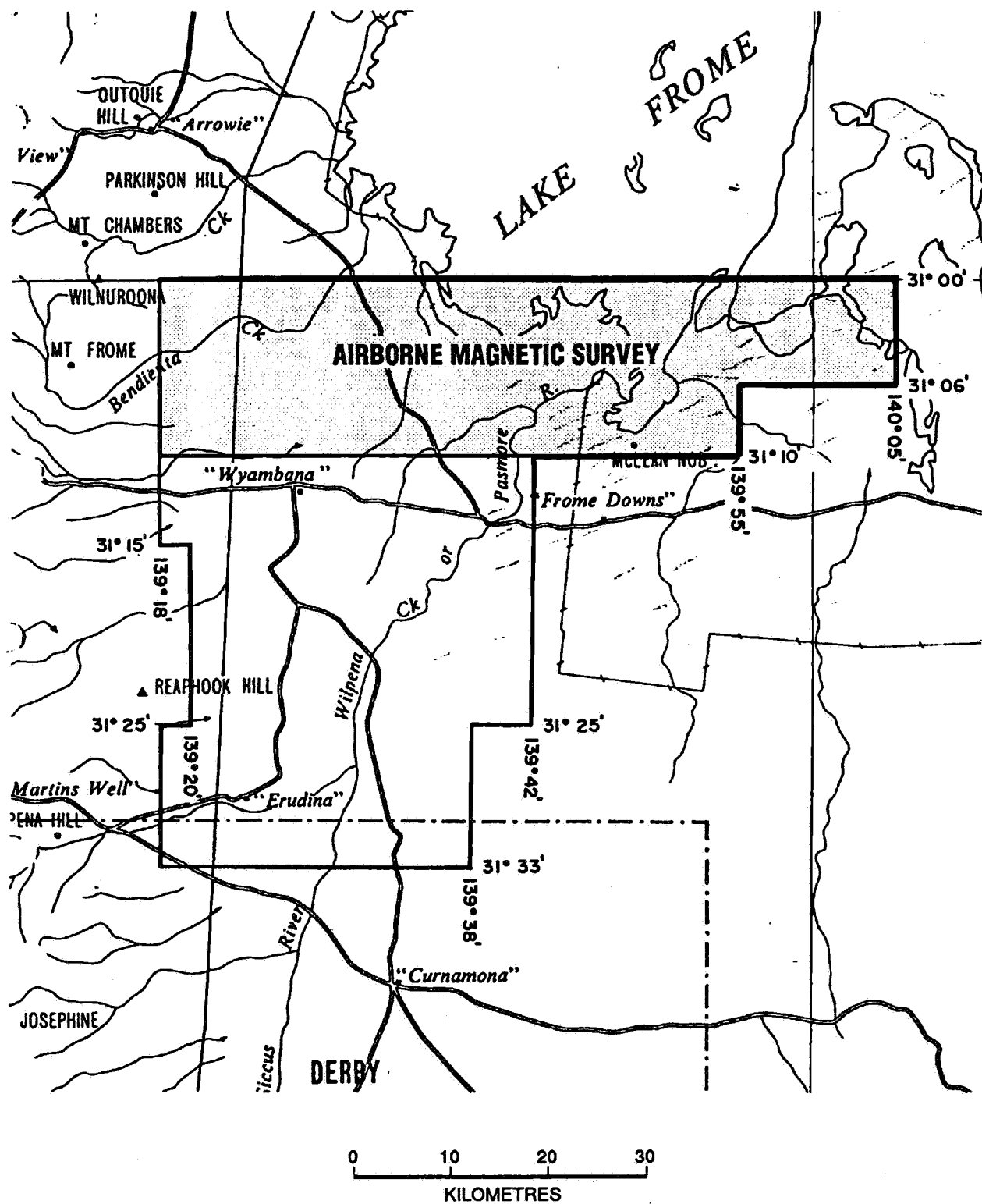


Figure 117

Applicant / Title Holder: CSR Limited

Licence N° : EL 854

DME\_SA 93-1682

07/10/85

**TENEMENT:** EL 911 (formerly SMLs 267, 514, 544, ELs 42, 59, 66, 69, 127, 171, 217, 296, 297, 522, 523, 614, followed by ELs 1065, 1203, 1487, 1684, 1698).

**AREA:** 1559 sq km

**COMMENCEMENT DATE:** 26/10/81

**EXPIRY DATE:** 25/10/83

**COMPANY:** MINES ADMINISTRATION PTY LIMITED AND TETON AUSTRALIA PTY LTD

**ENVELOPE:** 3614

**REFERENCES:** Curtis, J.L. and Moore, M.J., 1982: Proterozoic Basement Exploration 1979-82 EL 911 Lake Namba Area (Billeroo Creek) Mines Administration Pty Limited (unpublished).

**LOCATION:** Lake Namba

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934, BENAGERIE, 6935.

**TARGETS:** Copper, gold, uranium,

**AGE/ROCK UNITS:** Cainozoic sediments including Tertiary Namba and Eyre Formations resting on Neoproterozoic (Adelaidean). Umberatana Group unconformably above Mesoproterozoic? Volcanics ('Benagerie Volcanics').

**EXPLORATION SUMMARY:** Work under this EL primarily centred around the ground definition by magnetic and gravity surveys of two airborne magnetic anomalies, M9 and M10 and subsequent diamond drill tests of the anomalies, following on from exploration undertaken on pre-existing titles EL 523 and EL 614. Geoex Pty Ltd were contracted to undertake the ground geophysical definition during the terms of the pre-existing titles. At M9 nine 4 km to 6 km long grid lines were spaced at 1 km with 4 intermediate lines each 2 km long (total 44 line km). Magnetic readings were taken at 100 metre intervals and gravity at 200 metre intervals. Diamond drill hole TM9W1, precollared to 135 metres, was drilled in September - October 1981 to 802.4 metres to test the western of two bullseye anomalies 2 km west of Telechie Dam.

At M10, 10 km north-east of Johnsons New Dam, 10 grid lines spaced at 0.25 to 0.5 km (20 line km) were surveyed with magnetic readings at 50 metre station spacing and gravity at 100 metre spacing. Diamond drillhole LNM 10-1, precollared to 83 metres, was drilled to 380 metres in January - February 1982.

On both prospects the drill holes were logged with gamma, resistivity, spontaneous potential, density and neutron probes; magnetic susceptibility and SG measurements were taken through the length of the core; and some petrological examinations were made of the basement cores. Very little additional work was done during the last 18 months of the licence term.

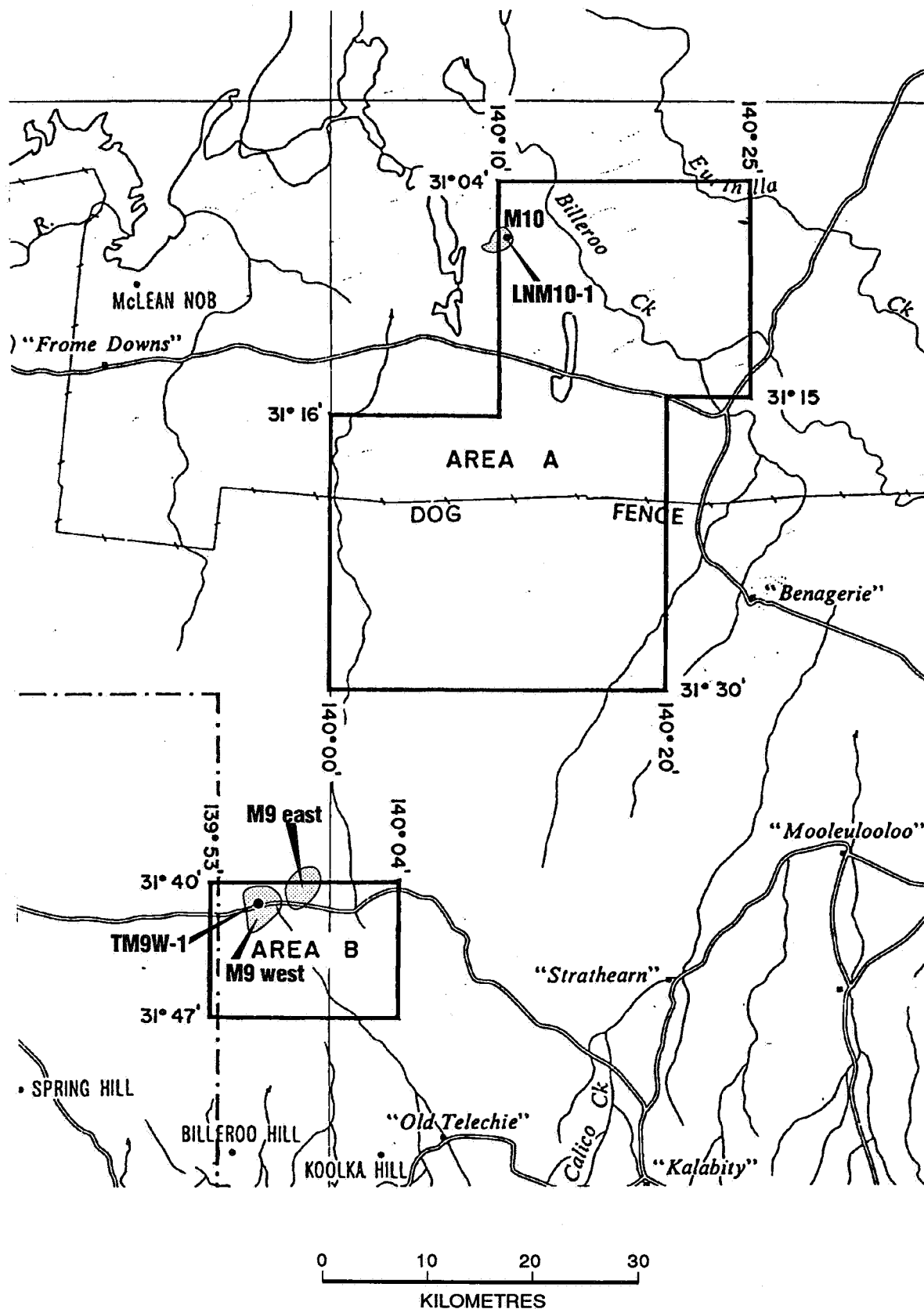
**MINERALISATION/PROSPECTS:** Geophysical interpretation of M9 showed good correlation with the airborne anomaly and a pair of bullseye magnetic anomalies the western of which was shallower than the eastern. A 1.5 to 2.0 mgal residual bouguer gravity anomaly lies eccentrically to the south. TM9W-1 drilled at the centre of the western 1200 nT magnetic anomaly deviated 29° off vertical so that its bottom was 742 metres vertically and 230 metres north-north east of the collar. The hole intersected 122 metres of Cainozoic sediments, principally Tertiary Namba and Eyre Formations, then 657 metres of horizontal Adelaidean (Upper

TM9 9  
on  
CURNAMONA

Umberatana Group) overlying unconformably from 778.65 metres a "felspathic microgneiss" containing disseminated and blebby accumulations of pyrite (composed of microcline, chlorite and magnetite). This rock was mentioned as 'not really gneissic' and that metamorphism was perhaps more thermal than regional. It was inferred to be meta-igneous and Palaeoproterozoic, possibly Willyama equivalent, in age. The magnetic anomaly was explained by a 500 fold contrast in magnetite, susceptibility between the basement and overlying sediments resulting from pervasive finely disseminated magnetic while SG measurements showed insufficient density contrast to explain the bouguer gravity anomaly.

M10 was interpreted from its dipolar nature as a pipe-like body at the intersection of a fracture system. The 250 nT magnetic anomaly showed good correspondence with the airborne data. It coincided with a 1.0 to 1.5 mgal bouguer gravity anomaly situated directly over the peak of the magnetic anomaly. LNM 10-1 intersected 96 metres of Cainozoic sediments, principally Tertiary Namba and Eyre Formations, followed by 135 metres of horizontal Adelaidean (Upper Umberatana Group) sediments resting unconformably at 231.5 metres on basalt (part altered and showing pillow - like structures) and agglomerate containing some fragments of pink porphyritic volcanics. Weakly disseminated chalcopyrite and galena is present in amygdales and fine irregularly distributed veinlets. The basic volcanics are not metamorphosed and inferred to be Mesoproterozoic (Benagerie Volcanics) perhaps correlating with basic rocks in Bumbarlow No 1. The magnetic anomaly was explained by a 50 fold contrast in susceptibility between the basalts and overlying sediments while the density contrast was considered as likely sufficient to explain the gravity anomaly.

DRILLING: Two diamond drill holes, TM9W-1 and LNM 10-1, totalling 1182.4 metres.




-  Magnetic anomaly  
**TM9W-1** • Diamond drill hole location and name

Figure 118

**Applicant / Title Holder:** Mines Administration Pty Ltd &  
 Teton Australia Pty Ltd

**Licence N° :** EL 911

DME\_SA 93-1683

**TENEMENT:** EL 957 (formerly SMLs 414, 513, 514 Sedimentary Uranium; ELs 66, 87, 174 Minad; EL 549; followed by EL 1391).

**AREA:** 2037 sq km

**COMMENCEMENT DATE:** 8/1/82

**EXPIRY DATE:** 7/1/87

**COMPANY:** MARATHON PETROLEUM AUSTRALIA, LTD (transferred to PAN AUSTRALIAN MINING LTD on 3/5/84)

**ENVELOPE:** 3713

**REFERENCES:**

Anderson, D.C. and Ellis, G.K., 1983: Technical Report Exploration Licence 957 (Benagerie) for Period January 8, 1982 to January 7, 1983. Marathon Petroleum Australia, Ltd. (unpublished).

Barbour, W.R., 1983: Technical Report Exploration Licence 957 (Benagerie) for Period January 7, 1983 to June 7, 1983 Marathon Petroleum Australia, Ltd (unpublished).

Rutter, H., 1985: The Frome Area of South Australia. An Analysis of the Regional Gravity and Magnetic Data for Pan Australian Mining Ltd.

Teale, G., 1985: Frome Embayment, South Australia. Pan Australian Mining Ltd. Report No. 1985/21 (unpublished).

**LOCATION:** Benagerie

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935, LAKE CHARLES 7035

**TARGETS:** Sedimentary uranium and later copper, lead, zinc, gold, uranium.

**AGE/ROCK UNITS:** Eastern flank of the Benagerie Ridge. Quaternary sediments above Tertiary Namba and Eyre Formation resting on a basement of Cretaceous clays in the east with Proterozoic metasediments on the Benagerie Ridge and Cambrian sediments in the west.

**EXPLORATION SUMMARY:** Following on from the 161 hole rotary drilling programme completed under EL 549 yielding up to 0.12%  $eU_3O_8$  over 3 metres (BE 125) in a palaeochannel in the northeastern part of the EL, there followed in March 1982 a three hole partial coring programme (BE 165C, 166C, 167C) yielding 54.3 metres of core from 272.8 total metres of hole. The cores which were drilled at 75 metre spacing in the vicinity of BE 135 were chemically analysed for uranium by XRF and for Cu, Pb, Zn, V, Se, Mo. In addition a partially cored rotary hole (BE 162C) was drilled adjacent to BE 7 which had shown up to 2000 ppm Cu, 0.2 g/t Au, 420 ppm Co in altered fine grained pyritic (abundant) metasediments. BE 162 C was drilled to 138.3 metres and cored for the last 28.3 metres with analysis of core for Cu, Pb, Zn, Co, Ni, U, Ga, Ce, Ba over one metre intervals. Cuttings from BE 7, 60, 61 and 37 and 162 C were petrologically examined.

Two programmes of rotary drilling were completed for sedimentary uranium, one of 15 holes (BE 168 to 182) in the north east in June 1982 totalling 1637 metres, and a second of 16 holes (BE 183 to 198) in the

south-west in November 1982 and totalling 1367 metres to test for an alteration cell entering the main channel system from the south. A water bore BE W1 was also drilled north of BE 19 to a depth of 75 metres.

Following relatively disappointing results in the search for sedimentary uranium the accent changed in late 1982 to exploration for base metals in the Proterozoic basement rocks with the encouragement provided by the anomalous base metal content in the bottom of a number of holes drilled under EL 549 and in BE 162 C. Regional geophysical interpretations of the gravity and airborne magnetic data were undertaken by consultant H Rutter in May 1982 in which it was concluded the area had "striking" similarities with the Roxby Downs district.

The surveying of five grids totalling 396 km (A1, A2, B, C, Low Stony Hill) was completed in late 1982 principally to the south and north-east of Benagerie H.S. Ground magnetic and gravity surveys totalling 198 line km was completed in October 1982 on 1 km metre spaced lines with readings at 100 metres intervals on the "B" and "C" grids at Benagerie, and magnetics on "A1" and "A2" grids; areas which were considered to cover the most significant magnetic anomalies.

Three diamond drill holes (BD 001, BD 002, and BD 003) were completed in late 1982 for a total of 1121.7 metres (837.5 m cored). BD 001 (302.5 metres) was drilled on the west flank of the Benagerie magnetic anomaly and BE 002 (276.45 metres) and BE 003 (542.7 metres) were drilled adjacent to anomalous base metal intervals in BE 195 and BE 37 respectively.

Cores were sampled at one metre intervals and analysed for Cu, Pb, Zn, Co, Ag, Mo. Further assays were done for W, As, Au, Ba, Ni, Cd, Mn on selected intervals.

After the advent of Panaust in mid 1984 the impetus of the project slowed. Further regional geophysical interpretation was undertaken by H Rutter in March 1985 who concluded the Benagerie area was "potentially geophysically related to Broken Hill" and have high potential for Pb, Zn, Ag. In addition consultant G Teale completed a considerable amount of petrographic work on drill samples and a review report on the Frome Embayment in October 1985.

A joint venture was negotiated with Billiton Australia in March 1986.

From April to June 1986 Billiton gridded a 6 km x 4 km area south of Benagerie and completed detailed ground magnetics (122-line km) over the grid, trial IP and SIROTEM surveys, reconnaissance SIROTEM over the centre of the grid and the drilling of two diamond drill holes BH 2 and BH 3, totalling 353 metres (BH 1 was abandoned at 54 metres) to test the Grapevine and Hamper SIROTEM anomalies. Core samples were analysed largely in 2 metre intervals for Cu, Pb, Zn, Ag, Au, Co, Mn, Fe.

Exploration continued under EL 1391.

**MINERALISATION/PROSPECTS:** The Paleocene - Eocene sands are extensive in EL 957 and consist of widespread blanket sands 20 to 30 metres thick with a top 70 to 80 metres below surface. Lithologically distinct from the blanket sand are restricted palaeochannel sands incised into Cretaceous, Cambrian or Proterozoic basement. These sands are moderately to well sorted and are locally very carbonaceous and pyritic.

Uranium was discovered in the general Berber Dam area under EL 549 in a north-west flowing palaeochannel incised into Cretaceous clays. Chemical analysis of the cored holes across the iron redox front near BE 135 showed pronounced disequilibrium and best intercepts of 0.059%  $U_3O_8$  over 0.1 meters in BE 166 C and BE 167 C in fine to very coarse sands with varying amounts of interstitial clay and carbon trash/humic staining in reduced ground.

The additional 15 open holes in the general Berber Dam area failed to extend the known mineralisation. The geochemical cell was poorly developed. When redox interfaces were crossed on 50 to 100 metre centres the altered cell pinched and showed only weak radiometric signatures.

The 16 open hole drill programme on the south-west of the EL encountered no alteration or uranium, and in the extreme southwest Tertiary sands were absent and basement rocks were at shallow depth. One hole, BE 195, south-east of "Benagerie" intersected a metasomatised pelitic siltstone with stratiform pyrite and minor chalcopyrite.

It was concluded that the EL had little potential for economic sandstone uranium deposits but there was potential for a large stratiform/stratabound base metal deposit in the metal anomalous Proterozoic basement eg. BE 7, BE 61, BE 6, BE 37, BE39.

The coring of BE 162 C resulted in a basement intersection of a pyritic carbonaceous meta-arenite with thin interbeds of mudstone and siltstone containing up to 5000 ppm Cu, 1450 ppm Zn, 450 ppm Pb over one metre intervals. Small scale cross-bedding was evident and petrological description was biotite pelitic, metasediment containing pyrite, chalcopyrite and minor bornite and chalcocite.

Gravity results on the "B" grid, which did not show any marked coincidence with the magnetics, were considered inconclusive and holes BD 001 to BD 003 were ultimately drilled on geological and geochemical targets.

BD 001 showed a maximum over a one metre interval of 1.4% Cu, 0.8% Mo and 4 g/t Ag within 4 metres at 0.54% Cu and 0.24% Mo in a monotonous interval of finely laminated to massive quartz - albite - magnetite rock (magnetite 2% to 30%). A one metre interval from 94 to 95 m showed 0.7 g/t Au. (Billiton interpretation: pyritic quartz - albite - magnetite shale).

Billiton SIROTEM defined four strong responses (named Grapevine, Hamper, Hamper Two and Bootstrap) the first two of which were located by the trial IP/EM survey. The magnetic quartz-albite unit was clearly evident in ground magnetic data. Because Grapevine and Hamper were near BD002 they were selected as preferred targets for BH2 (186 metres) and BH3 (167 metres).

BD 002 intersected fine grained, finely laminated, meta - calc - pelites (Teale 1985) containing biotite, garnet, epidote, tourmaline, scapolite, siderite and fluorite. Scapolite - pyrite +/- magnetite bearing limestones are present as are beds rich in scapolite (up to 60%). Most lithologies have greater than 5% scapolite. Pyrite beds are up to 6 cm thick and some lithologies have up to 10% bedded pyrite with lesser sphalerite and minor chalcopyrite. A 79 metre interval from 127 to 206 metres averaged 0.37% Zn including 6 metres at 2.1% Zn (Billiton interpretation: pyritic K feldspar - biotite - calcite - quartz shale).

BD 003 intersected laminated and brecciated albite metasediments with abundant haematite and some scapolite. Highest assay 1 metre at 0.43% Cu.

Teale (1985) concluded the area offered excellent promise for stratiform base metals and for breccia and stockwork type Cu - Mo +/- Au mineralisation. The host sediments were interpreted as Early Mesoproterozoic unconformably overlying Willyama. The favoured hypothesis was for rocks in BD 002 to be soda "cherts" deposited in shallow water with a source of Na - Si (-F) solutions from a distal alkaline/peralkaline volcanic source. Billiton considered all lithologies to be metapelites.

It was concluded by Panaust that exploration for base metals under the Tertiary cover would be difficult and expensive hence a joint venture partner was sought.

Billiton SIROTEM defined four strong responses (named Grapevine, Hamper, Hamper Two and Bootstrap) the first two of which were located by the trial IP/EM survey. The magnetic quartz-albite unit was clearly evident in ground magnetic data. <sup>also</sup> Because Grapevine and Hamper were near BD002 they were selected as preferred targets for BH2 (186 metres) and BH3 (167 metres).

BH 2 intersected interbedded fine - grained, finely laminated pyritic, light grey to black, graphite - sericite - K feldspar shales from 99 to 186 metres. Minor native copper and malachite 99 to 106 metres. Best assays



99-106 metres 0.5% Cu including 105-106 metres 5.5% Cu and 0.12 g/t Au; 158-160 metres 0.24 g/t Au, however copper values averaged > 500 ppm over 88 metres.

BH 3 encountered finely laminated sericite - graphite shales over 87 metres from 80 metres with Zn 7 to 175 ppm, Pb 14 to 105 ppm, Cu uniformly low, Ag and Au less than detection.

Downhole IP and SIROTEM logging in both holes confirmed that they had intersected the conductors.

A reinterpretation of bottom hole intersections in Marathon holes lead Billiton to conclude that the number of holes penetrating Proterozoic lithologies was greater than previously indicated by Marathon (see interpreted Proterozoic geology map).

The main magnetic features were attributed to quartz - albite - magnetite (QAM) sequences considered by Billiton to be prospective for Cu - Au especially where they are cut by shears, while the adjacent pelitic metasediments were believed prospective for Pb-Zn.

DRILLING: 31 rotary holes (BE 168 to 198) and one water bore BE-W1 totalling 3079 metres.

4 partly cored rotary holes (BE 162C, 165C, 166C, 167C) totalling 411.1 metres (82.6 metres cored).

5 diamond drill holes (BD 001, 002, 003, BH2, BH3) totalling 1474.7 metres. BH 1 was abandoned as an open hole at 54 metres.

0 - 75.0      Rotary / mud  
BDD 88B 4    75 - 200 m      Diamond core

Licence N° : EL 957

Applicant / Title Holder: Marathon Petroleum Australia Ltd

- ➔ Interpreted Tertiary palaeochannel
- 175 Rotary drill hole (prefix BE)
- BD001 Diamond drill hole
- BE-W1 Water bore and number
- 162C Cored rotary hole (prefix BE)

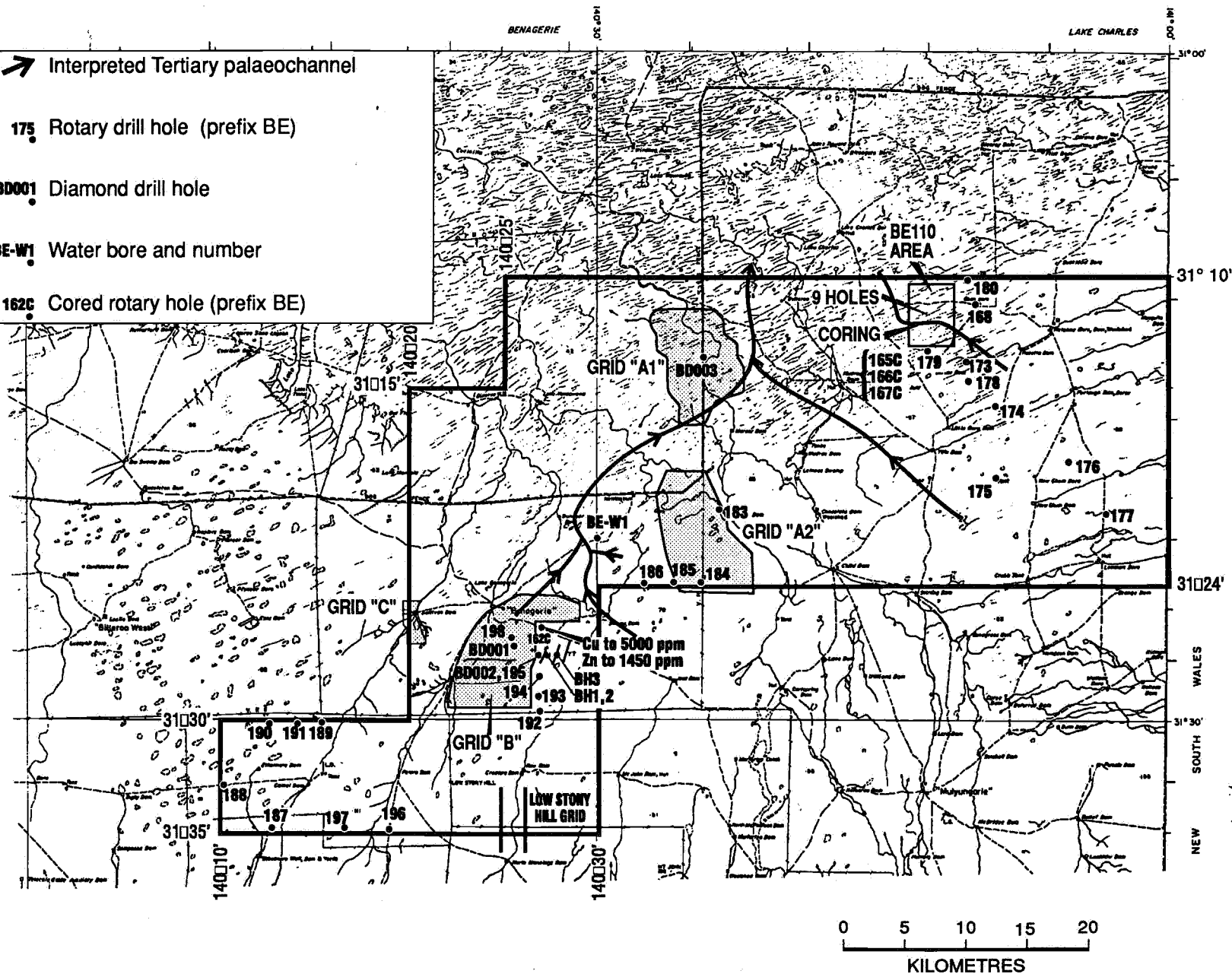


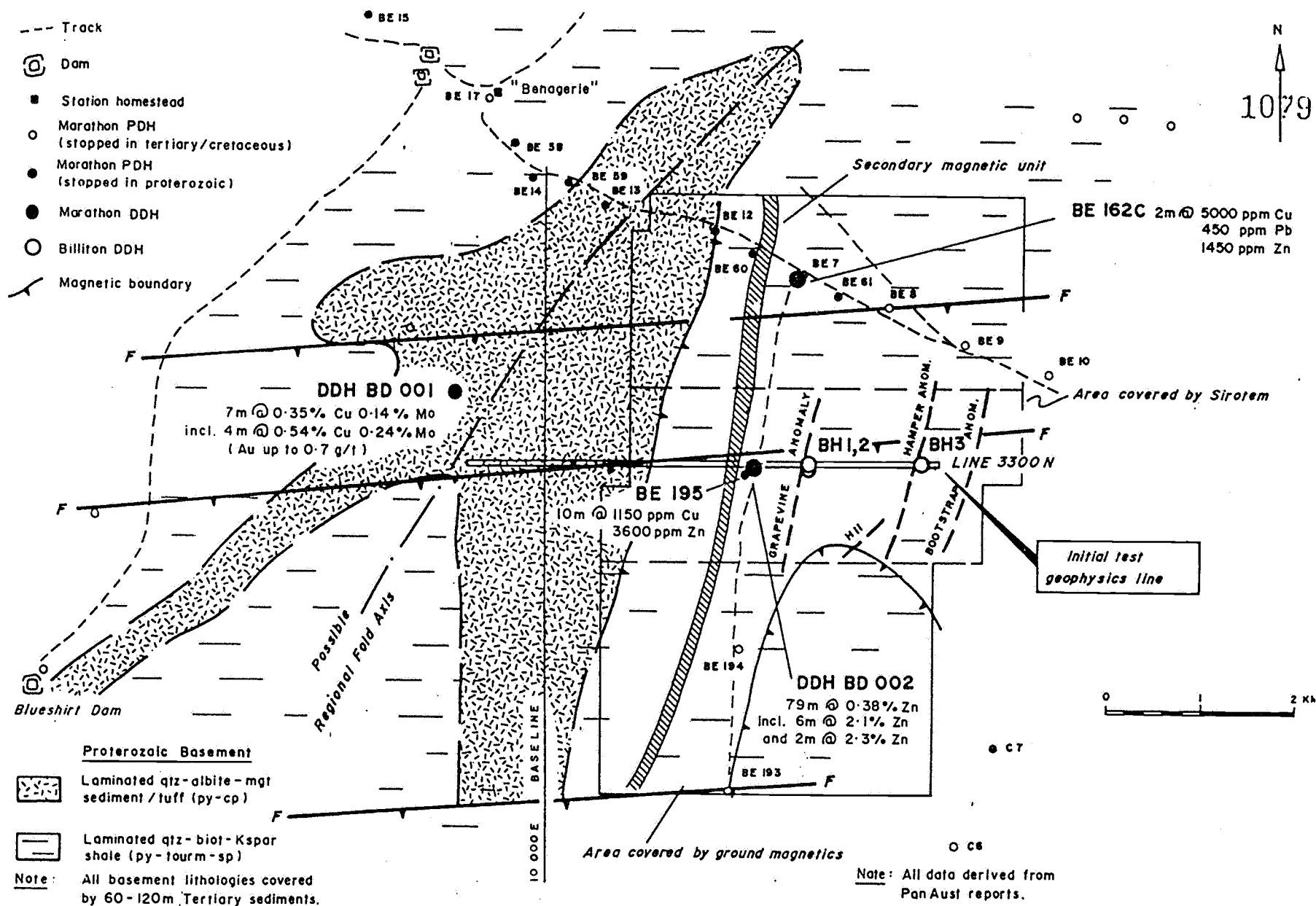
Figure 119

**PRELIMINARY INTERPRETED GEOLOGY WITH DRILLHOLE LOCATION**

**BENAGERIE PROSPECT**

**REVIEW OF MINERAL EXPLORATION**

**CURNAMONA 1:250,000 MAP SHEET**



**TENEMENT:** EL 970 (formerly SMLs 118, 209, 209A, 210, 210A, 222, 241, 242, 267, 440, 534, 544, 595, 672, 673, 714, ELs 42, 62, 85, 132, 159, 168, 254, 259, 263, 278, 297, 343, 450; followed by 1307, 1352, 1444).

**AREA:** 1782 sq km

**COMMENCEMENT DATE:** 18/3/83

**EXPIRY DATE:** 17/3/83

**COMPANY:** BHP MINERALS LIMITED

**ENVELOPE:** 4704

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Glenorchy H.S.

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934, MULYUNGARIE 7034

**TARGETS:** Copper, gold, uranium

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup locally masked by a veneer of Quaternary and Tertiary sediments.

**EXPLORATION SUMMARY:** The objective was to explore for 'Olympic Dam Style' mineralisation in association with regional magnetic anomalies identified from SADME and other airborne surveys. Grids were surveyed on three of these magnetic anomalies, Spring Hill (67.5 line km), 5 km east-north-east of Lignum Dam (57.5 km), 7 km north-north-west of Johnny Hill (73.5 km).

Detailed gravity and ground magnetic surveys were completed on each of these grids with readings at 100 metre spacing along lines. The airborne magnetic survey of adjacent EL 971 overlapped slightly onto EL 970 on the western side. The Spring Hill grid was geologically mapped at 1:10 000 scale, 22 rock samples were collected, principally from Spring Hill, for multielement analysis, and three magnetic samples from Spring Hill for petrological examination.

Five vertical rotary/percussion holes (GLG-P1 to GLG-P5) totalling 432 metres (deepest 114 metres) were drilled to test two magnetic anomalies at Lignum Dam. The holes were logged with a gamma probe, eight chip samples were petrologically examined, and drill cuttings were sampled at 2 metre intervals and analysed for Cu, Pb, Zn, Ni, Mn.

**MINERALISATION/PROSPECT:** The work at Spring Hill showed the magnetic response was caused by magnetite-biotite-plagioclase rocks showing no significant metal values associated with an elongate east-west magnetic anomaly.

At Johnny Hill a discrete (2500 nT) west trending magnetic anomaly was found to be associated with gravity lows and this downgraded its potential.

Drilling at Lignum Dam of two coincident magnetic and gravity anomalies intersected unmineralised gabbro and magnetite - potash feldspar hornfels at relatively shallow depth (approximately 10-20 metres). On this basis the licence was surrendered.

**DRILLING:** Five rotary/percussion holes (GLG-P1 to GLG-P5) totalling 432 metres.



**TENEMENT:** EL 971 (formerly SMLs 267, 273, 438, 544, ELs 42, 168, 254, 278; followed by 1738).

**AREA:** 1480 sq km

**COMMENCEMENT DATE:** 18/3/82

**EXPIRY DATE:** 17/3/83

**COMPANY:** BHP MINERALS LIMITED

**ENVELOPE:** 4716

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Bibliando/Scott Hill

**1:250 000 SHEET** CURNAMONA, PARACHILNA

**1:100 000 SHEET** CURNAMONA 6834, WILLIPPA 6734

**TARGETS:** Copper, gold, uranium

**AGE/ROCK UNITS:** Neoproterozoic (Adelaidean), Sturtian age sediments of the Umberatana Group intruded by carbonate diapiric breccias.

**EXPLORATION SUMMARY:** The licence was acquired to test the possibility that coincident gravity and magnetic anomalies over the Bibliando Dome (PARACHILNA) could be due to an 'Olympic Dam - style mineralised sequence' previously not intersected by Western Mining hole BTM 1 (562.3 metres). An airborne magnetic/radiometric survey (2200 line km) was completed over the entire licence and extending slightly eastwards onto EL 970 by Georex Pty Ltd in March 1982 on north south lines spaced at 1 km. Four north-south grid lines totalling 30 km and pegged at 100 metre centres were surveyed within an 8050 metre east-west interval. Ground magnetics at 25 metre station spacing and a gravity survey at 100 metre station spacing were completed on the four grid lines. One of these lines (16100E) was later extended a further 6 km north for purposes of a gravity traverse. In addition a ground magnetic and gravity profile (24 km) was completed in the Toolaby Hills. A petrological examination was made of four samples, from BTM 1. Twenty three rock samples, largely carbonate breccias, were analysed for a very wide range of elements.

**MINERALISATION/PROSPECTS:** After interpretation of the magnetic and gravity surveys it was concluded that a dense magnetic southerly dipping body occurs at 1500 to 1800 metres below surface in the Bibliando Dome area. The Bibliando Dome gravity anomaly was recognized to be of some 10 milligals intensity over a width of more than 14 km with a more likely actual width of 20 km. The Toolaby gravity anomaly has similar width and intensity and probably represents a similar basement feature. The source was interpreted as probably Willyama age rocks beneath Sturtian and perhaps 1000 metres of Burra Group sediments.

Since both Bibliando and Toolaby were interpreted to be at depths exceeding 1500 metres the EL was surrendered.

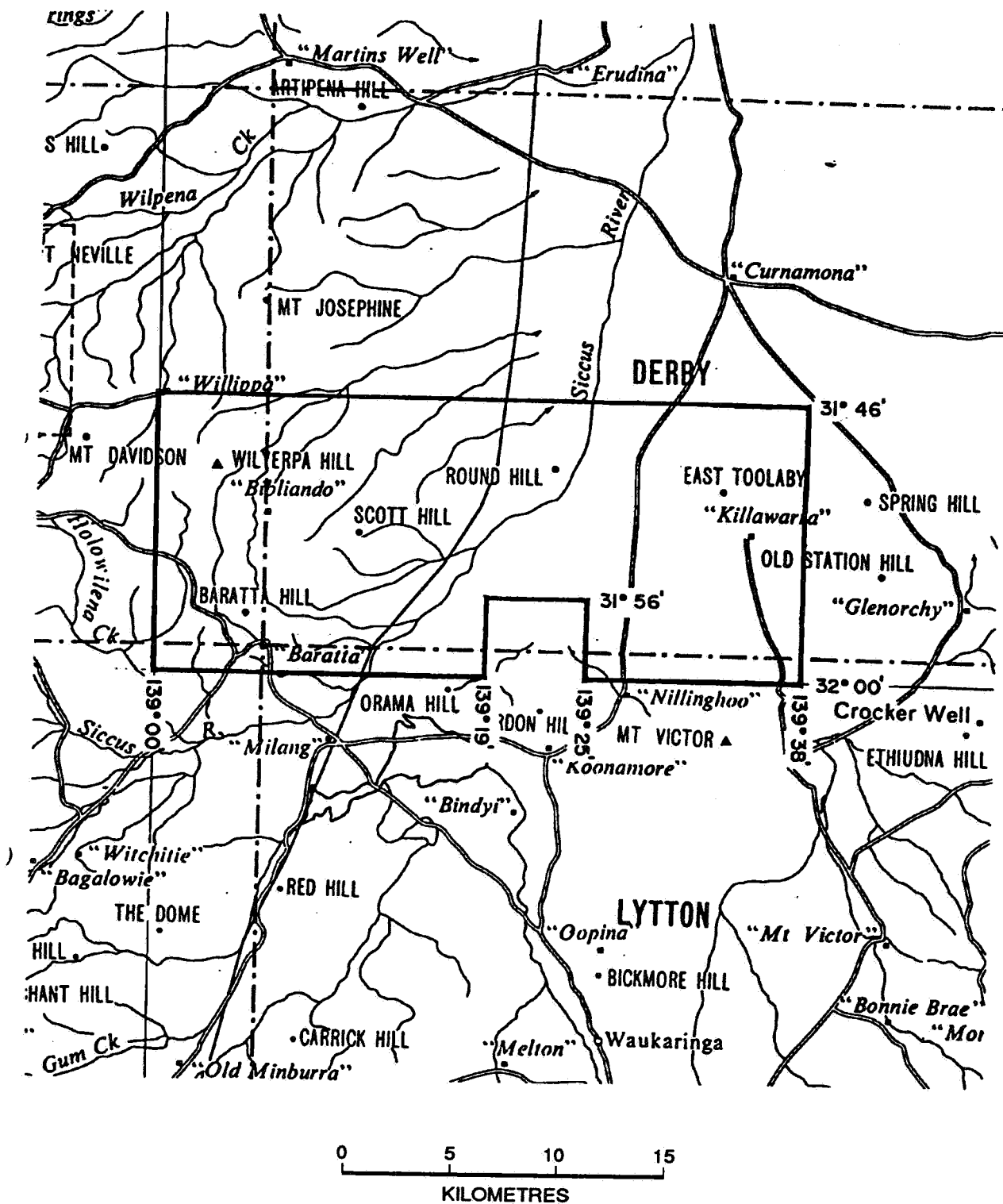


Figure 121

Applicant / Title Holder: B.H.P. Minerals Ltd

Licence N° : EL 971

DME\_SA 93-1686



**TENEMENT:** EL 1004 (formerly SMLs 222, 440, 595, 714, ELs 85, 132, 259, 377, 597; followed by ELs 1412, 1786)

**AREA:** 818 reducing to 525 sq km

**COMMENCEMENT DATE:** 3/5/82

**EXPIRY DATE:** 2/5/87

**COMPANY:** AAR LIMITED, MOUNT ISA MINES LIMITED, TETON AUSTRALIA PTY LIMITED.

**ENVELOPE:** 3203

**REFERENCES:**

**LOCATION:** South Eagle

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934, MULYUNGARIE 7034

**TARGETS:** Sedimentary uranium.

**AGE/ROCK UNITS:** Tertiary palaeochannels incised into Cretaceous clays unconformably overlying Precambrian basement.

**EXPLORATION SUMMARY:** Exploration work outside MPL's 14, 15 and RL's 10, 11, 12 (which are excluded from EL 1004) is not recorded in envelope 3203. Reports on any work on the Retention Leases were not sighted.

**MINERALISATION/PROSPECTS:** A description of the Honeymoon uranium deposit can be found under EL 377.



**TENEMENT:** EL 1060 (formerly SMLs 279, 415, 580, 696; ELs 98, 238, 412, 721; followed by ELs 1382, 1763)

**AREA:** 1972 sq km

**COMMENCEMENT DATE:** 1/11/82

**EXPIRY DATE:** 31/11/86

**COMPANY:** SEDIMENTARY URANIUM N.L., MINES ADMINISTRATION PTY. LIMITED, TETON AUSTRALIA PTY LIMITED, CARPENTARIA EXPLORATION COMPANY PTY LIMITED.

**ENVELOPE:**

**REFERENCES:**

**LOCATION:** EAST KALKAROO (MULYUNGARIE)

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** MULYUNGARIE 7034, LAKE CHARLES 7035.

**TARGETS:** Sedimentary uranium.

**AGE/ROCK UNITS:**

**EXPLORATION SUMMARY:** CONFIDENTIAL ENVELOPE

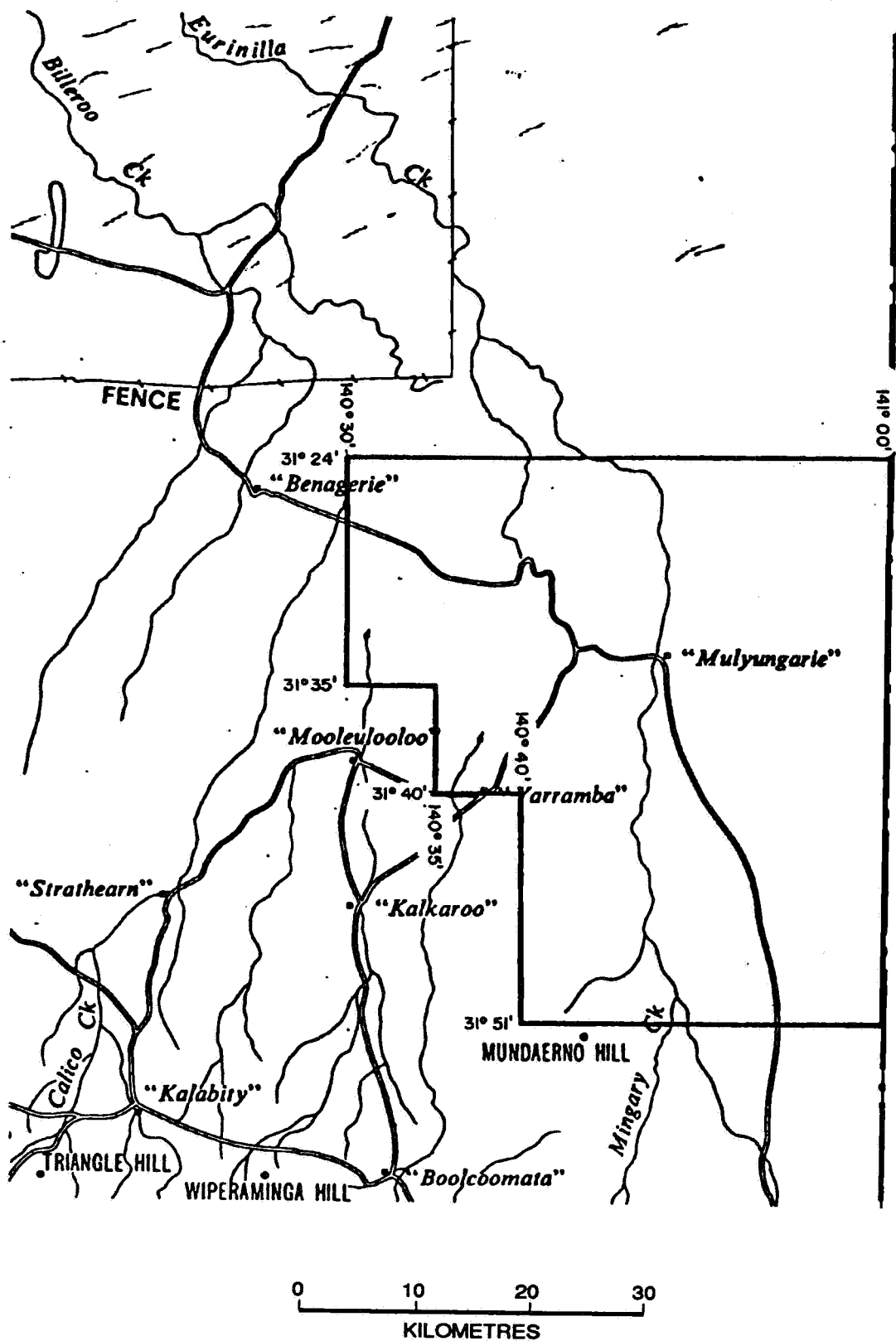


Figure 123

**Applicant / Title Holder:** Sedimentary Uranium N.L. (80%), Mines Administration Pty. Ltd (6 $\frac{2}{3}$ %), Teton Australia Pty Ltd (6 $\frac{2}{3}$ %), Carpentaria Exploration Co.Pty Ltd (6 $\frac{2}{3}$ %)  
**Licence N° :** EL 1060

DME\_SA 93-1688

**TENEMENT:** EL 1065 (formerly SMLs 267, 268, 514, 543, 544, ELS 42, 45, 59, 109, 227, 411, 722; followed by ELs 1487, 1698).

**AREA:** 2490 sq km reduced to 1347 sq km on 20/3/84

**COMMENCEMENT DATE:** 8/11/82

**EXPIRY DATE:** 7/11/87

**COMPANY:** AAR LIMITED

**ENVELOPE:** 6131

**REFERENCES:** Successive quarterly reports.

**LOCATION:**

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, PASMORE 6835, KALABITY 6934, BENAGERIE 6935.

**TARGETS:** Sedimentary uranium; copper, gold, uranium.

**AGE/ROCK UNITS:**

**EXPLORATION SUMMARY:** AAR, a subsidiary of CSR, was in joint venture with Teton Australia Pty Limited (49%) which withdrew from the joint venture in late 1985. The exploration was a continuation of the work undertaken on EL 722 however following the drilling of BWM1A-1 into regional magnetic anomaly M1 under EL 722, no substantial work was undertaken during the five years of this title. Most effort was directed to attracting a joint venture partner but without success and awaiting the clarification of Government policies on uranium development. A similar pattern is noted for EL 1203. Following expiry of this licence, retention leases were acquired over Goulds Dam and the Billeroo Channel.

The limited work undertaken during the term of the EL was:

- A review of regional airborne magnetic and gravity data by consultant P Woyzbun who recommended a wide spaced 12 line gravity and magnetic survey over anomalies M1 and M5. This survey was implemented by Solo Geophysics who integrated the results with pre-existing Geoex data (see also EL 1203).
- Appointment of consultant geologist G Chuck to review the potential for sedimentary exhalative base metal deposits in the Frome Embayment.
- Thesis at University of NSW by J Heape on lithogeochemistry and petrology of basement rocks of drill holes in Curnamona area.
- Reprocessing of the SADME Telechie airborne magnetic data. The tapes for the Benagerie and Lake Charles surveys were apparently unavailable.



# Outcrop area

**TENEMENT:** EL 1119 (formerly SMLs 118, 151, 172, 209, 209A, 210, 210A, 222, 269, 440, 534, 535, 562, 595, 672, 673, 677, 714, El's 47, 62, 85, 132, 259, 423, 794; followed by EL 1497, 1861)

**AREA:** 822 sq km

**COMMENCEMENT DATE:** 15/3/83

**EXPIRY DATE:** 14/3/88

**COMPANY:** CARPENTARIA EXPLORATION COMPANY PTY LTD,  
ABERFOYLE RESOURCES LIMITED (JV 2/5/84)

**ENVELOPE:** 3365

**REFERENCES:** Successive quarterly reports.

Richard, D.T. and Zweifel, H. 1975. Genesis of Precambrian Sulphide Ores, Skellefte District, Sweden, Econ. Geol. 70 pp 255-274.

**LOCATION:** Kalabily

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934, MULYUNGARIE 7034

**TARGETS:** Lead, zinc, gold.

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** Aberfoyle was initially attracted to an outcropping barite quartz magnetite ridge at South Burden's Dam with potential to host stratiform Pb - Zn mineralisation. The prospect was mapped, gridded, sampled, surveyed for magnetic and UTEM response and drilled. Further work at Waukaloo confirmed the anomalous nature of the Bimba formation which was tested with RAB and percussion drilling.

Correlations were drawn by Aberfoyle's Stephen Toteff between the Olary Block and the Skellefte field in Sweden (see reference) where base and precious metal deposits occur at the transition from sodic felsic volcanics into pelitic metasediments. Problems arise in high grade metamorphic terrains such as the Olary Block where recognition of alteration assemblages are more difficult.

Detailed mapping, sampling was completed at Mt Howden, Ironstone, Wiperaminga and South Dome Rock prospects with drilling at Mt Howden and Ironstone. A Landsat fracture pattern analysis was also completed before Aberfoyle withdrew from the joint venture.

Carpentaria assessed gold potential of the licence in soil and rock chip programmes including re-assaying drill cuttings and core.

**MINERALISATION:** At South Burden's Dam 65 line km of UTEM identified conductive trends parallel to a quartz barite ironstone ridge but variably resistive overburden may have been responsible. 200 RAB holes were bottom hole sampled for Cu, Pb, Zn, Au, Ag and Mn (AAS) and As, Ba (XRF) and showed broad elevated geochemical values with some high base metals due to high Mn (maximum value 27.8%). Six percussion and the diamond hole intersected similar base metal values to those in weathered bedrock. No source for EM conductors was found and downhole SIROTEM did not locate off-hole conductors. The core

hole intersected alternating quartzo-feldspathic to quartz mica metasediments with pyrite and minor pyrrhotite throughout. Basemetal sulphides occur in rare veins but analytical results were disappointing.

RAB drilling confirmed the anomalous nature of the Bimba formation at Waukaloo but percussion drilling (PDH KW 1, 2 for 380 m) showed trace to 1% pyrite and base metal values similar to those in weathered rocks (3000 ppm Zn, 500 ppm Pb).

A Zn-Pb subprovince in the Olary Block was recognised at Mt Howden where methodical rock chipping showed Zn to 1.37%, Pb to 1.99% and Hg to 0.86 ppm. Three percussion holes were drilled (MHP 1-3, 241.5 m) with the best intercept in MHP 3 being 1.5 m at 7650 ppm Zn, 2240 ppm Pb, 2 ppm Ag.

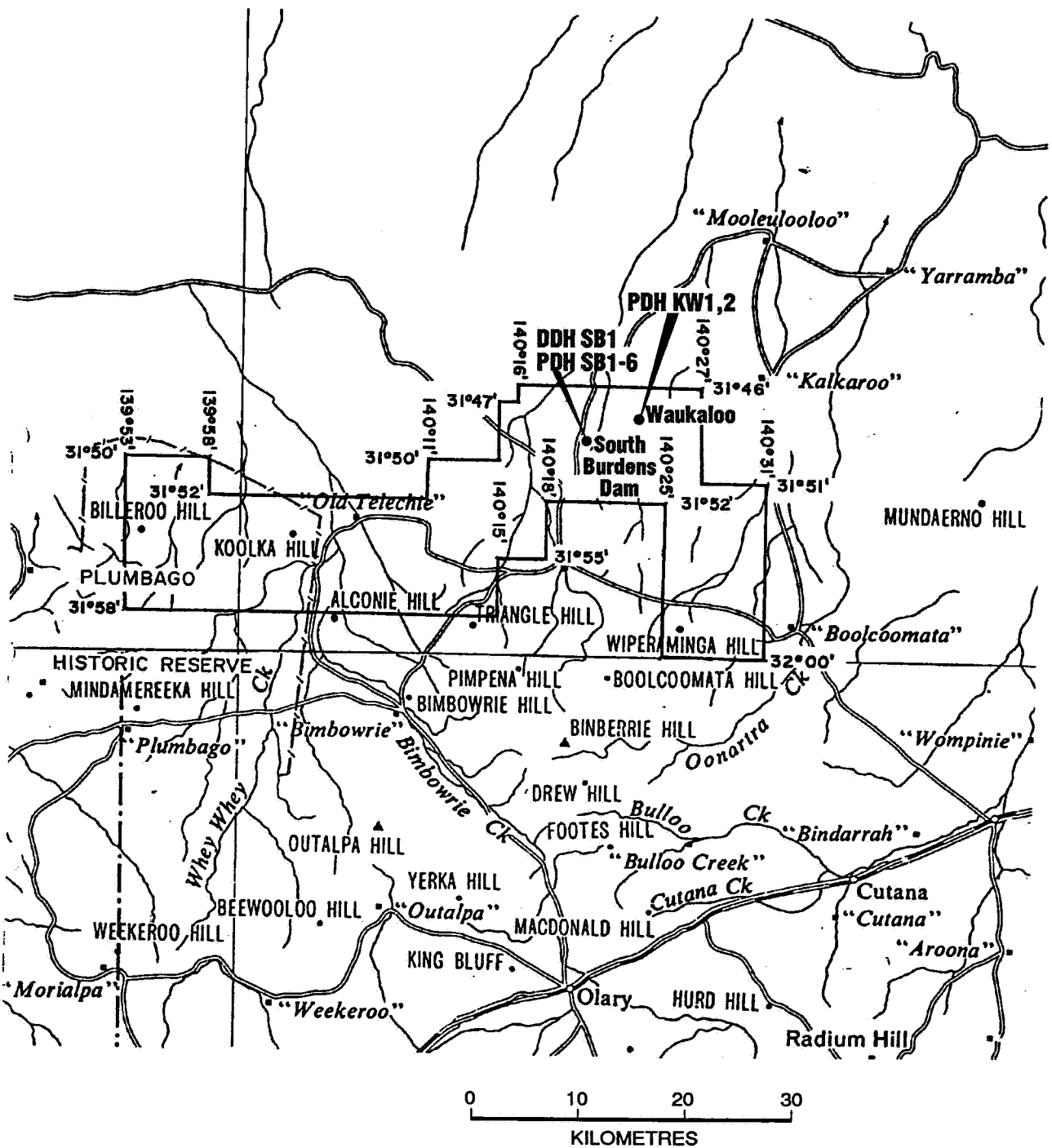
At Ironstone RAB drilling (31 holes, 202 m) located a quartz mica schist with a thin marble band containing 1940 ppm Zn.

Carpentaria's gold exploration identified anomalous rock chip and soil BCL values at Dome Rome and Waukaloo, the best value being 4.0 g/t Au over 10 metres (Waukaloo rock chip). BCL soil sampling covered 18400 metres (232 composite samples) and 176 rock chip samples were collected at 85 sites. Previous drill samples were re-sampled and assayed for gold revealing trace gold associated with Cu in the Bimba formation (best assays 1 m at 1.92 g/t (rockchip), 8.6 ppb (soil) and 6 m at 0.51 g/t in KD 12 from 91 m).

**DRILLING:** RAB: 645 holes totalling 5905 metres  
Percussion: 11 holes totalling 1601.5 metres  
Diamond: 1 hole for 182 metres (South Burden's Dam)



# SCHEDULE A



Note: 645 RAB holes not shown

Figure 125

**Applicant / Title Holder:** Carpentaria Exploration Company Pty Ltd,  
Aberfoyle Exploration Pty Ltd

**Licence N° :** EL 1119

DME\_SA 93-1690

**TENEMENT:** EL 1144 (formerly SMLs 513, 514 Sedimentary Uranium; EL 66 Minad; ELs 435, 802 Marathon; ELs 90, 105, 178, 334 Southern Ventures; followed by EL 1252 Panaust).

**AREA:** 588 sq km

**COMMENCEMENT DATE:** 27/5/83

**EXPIRY DATE:** 26/5/84

**COMPANY:** NORTH FLINDERS MINES LIMITED

**ENVELOPE:** 5259

**REFERENCES:** Ransom, D.M., 1984: Assessment of EL 1144 Lake Carnanto South Australia prepared for North Flinders Mines Limited.

**LOCATION:** Lake Carnanto

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935, LAKE CHARLES 7035

**TARGETS:** Copper, gold, uranium,

**AGE/ROCK UNITS:** Situated on the eastern flank of the Benagerie Ridge. Quaternary, Tertiary and Cretaceous sediments overlying a basement of Cambrian sediments, Mesoproterozoic acid volcanics and Carpentarian shales.

**EXPLORATION SUMMARY:** The area was applied for on the basis of interest in magnetic anomalies in shallowly covered basement on the Benagerie Ridge. The only work undertaken was a review of basement geology determined from past sedimentary uranium drilling and an assessment of exploration potential in basement rocks by consultant D.M. Ransom.

**MINERALISATION/PROSPECTS:** The western half of the EL is situated over the Benagerie Ridge where basement of acid volcanics and Mesoproterozoic or Carpentaria shales has been intersected at depths of 50 metres or less. There is a north-east trending zone of shallow magnetic features striking across the Benagerie Ridge and superimposed on deeper broader north-south magnetic zones thought to represent deeper Willyama basement.

In the eastern part of the EL drilling has shown the post - Mesozoic section to be as thick as 150 metres overlying Cambrian limestone.

Any potential lies in the shallow magnetic anomalies which are situated over the projected position of the likely Mesoproterozoic or Carpentarian grey to red-brown variably carbonaceous shale sequence. It seems likely these minor anomalies are magnetic units or perhaps mafic intrusives in the shale siltstone sequence. The less likely alternative is that they are magnetic ore deposits.

A limited ("high risk") programme of rotary percussion drilling to test the shallow magnetic anomalies was recommended but not implemented.

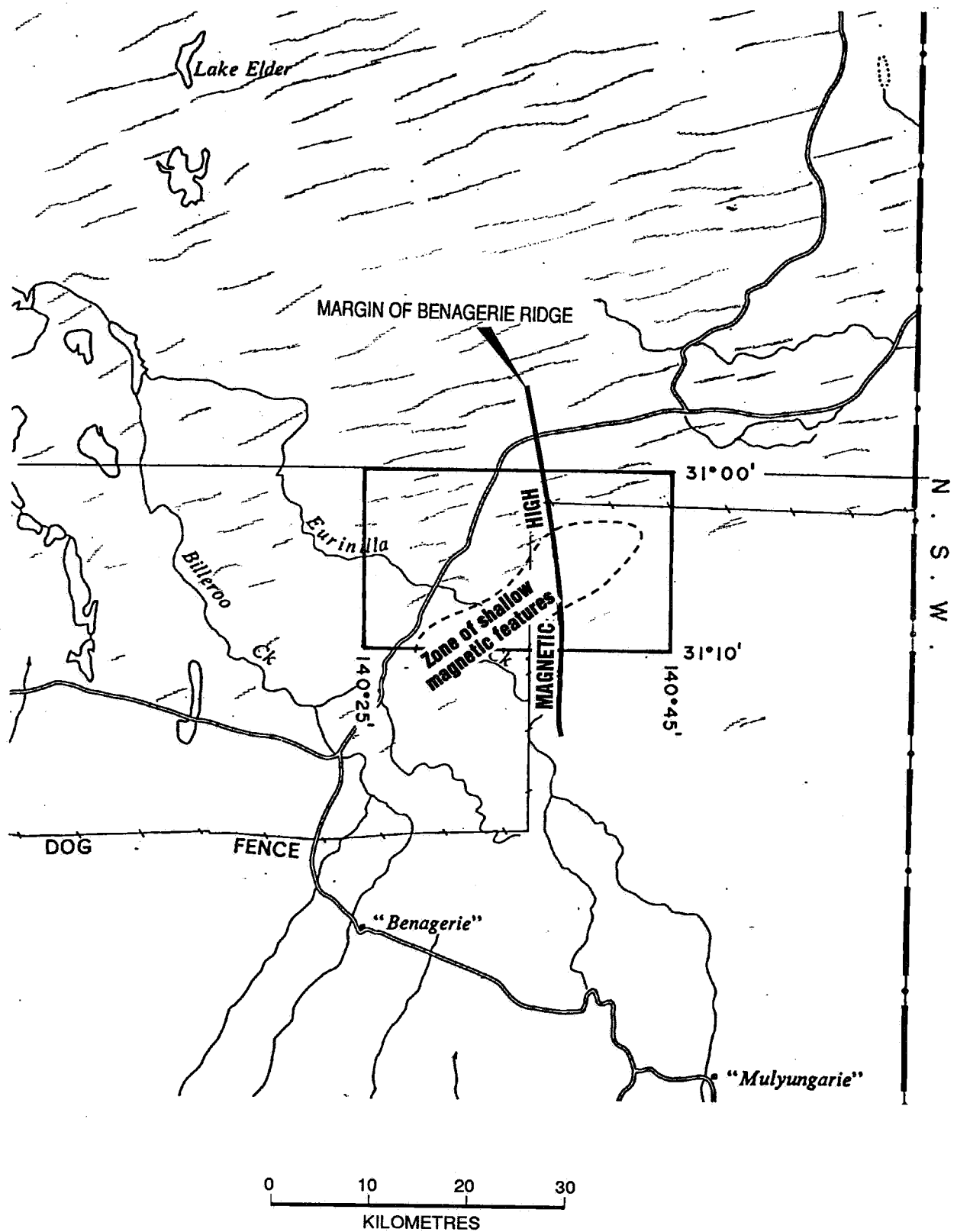


Figure 126

Applicant / Title Holder: North Flinders Mines Ltd

Licence N° : EL 1144

DME\_SA 93-1691

27/10/93

X

<u>TENEMENT:</u>	EL 1203 (formerly SMLs 267, 514, 544 ELs 42, 59, 66, 69, 127, 171, 217, 296, 297, 522, 523, 614, 911; followed by ELs 1487, 1684, 1698 ).
<u>AREA:</u>	1559 sq km
<u>COMMENCEMENT DATE:</u>	14/12/83
<u>EXPIRY DATA:</u>	13/12/87
<u>COMPANY:</u>	CSR LIMITED AND TETON AUSTRALIA PTY LTD
<u>ENVELOPE:</u>	3614
<u>REFERENCES:</u>	Successive quarterly reports.
<u>LOCATION:</u>	Lake Namba
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	CURNAMONA 6834, KALABITY 6934, BENAGERIE 6935
<u>TARGETS:</u>	Copper, gold, uranium.
<u>AGE/ROCK UNITS:</u>	Quaternary and Tertiary sediments resting on a Precambrian basement.

**EXPLORATION SUMMARY:** This EL was progressively extended with very little work being done after the diamond drilling to test basement magnetic anomalies well documented by Curtis and Moore (1982) in the Env. 3614 (also EL 911). Indeed there was little or no work undertaken in the final year of EL 911, the pre existing title. A similar pattern is noted for EL 1065. The title was held jointly with Teton who decided to withdraw in the latter half of 1985. A farm-out was sought unsuccessful and in 1987 CSR sold its mining interests to Placer during the four year term of the EL.

The following was completed:

- Continuous re-interpretation of previously acquired geophysical data both airborne and ground including reprocessing of the SADME Telechie airborne survey and a review by Consultant P Woyzbun recommended 12 line km of gravity and magnetics presumably around anomalies M1 and M5. This work was ultimately completed by Solo Geophysics in early 1985.
- Review of geological data by consultant G Chuck with objective of generating exhalative base metals concepts and University of N.S.W. M.Sc. Thesis by J Heape on lithogeochemistry and petrology (neither in envelope).

The Solo geophysical data when merged with pre-existing data clearly indicated two separate north-south gravity/magnetic trends. The westerly trend extends for 20 km southward from the M1 magnetic anomaly. The eastern trend demonstrates that the M5A gravity/magnetic trend is restricted both in the north and south. The combination of these two features appears to define a semi - coincident magnetic and gravity trough in an area which previously had appeared as a regional gravity high.

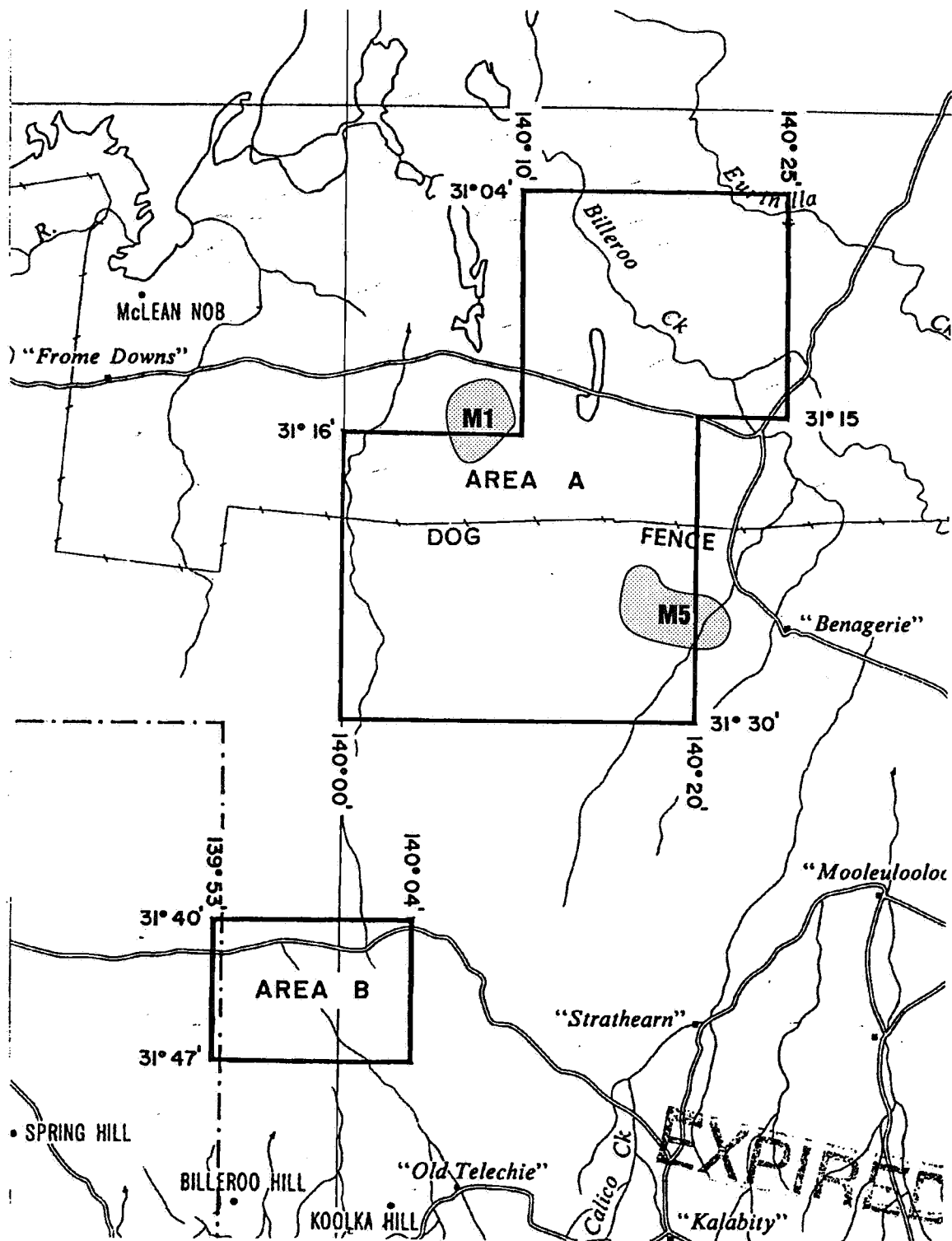


Figure 127

Applicant / Title Holder: CSR Limited, Teton Australia Pty Ltd

Licence N° : EL 1203

DME\_SA 93-1692

X

**TENEMENT:** EL 1252 (formerly SMLs 513, 514 Sedimentary Uranium; EL 66 Minad; ELs 435, 802 Marathon; ELs 90, 105, 178, 334 South Ventures; EL 1144 North Flinders; related to EL 957).

**AREA:** 588 sq km

**COMMENCEMENT DATE:** 24/9/84

**EXPIRY DATE:** 23/9/87

**COMPANY:** PAN AUSTRALIAN MINING LTD

**ENVELOPE:** 5851

**REFERENCES:** Teale, G., 1985: Frome Embayment, South Australia. Pan Australian Mining Ltd Rept. No 1985/21 (unpublished).

Rutter, H., 1985: The Frome Area of South Australia. An analysis of the Regional Gravity and Magnetic Data for Pan Australian Mining Ltd.

**LOCATION:** Lake Carnanto (Lake Charles)

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935, LAKE CHARLES 7035

**TARGETS:** Copper, lead, zinc, gold.

**AGE/ROCK UNITS:** Situated on and adjacent to the Benagerie Ridge. Quaternary, Tertiary and Cretaceous sediments up to 100 metres thick overlie a basement of early Proterozoic Willyama Supergroup, Mesoproterozoic pelitic metasediments, and Mesoproterozoic acid volcanics.

**EXPLORATION SUMMARY:** This EL was explored jointly with EL 957 formerly by Marathon Petroleum under ELs 802. Pan Australian acquired the Marathon tenements in 1983. The target initially was Olympic Dam style copper - gold mineralisation in the basement rocks of the Benagerie Ridge which was perceived to have geophysical and geological similarities with the Andamooka area of the Stuart Shelf. Most work was done on EL 957 and there was very little exploration of EL 1252 other than interpretation of SADME airborne magnetics and gravity. No drilling was done under EL 1252.

The envelope contains a comprehensive review by G Teale of the exploration completed under EL 957 with special emphasis on the geology and geochemistry of the four principal cored holes drilled into basement of the Benagerie Ridge. The nature of the basement metasediments is well described and the genesis of the associated base metal mineralisation is discussed. Reference should be made to EL 957 (Env. 3614).

Billiton became joint venture partner on ELs 957/1252 from March 1986 to late 1988. During this period a geophysical and geological interpretation was completed. Good interpretive maps were provided.

Overall it would appear that very little work other than geophysical interpretation was undertaken by either Panaust or Billiton in EL 1252. Intensive work took place to the south on EL 957.

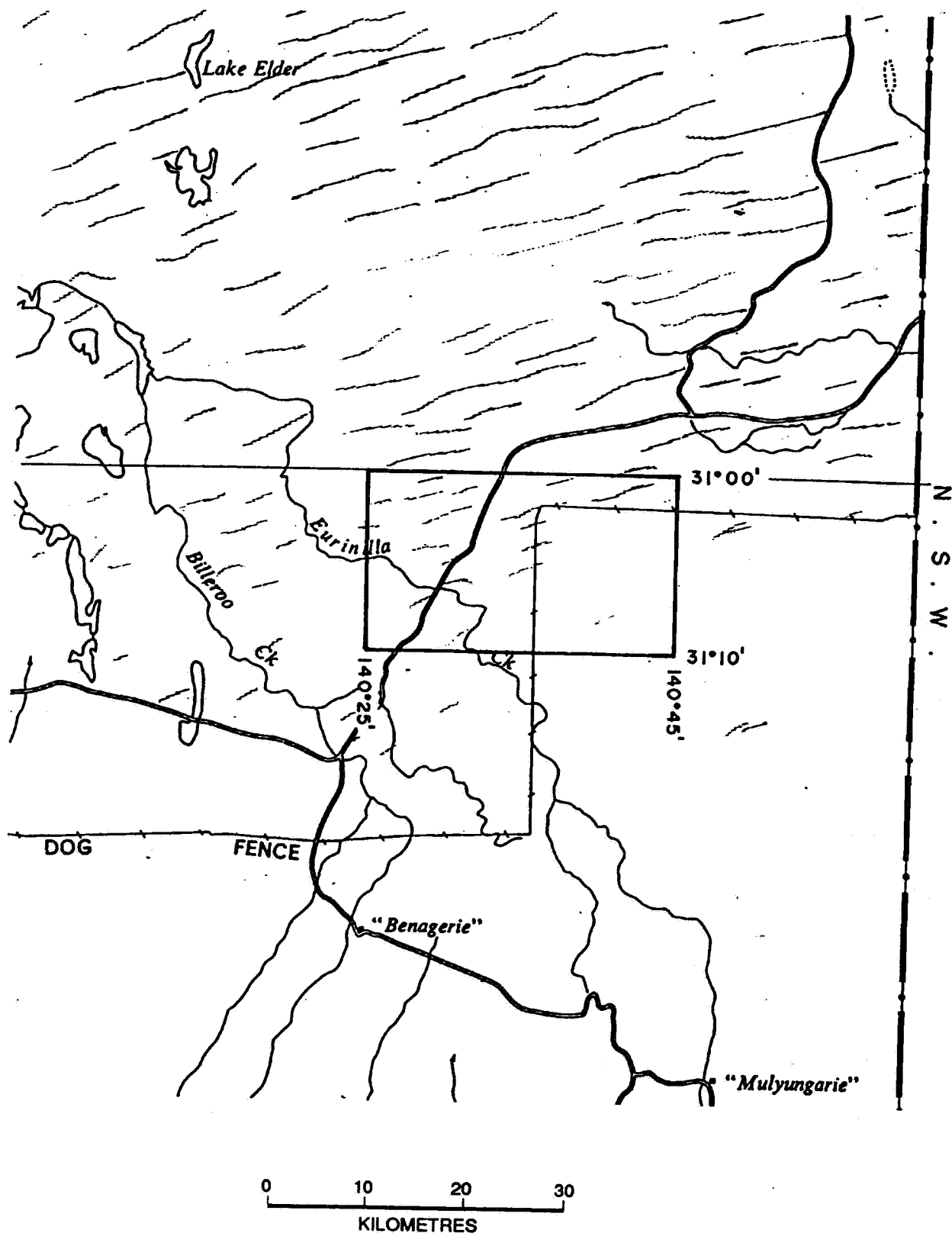


Figure 128

Applicant / Title Holder: Pan Australian Mining Ltd

Licence N° : EL 1252

DME\_SA 93-1693

**TENEMENT:** EL 1257 (followed by EL 1389)

**AREA:** 635 sq km

**COMMENCEMENT DATE:** 5/11/84

**EXPIRY DATE:** 4/11/86

**COMPANY:** ADELAIDE AND WALLAROO FERTILISERS LIMITED

**ENVELOPE:** 5884

**REFERENCES:**

**LOCATION:** Ethiudna Mine (Bimbowrie)

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** WINNININNIE 6833, CURNAMONA 6834, KALABITY 6934

**TARGET:** Wollastonite

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** The initial objective was to search for hard rock phosphate in igneous rocks but this quickly changed to an assessment of the wollastonite resources at Ethiudna Mine. Firstly diamond drill core samples were examined for previous holes by SADME (EML 1, EEC1 and 2) and Petrocarb (ETA 1, 2 and ET1, 2). Then cores showed significant thicknesses of wollastonite bearing calc-silicates bounded by cupriferous quartzite. There followed a magnetic survey on a 20m by 50m grid and two diamond drilling campaigns in the vicinity of Main Shaft, Central and Piper Shaft.

- (i) In 1985, 10 diamond drill holes (ED1-10) collared over a 540m north-south interval and totalling 505 metres.
- (ii) In 1986, 12 diamond drill holes (ED11-22) filling-in between the earlier holes and totalling 507.4 metres.

51 individual one metre core samples were forwarded to Amdel from first campaign for analysis for Ca, CO<sub>3</sub> and Mg in order to complete normative wollastonite, calcite and diopside. 382 individual one metre core samples from ED1-8 were analysed for Cu, Co, Ni, Au, Mo and W.

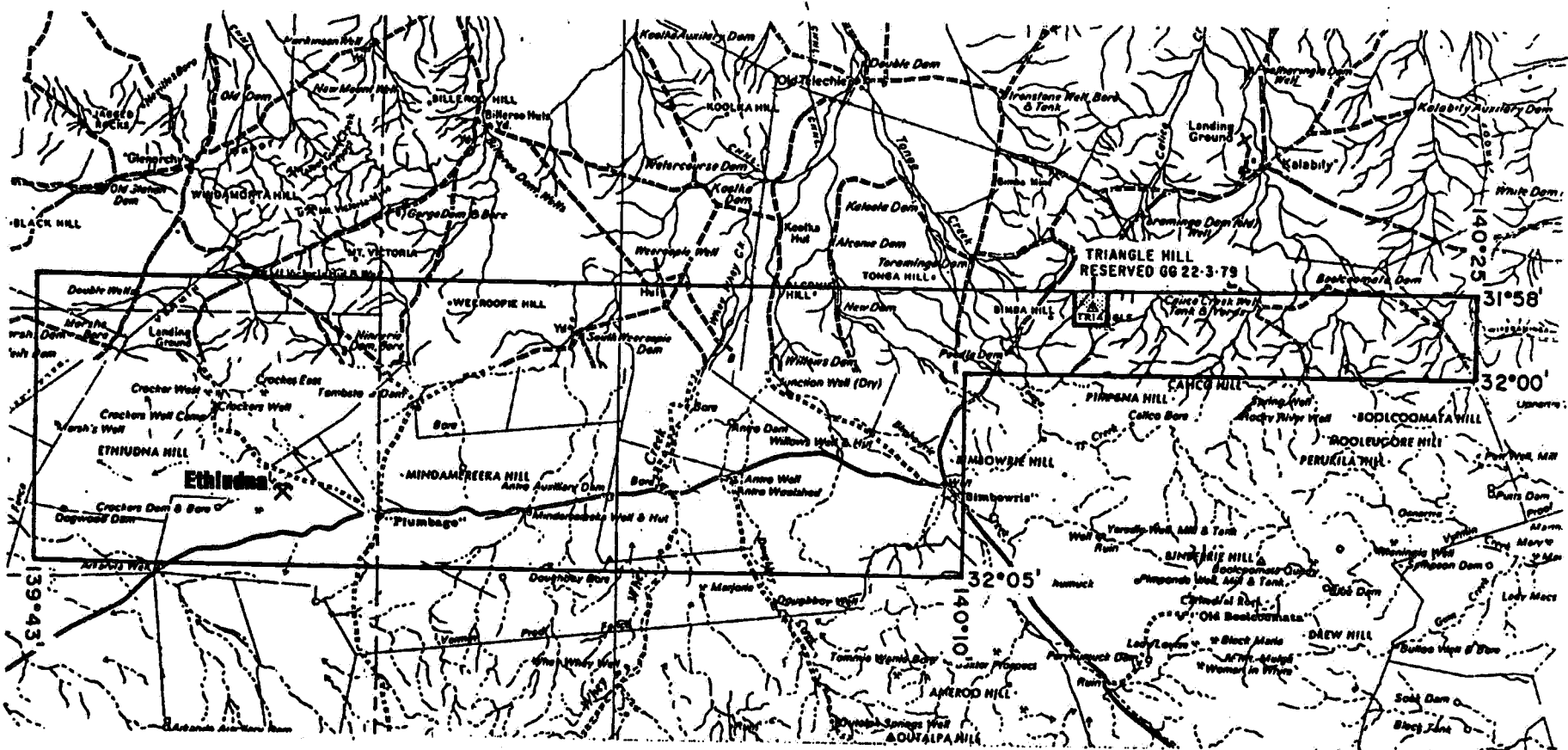
The EL was inadvertently allowed to lapse and a new application for EL 1389 was lodged.

**MINERALISATION/PROSPECTS:** Three holes ED 2,5,8 in the initial campaign intersected intervals of 13, 7 and 31m respectively of wollastonite rich calc silicate rocks. Normative calculations showed 30-40% wollastonite with ED8 showing 40% over 31m. Calc-silicates are overlain by copper bearing "hanging wall quartzite" and underlain by grey-green quartzite. Average thickness of north dipping calc-silicate is 10 to 15 metres. Metal assays show best 8m (5m true) at 0.8% Cu in quartzite of ED8 near Piper Shaft, best Au 0.38 ppm, Co 0.37%, Ni 470 ppm, Mo 58 ppm all over 1 metre intervals with W 510 ppm over 2 metres. Metal analyses were disappointingly low.

**DRILLING:** 22 diamond drill holes totalling 1012.4 metres (all on OLARY).



**Applicant / Title Holder:** Adelaide & Wallaroo Fertilizers Ltd



A horizontal scale bar with the word "KILOMETRES" centered below it. The bar has four major tick marks labeled "0", "5", "10", and "15" from left to right.

**Figure 129**

<u>TENEMENT:</u>	EL 1258 (formerly SMLs 279, 415, 612, 694, ELs 121, 189, 457, 848; followed by EL 1624)
<u>AREA:</u>	1185 sq km
<u>COMMENCEMENT DATE:</u>	13/11/84
<u>EXPIRY DATE:</u>	12/11/89
<u>COMPANY:</u>	MOUNT ISA MINES LIMITED
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATION:</u>	Mingary
<u>1:250 000 SHEET:</u>	CURNAMONA, OLARY
<u>1:100 000 SHEET:</u>	MULYUNGARIE 7034, MINGARY 7033
<u>TARGETS:</u>	Copper, lead, zinc.
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CONFIDENTIAL ENVELOPE

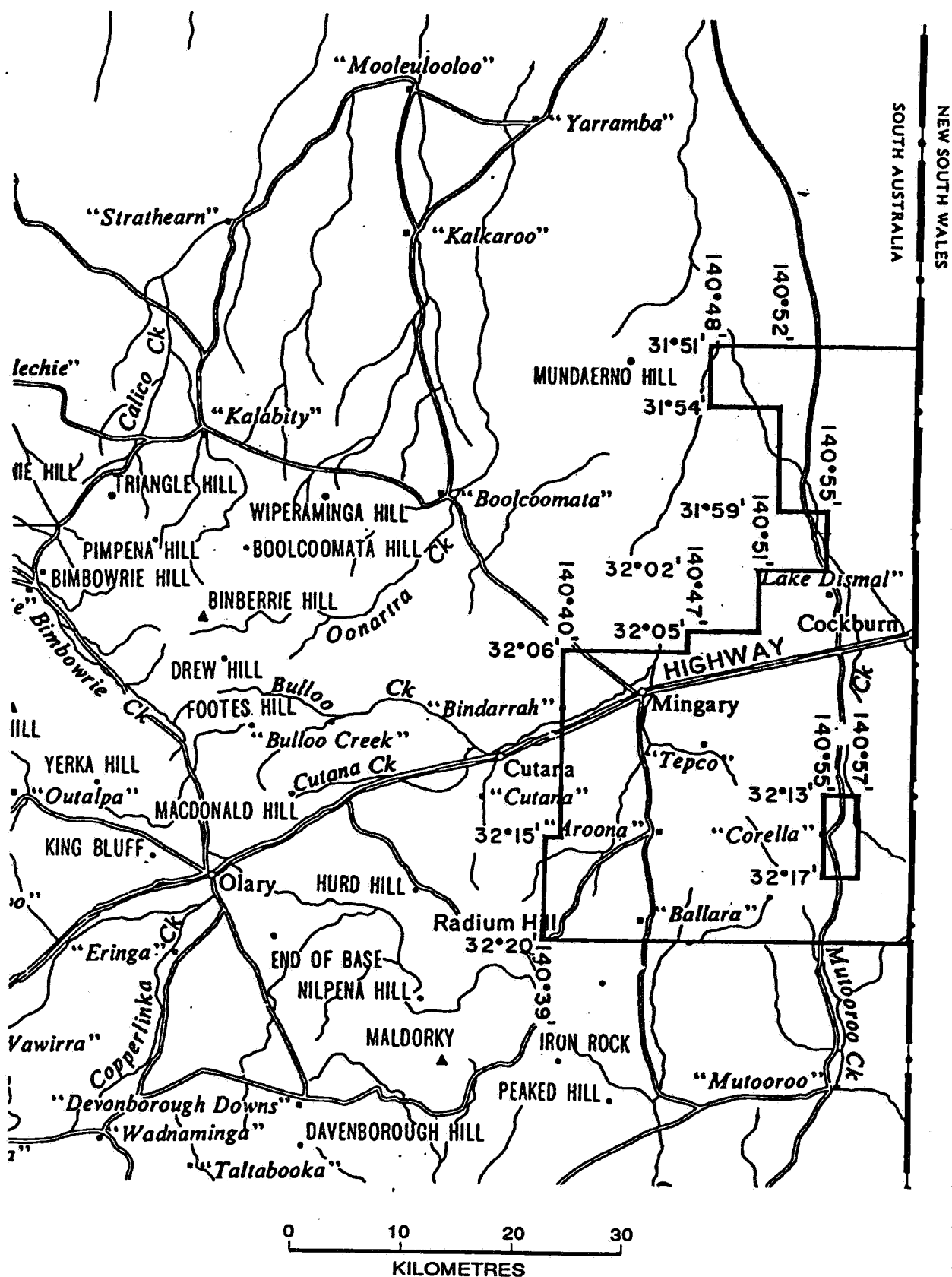


Figure 130

Applicant / Title Holder: Mount Isa Mines Limited

Licence N° : EL 1258

DME\_SA 93-1695

**TENEMENT:** EL 1307 (formerly SMLs 118, 210, 210A, 267, 535, 544, 673, ELs 42, 159, 168, 254, 263, 278, 297, 343, 450, 970; followed by EL 1444)

**AREA:** 571 sq km

**COMMENCEMENT DATE:** 3/10/85

**EXPIRY DATE:** 2/10/87 (surrendered)

**COMPANY:** PNC EXPLORATION (AUSTRALIA) PTY LTD

**ENVELOPE:** 6452

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Glenorchy

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834

**TARGETS:** Uranium, copper, lead, zinc.

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:**

**MINERALISATION/PROSPECTS:** After obtaining airphotographs, gravity and magnetics the licence was mapped at 1:25 000 scale and several small radiometric anomalies were discovered. 34 rock samples, 31 petrology samples and 10 EXT size (2 cm) cores were collected, the latter to be tested for density, magnetic susceptibility, remanent magnetism, electrical conductivity and IP parameters. 47 RAB holes (1873 m) were drilled and logged radiometrically. 29 water bore samples were analysed and 142 drill chip samples analysed for U, Th, Ce, La, Nb (XRF), Cu, Pb, Zn, Co (AAS). 55 samples of radioactively (?) anomalous sediments were analysed for U and Th.

**MINERALISATION/PROSPECTS:** Airphoto interpretation of the Jagged Rocks area revealed a circular structure with quartz - albite - mica pegmatite up to 100 m wide in a semi circle of 2 km radius. The pegmatite was radiometrically anomalous with visible davidite. Rock chip analyses returned up to 2.55% U (10 out of 40 > 1000 ppm U), 0.9% Cu and 0.3% Pb. Mapping and drilling showed migmatitic granitoids and gneiss outcropping in the south and extending north under thin cover (<40 m) before plunging rapidly to depths in excess of 90 m in the north. Geochemical results showed an east-west zone (1 km wide, 15 km in length) with Cu > 100 ppm, U > 30 ppm, parallel to magnetic trends and possibly reflecting stratigraphy. Groundwater geochemistry had a range from 50 ppb U<sub>3</sub>O<sub>8</sub> in the west to 680 ppb U<sub>3</sub>O<sub>8</sub> in the east probably due to a channel incised into basement.

**DRILLING:** Fortyseven RAB holes totalling 1873 metres



X

**TENEMENT:** EL 1308 (formerly SML 118, 209, 209A, 534, 672, ELs 62, 132, 376, 629; followed by ELs 1480, 1591)

**AREA:** 149 sq km

**COMMENCEMENT DATE:** 3/10/85

**EXPIRY DATE:** 2/10/86

**COMPANY:** PNC EXPLORATION (AUSTRALIA) PTY LTD

**ENVELOPE:** 6453

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Kalabity

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934

**TARGETS:** Uranium, copper lead, zinc.

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup overlain by Adelaidean sediments.

**EXPLORATION SUMMARY:** Following acquisition of aerial photography, magnetics and gravity data a programme of 1:25 000 mapping was completed. Two radiometric anomalies (GK 1, GK 4) first located in 1968 were re-located and examined along with 4 other anomalies. Sampling included 24 petrographic specimens, 18 rock chip and 4 EXT size (2 cm diameter) cores collected using a light weight coring machine. Assaying was for U, Th, Ce, La, Nb, Cu, Pb, Zn, Co.

Geological mapping failed to located any targets warranting further exploration for uranium. Base metal potential was downgraded by the absence of "Bimba Suite" equivalents within the tenements.

The GK 1 anomaly was examined and considered to have been adequately explored by costeans and 2 drillholes. A thin quartz muscovite - feldspar dyke with trace monazite occurs in a northerly trending retrograde shear zone. At GK 4 spot radiometric anomalies up to 2500 cps occur in a narrow quartz - feldspar - pyrite dyke in graphite chistolite schist. Samples returned up to 175 ppm U, 260 ppm Cu and 200 ppm Zn.

Approximately 9.5 km east of Kalabity Homestead a davidite locality was discovered which was not detected in previous airborne radiometric surveys. Davidite crystals occur scattered with milky quartz float with two samples returning 2% and 4% U with 700 ppm and 1250 ppm Th respectively (the maximum uranium content that davidite can hold is 4.4%).



<u>TENEMENT:</u>	EL 1352 (formerly SMLs 118, 209, 209A, 210,210A, 222, 241, 267, 440, 534, 544, 595, 672, 673, 714, ELs 42, 62, 85, 132, 259, 297, 377, 597, 970, 1004; followed by EL 1751)
<u>AREA:</u>	1199 sq km
<u>COMMENCEMENT DATA:</u>	20/8/86
<u>EXPIRY DATE:</u>	19/8/91
<u>COMPANY:</u>	PLACER EXPLORATION LIMITED
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATION:</u>	Strathearn
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	CURNAMONA 6834, KALABITY 6934, MULYUNGARIE 7034
<u>TARGETS:</u>	
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CONFIDENTIAL ENVELOPE



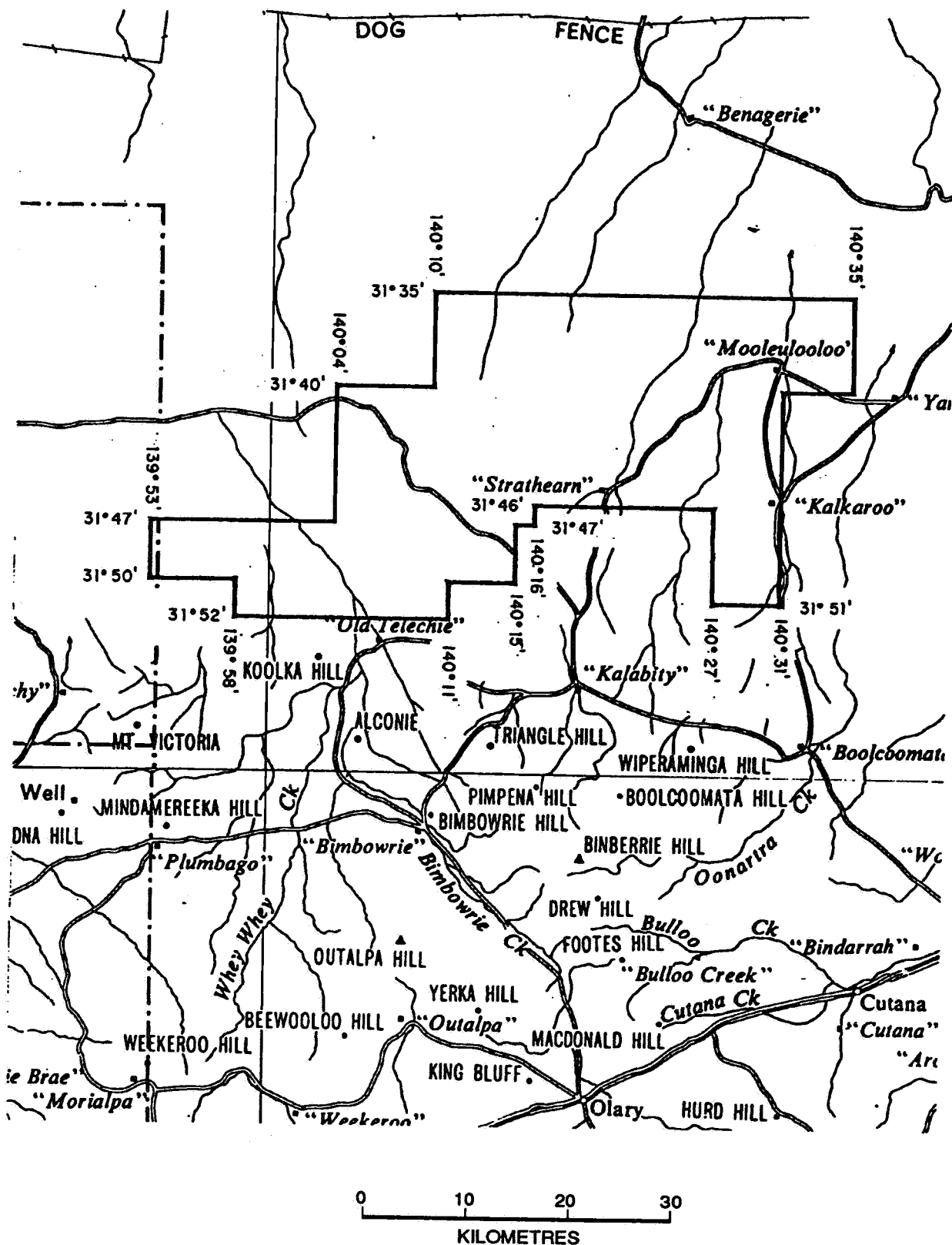


Figure 133

Applicant / Title Holder: Placer Exploration Limited

Licence N° : EL 1352

DME\_SA 93-1698

<u>TENEMENT:</u>	EL 1382 (formerly SMLs 279, 415, 580, 696 ELs 98, 238, 412, 721, 1060; followed by EL 1763)
<u>AREA:</u>	1961 sq km
<u>COMMENCEMENT DATE:</u>	3/2/87
<u>EXPIRY DATE:</u>	2/2/92
<u>COMPANY:</u>	PLACER EXPLORATION LIMITED, SEDIMENTARY HOLDINGS LIMITED, CARPENTARIA EXPLORATION COMPANY PTY LTD
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATION:</u>	East Kalkaroo (Mulyungarie)
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	MULYUNGARIE 7034; LAKE CHARLES 7035
<u>TARGETS:</u>	
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CONFIDENTIAL ENVELOPE

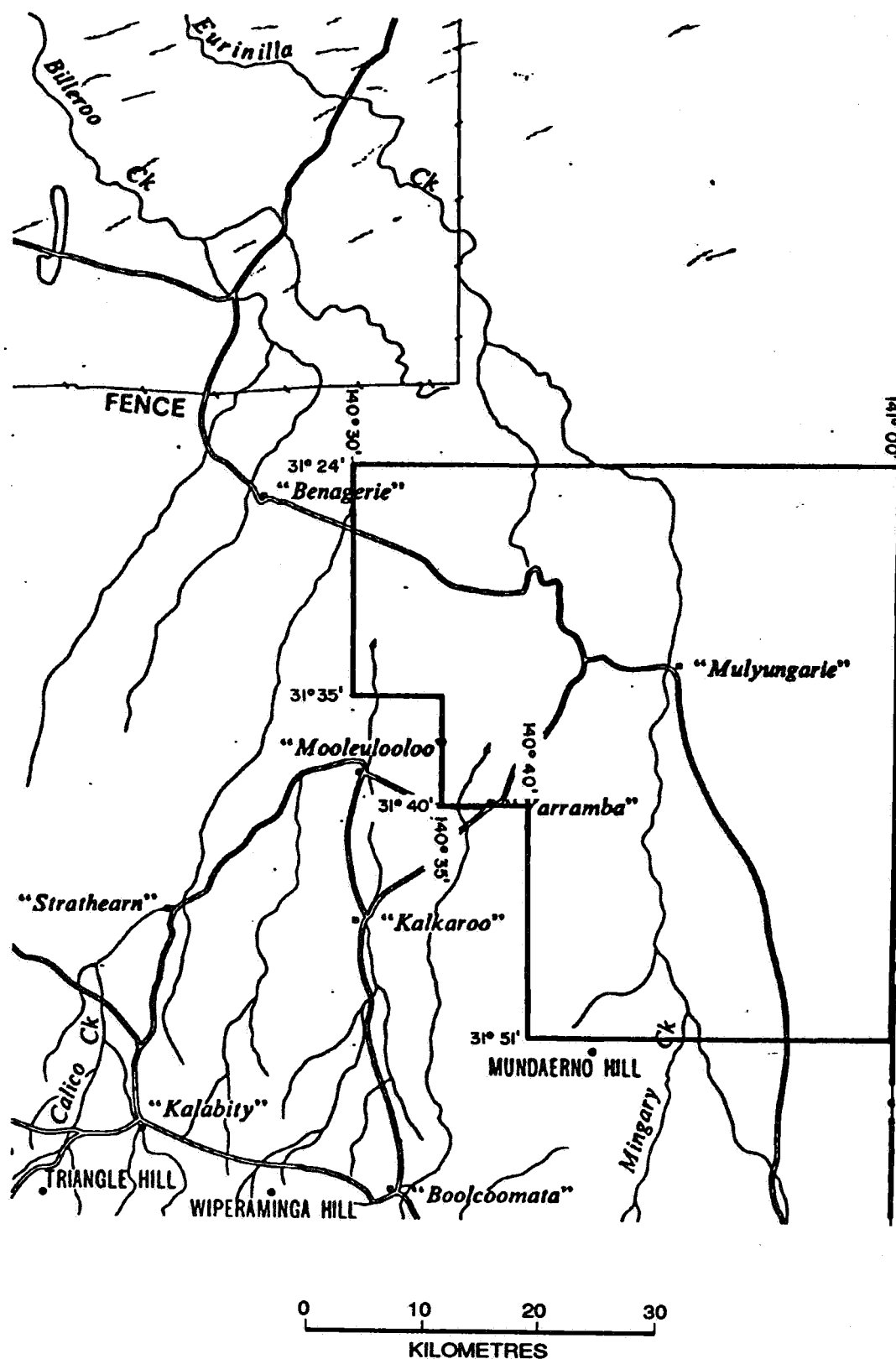


Figure 134

**Applicant / Title Holder:** Placer Exploration Limited, Sedimentary Holdings Limited,  
Carpentaria Exploration Company Pty Ltd

**Licence N° :** EL 1382

DME\_SA 93-1699

**TENEMENT:** EL 1389 (formerly EL 1257)

**AREA:** 635 sq km

**COMMENCEMENT DATE:** 2/3/87

**EXPIRY DATE:** 1/3/89

**COMPANY:** ADELAIDE & WALLAROO FERTILISERS LIMITED

**ENVELOPE:** 5884

**REFERENCES:** O'Connor, S.G. and Bampton, K.F., 1988: Wollastonite Project Status Report. Adelaide Chemical Company.

Draper, N., 1988: Ethiudna Project Wollastonite Production. First Feasibility Study.

**LOCATION:** Ethiudna

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** WINNININNIE 6833, CURNAMONA 6834, KALABITY 6934

**TARGET:** Wollastonite

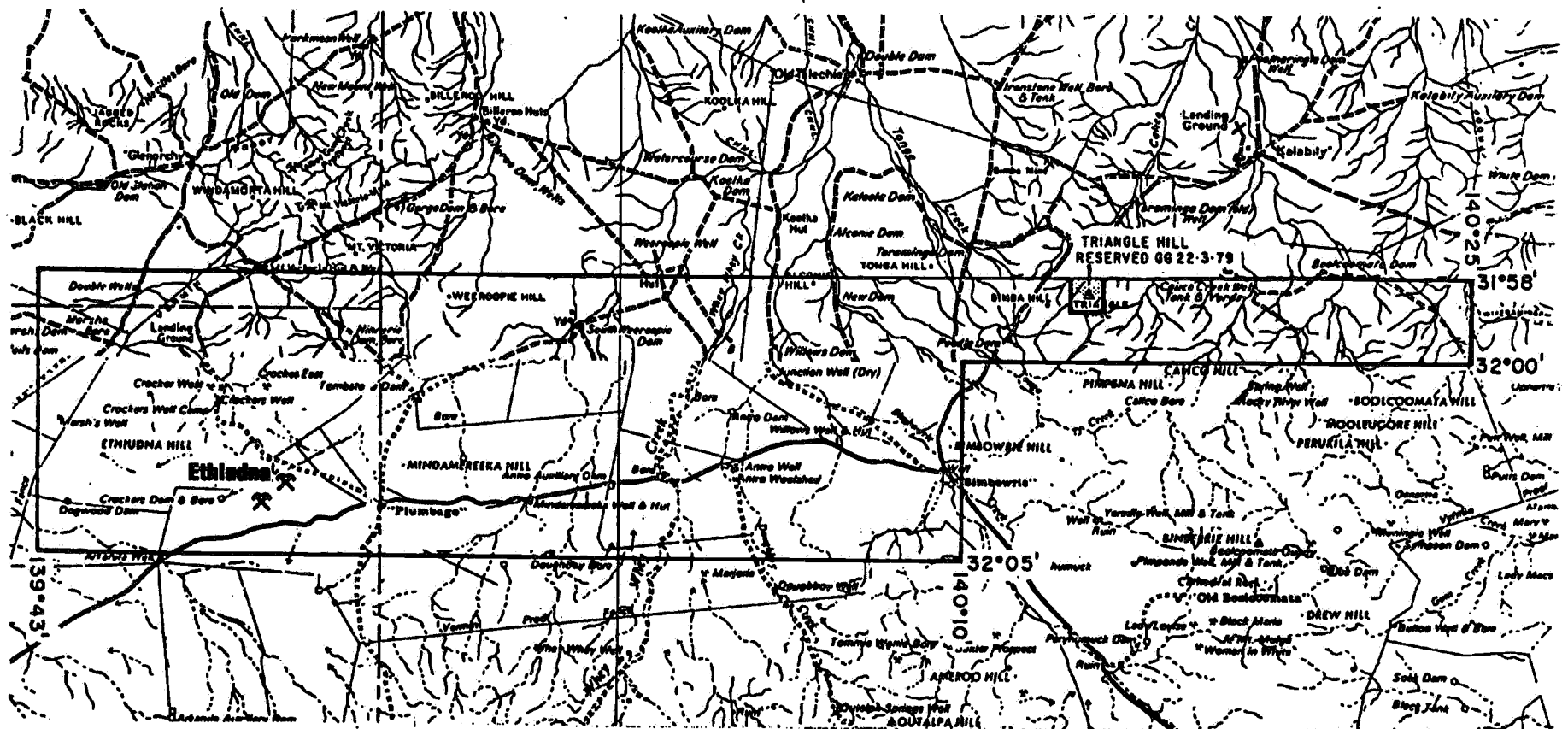
**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup

**EXPLORATION SUMMARY:** Following completion of diamond drill holes E11 to E22 (see EL 1257) 106 core samples were sent to Amdel for silicate analysis in order to compute normative wollastonite. Amdel were commissioned to undertake a programme of beneficiation testwork on core samples. A third diamond drilling campaign was completed at Ethiudna with 4 holes (ED 23-26) totalling 152m. Difficulties were encountered and a variety of analytical methods were tried to establish a reliable means of estimating wollastonite content of core and metallurgical concentrates as compared with point counting under microscope. A resource estimate was made and a preliminary feasibility study was completed by consultant N. Draper.

**MINERALISATION/PROSPECTS:** Wollastonite occurs in a 45 degree north dipping calc-silicate bed about 15m thick but ~~leaving~~ <sup>leaving</sup> down dip and along strike. The two major lenses, known as Main Shaft and Piper Shaft are 450 m apart and sub-parallel. They are overlain by quartzites which contain minor copper mineralisation. The mineralogy of the calc-silicate is wollastonite, diopside, quartz, calcite, minor feldspar and sulphides. The indicated resource is 1 million tonnes at 35% wollastonite with potential for significant extensions under alluvial cover. Testwork showed that concentrates containing 85-90% wollastonite could be achieved by magnetic separation with anionic and cationic flotation. The pre-feasibility study considered alternatives of contract mining and treatment plants at either Burra or Ethiudna and the sale of 20 000 tonnes of product per year.

**DRILLING:** Four diamond drill holes totalling 152 metres (All on OLARY).

**Applicant / Title Holder:** Adelaide & Wallaroo Fertilizers Ltd



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**Figure 135**

\* **TENEMENT:** EL 1391 (formerly SMLs 414, 513, 514 Sedimentary Uranium, ELs 66, 87, 174 Minad and ELs 549, 957 Marathon - Panaust).

**AREA:** 2030 sq km

**COMMENCEMENT DATE:** 13/3/87

**EXPIRY DATE:** 12/3/89

**COMPANY:** PAN AUSTRALIAN MINING LTD

**ENVELOPE:** 3713

**REFERENCES:** Progressive quarterly reports by Billiton.

**LOCATION:** Benagerie

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935, LAKE CHARLES 7035

**TARGETS:** Copper, lead, zinc, gold.

**AGE/ROCK UNITS:** The EL is situated over the centre of the Benagerie Ridge and on its eastern flank where exploration was focussed on a sequence of Proterozoic (Carpentarian?) pelitic metasediments and quartz-albite-magnetite rocks beneath Tertiary cover.

**EXPLORATION SUMMARY:** EL 1391 is the last in a series which commenced in late 1979 when Marathon Petroleum was granted EL 549. Extensive sedimentary uranium exploration took place until 1982 when under EL 957 Marathon began exploring for base metals eg Broken Hill, Olympic Dam style in the Proterozoic basement of the Benagerie Ridge south-east of Benagerie H.S. Marathon ownership was transferred to Panaust in April 1984. Panaust negotiated a joint venture with Billiton in March 1986 over EL 957 followed by EL 1391 and these commenced an intensive programme of magnetics and SIROTEM on a large grid south-east of Benagerie H.S. to explore for base metals in the Proterozoic basement of the Benagerie Ridge prompted by encouraging metal values in Marathon drill holes.

Three diamond drill holes were completed prior to the granting of this EL.

Work under this EL involved an extension of the original (6 km x 4 km) EL 957 grid to the north and west (130 line km at 200 metre line spacing), ground magnetics over these extensions and 44 km of SIROTEM in April 1987 to cover the nose region of an anticline about 3 km east of Benagerie H.S. interpreted from a magnetic anomalous marker and the distribution of quartz - albite - magnetite rocks. Two anomalous SIROTEM zones were defined 'Homestead' and 'Classic', both in the region of the interpreted nose. The Classic anomaly was tested with a 72° inclined 200 metre diamond drill hole, BDD88B4, in March 1988. Core was extensively sampled at one metre intervals or less with assays for Cu, Pb, Zn, Ag and some Pt, Pd.

Billiton withdrew from the joint venture in October 1988 and Panaust was unable to attract another partner.

**MINERALISATION/PROSPECTS:** Drilling of BDD 88 B4 showed that the SIROTEM anomaly was generated by highly conductive grey carbonaceous shales containing stratiform siliceous pyrite horizons and siliceous pyritic breccias.

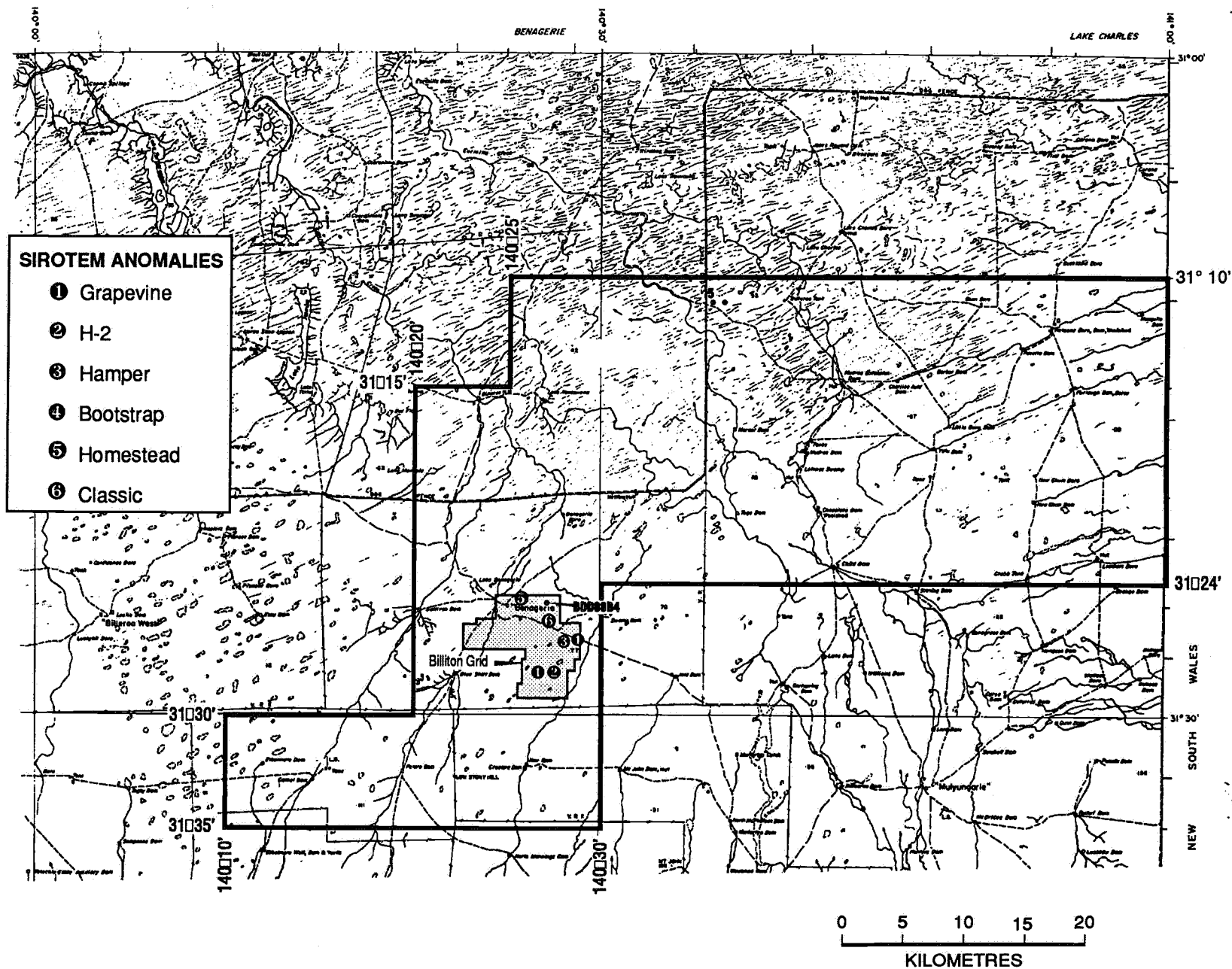
Best assays were 0.55 metres at 0.96% Pb, 0.6 metres at 0.25% Pb, 0.15% Cu and 2 metres at 0.23% Pb however Cu, Pb and Zn were present at anomalous levels throughout the cored interval from 75 metres. For more detail on geology refer EL 957.

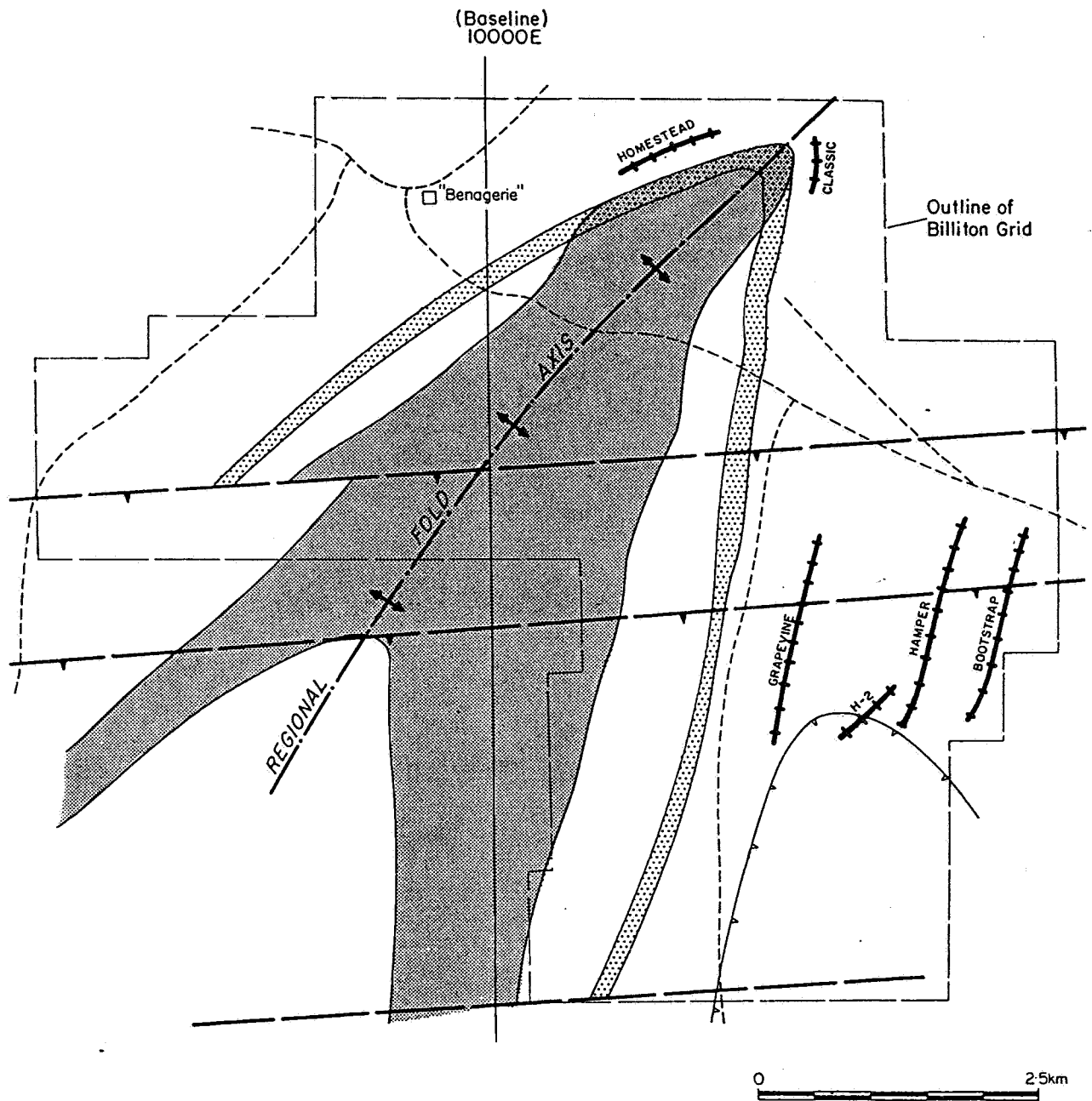
**DRILLING:** One diamond drillhole (BDD 88 B4) to 200 metres (125 metres cored).







Licence N° : EL 1391

Applicant / Title Holder: Pan Australian Mining Ltd

Figure 136





-  Laminated quartz-biotite-feldspar shale
-  Laminated quartz-albite-magnetite sediment
-  Magnetic marker horizon
-  Magnetic boundary
-  Interpreted fault
-  Sirotek anomaly

CURNAMONA 1:250,000 MAP SHEET  
REVIEW OF MINERAL EXPLORATION  
**BENAGERIE PROSPECT - SCHEMATIC GEOLOGICAL INTERPRETATION**



X

**TENEMENT:** EL 1412 (formerly SMLs 222, 440, 595, 714, ELs 85, 132, 259, 377, 597, 1004; followed by 1786)

**AREA:** 518 sq km

**COMMENCEMENT DATE:** 27/6/87

**EXPIRY DATE:** 21/6/92

**COMPANY:** PLACER EXPLORATION LIMITED, MOUNT ISA MINES LIMITED.

**ENVELOPE:** 3203

**REFERENCES:**

**LOCATIONS:** Kalkaroo

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** MULYUNGARIE 7034

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:** Tertiary palaeochannels incised into Cretaceous clays unconformably overlying Precambrian basement.

**EXPLORATION SUMMARY:** Exploration work outside MPL's 14, 15 and RL's 10, 11, 12 (which are excluded from EL 1412) is not recorded in envelope 3203. Reports on any work on the Retention Leases were not sighted.

**MINERALISATION/PROSPECTS:** A description of the Honeymoon uranium deposit can be found under EL 377.



**TENEMENT:** EL 1444 (formerly SMLs 118, 210, 210A, 535, 673, ELs 159, 263, 278, 343, 450, 970, 1307)

**AREA:** 146 sq km

**COMMENCEMENT DATE:** 11/11/87

**EXPIRY DATE:** 10/5/88 (Surrendered)

**COMPANY:** HALLMARK GOLD N.L.

**ENVELOPE:** 6954

**REFERENCES:** Quarterly Report

**LOCATION:** Glenorchy

**1:250 000 SHEET:** CURNAMONA

**1:1000 000 SHEET:** CURNAMONA 6834

**TARGETS:** Gold, uranium, copper, yttrium

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** Literature review of previous uranium exploration and uranium/copper occurrences.

**MINERALISATION/PROSPECTS:** The Mt Victoria uranium prospect was diamond drilled in the 1950's with probable reserves estimated at that time to be 67 000 tonnes at 6.95 pound  $U_3O_8$  per tonne. Uranium and base metal mineralisation commonly comprises uranium - titanium - chalcopyrite - pyrite and occurs as hydrothermal replacement lode deposits in sheared and brecciated granitoids.

The EL was considered to be projective for gold and yttrium Xenotime (yttrium phosphate, YPO<sub>4</sub>) is recorded in pegmatoidal dykes near Mt Victoria Hut and other localities.



X

**TENEMENT:** EL 1471 (formerly SMLs 244, 589 ELs 430, 463)

**AREA:** 1393 sq km

**COMMENCEMENT DATE:** 1/3/88

**EXPIRY DATE:** 28/2/89

**COMPANY:** ABERFOYLE RESOURCES LIMITED

**ENVELOPE:** 8013

**REFERENCES:** Quarterly reports.

**LOCATION:** Coombs Springs

**1:250 000 SHEET:** FROME, CURNAMONA

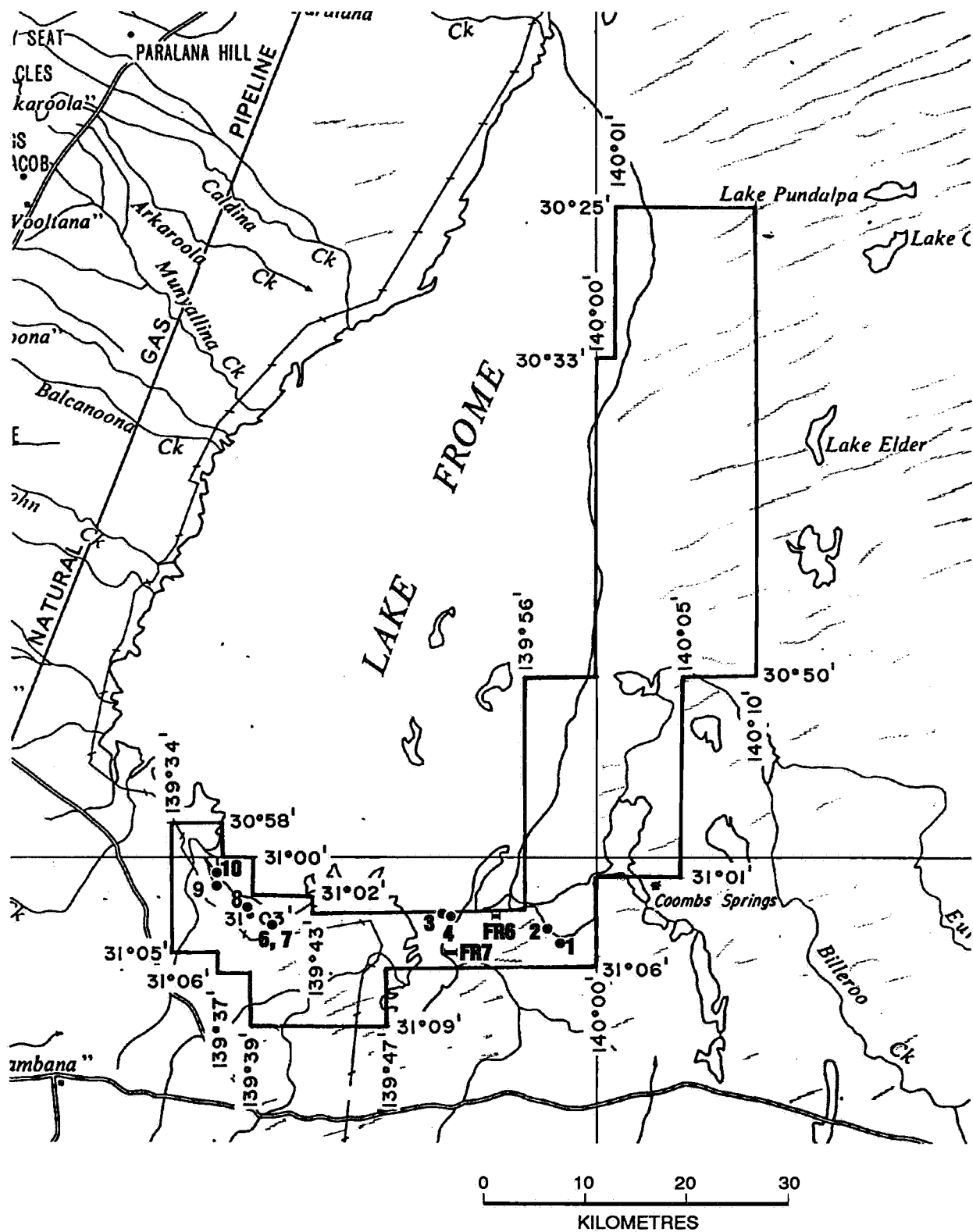
**1:100 000 SHEET:** FROME 6836, COONARBINE 6936, PASMORE 6835, BENAGERIE 6935.

**TARGETS:** Heavy mineral sands.

**AGE/ROCK UNITS:** Quaternary sediments around Lake Frome.

**EXPLORATION SUMMARY:** Review of open file data and photomosaic assessment of the potential for Quaternary sediments to host mineral sand accumulations. Thirty seven surface samples and 108 hand auger holes were drilled on 13 traverse lines to depths of mainly 4 to 6 metres (407 m total). Only 2 hand auger holes (total 4 m) were drilled on CURNAMONA. Holes were sampled at 1.5 m intervals and panned in the field. Concentrates were submitted for heavy media separation and showed the presence of rutile (5%), ilmenite (55-75%), zircon (2-15%), monazite (to 3%), leucoxene (to 10%) and silicates (to 20%) indicating an immature assemblage. The maximum heavy mineral content was 2.82%.

**MINERALISATION/PROSPECTS:** Rocks within the Lake Frome area represent Cainozoic lacustrine and fluvial sedimentation. Although heavy minerals occur in the sands they are unlikely to form economic deposits.



8 • Surface sample

FR7 — Auger traverse

Note: Sampling on FROME not shown

Figure 139

Applicant / Title Holder: Aberfoyle Resources Limited

Licence N° : EL 1471

DME\_SA 93-1704

X

<u>TENEMENT:</u>	EL 1480 (formerly SMLs 118, 209, 209A, 534, 672, ELs 62, 132, 376, 629, 1308; followed by EL 1591)
<u>AREA:</u>	148 sq km
<u>COMMENCEMENT DATE:</u>	8/4/88
<u>EXPIRY DATE:</u>	7/10/89
<u>COMPANY:</u>	CLAY AND CERAMIC PRODUCTS PTY LTD
<u>ENVELOPE:</u>	8010
<u>REFERENCES:</u>	Quarterly Report
<u>LOCATION:</u>	Kalabity
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	KALABITY 6934
<u>TARGETS:</u>	Andalusite
<u>AGE/ROC UNITS:</u>	

EXPLORATION SUMMARY: The licence was taken up to allow exploration for andalusite and other high alumina minerals for use in industrial ceramics.

Some 12 samples of andalusite rich sand, chiastolite, feldspar and beryl were collected in the vicinity of the Kalabity Woolshed. The samples were examined under binocular microscope, before and after heavy media separation and one was assayed from 10 non-metallic oxides and returned 39% SiO<sub>2</sub>, 55% Al<sub>2</sub>O<sub>3</sub>. Laboratory work including expansion and strength tests showed that the material tested would be unlikely to have refractory applications.





**TENEMENT:** EL 1487 (formerly SMLs 267, 268, 514, 543, 544, ELs 42, 45, 59, 66, 69, 109, 127, 217, 227, 411, 614, 722, 911, 1065, 1203; followed by 1684, 1698)

**AREA:** 1965 sq km reducing to 794 sq km

**COMMENCEMENT DATE:** 17/5/88

**EXPIRY DATE:** 16/5/93

**COMPANY:** PLACER EXPLORATION LIMITED

**ENVELOPE:** 8691

**REFERENCES:** Successive quarterly report.

**LOCATION:** Goulds Dam, Birthday Dam, Waltherco Hut.

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** PASMORE 6835, BENAGERIE 6935, CURNAMONA 6834, KALABITY 6934

**TARGETS:** Silver-lead-zinc; copper-gold-uranium.

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** Placer purchased the tenement from CSR in 1988 and focussed exploration on lateral equivalents of the Bimba Formation and/or Olympic Dam type mineralisation under Tertiary and younger cover. Grids were established at Birthday Dam and Waltherco Hut and read for ground magnetics (28.1 line km). IP (2.7 line km) located several minor anomalies and chargeable zones. Twenty one rotary holes (1475 metres) were bottom hole sampled and tested for Cu, Pb, Zn, Mn, Ag and Au. No mineralisation was intercepted and Bimba equivalents were not positively identified.

**MINERALISATION/PROSPECTS:** The Birthday Dam grid on an adjoining title was extended into EL 1487 and three holes were drilled (BD 32-34, 236 m). Maximum bottom hole sample results were 44 ppm Cu, 20 ppm Pb, 150 ppm Zn, 880 ppm Mn, <1 ppm Ag, 0.03 ppm Au. Petrology suggested that the Bimba Formation was not intersected and this could be due to structural complexity (overturning) or substantial thinning.

Eighteen holes were drilled on the Waltherco Hut grid (WH 1-18, 1239 metres). Holes WH 1-6, 16-18 intersected a graphite/quartz filled fault between granitic and gneissic rocks to the north and metasediments to the south. The geochemical response was low (100 ppm Cu, 209 ppm Pb, 20 ppm Zn, 140 ppm Mn, 0.06 ppm Au). Other holes intersected highly magnetic granites and magnetic metasiltsstones within the contact aureole of the granite. Geochemical response was also low (220 ppm Cu, 155 ppm Pb, 115 ppm Zn, 420 ppm Mn, 0.05 ppm Au).

**DRILLING:** 21 percussion holes totalling 1475 metres.

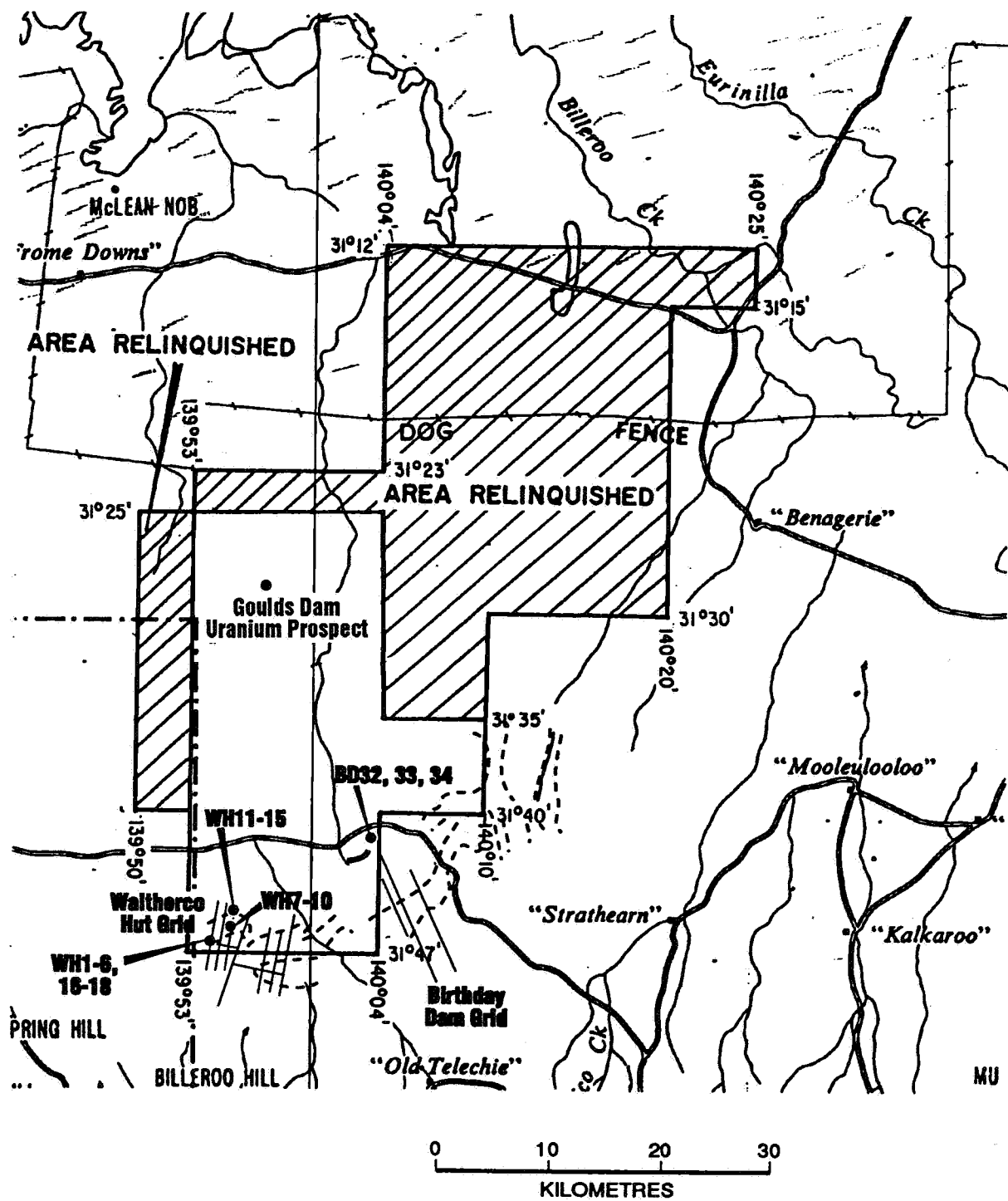


Figure 141

Applicant / Title Holder: Placer Exploration Limited

Licence N° : EL 1487

DME\_SA 93-1706

07-25/6/95

**TENEMENT:** EL 1497, (formerly SMLs 118, 151, 172, 209, 209A, 210, 210A, 222, 269, 440, 534, 535, 562, 595, 672, 673, 677, 714, ELs 47, 62, 85, 132, 259, 423, 794, 1119; followed by EL 1861)

**AREA:** 822 sq km

**COMMENCEMENT DATE:** 4/7/88

**EXPIRY DATE:** 3/7/93

**COMPANY:** CARPENTARIA GOLD PTY LTD (10%), CRA EXPLORATION PTY LIMITED (90%)

**ENVELOPE:** 3365

**REFERENCES:**

**LOCATION:** Kalabity

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934, MULYUNGARIE 7034.

**TARGETS:**

**AGE/ROCK UNITS:**

**EXPLORATION SUMMARY:** CONFIDENTIAL ENVELOPE

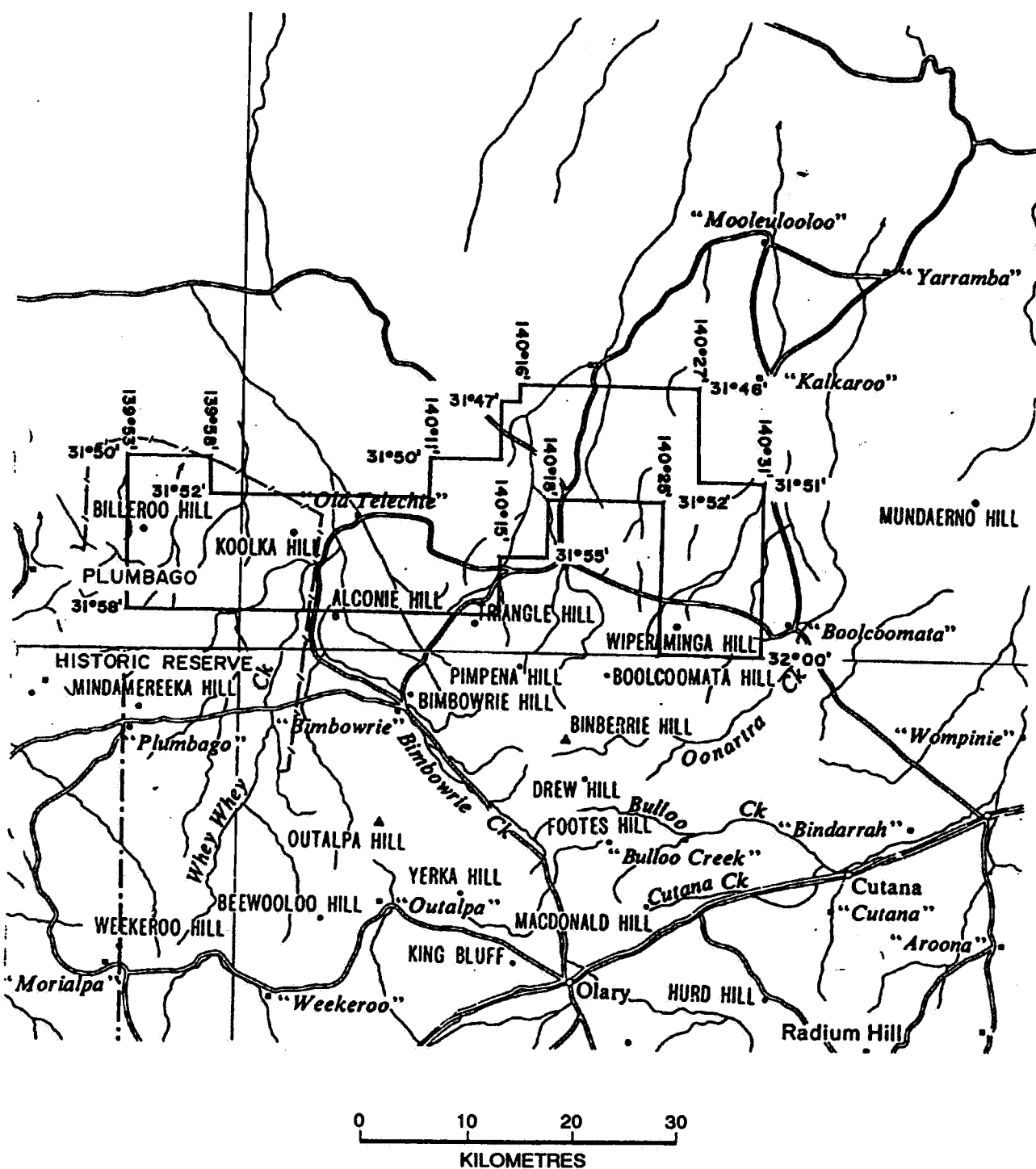


Figure 142

**Applicant / Title Holder:** Carpentaria Gold Pty Ltd (10%),  
CRA Exploration Pty Ltd (90%)

**Licence N° :** EL 1497

DME\_SA 93-1707

**TENEMENT:** EL 1591 (formerly SMLs 118, 209, 209A, 534, 672, ELs 62, 132, 376, 629, 1308, 1480)

**AREA:** 148 sq km

**COMMENCEMENT DATE:** 3/7/89

**EXPIRY DATE:** 2/7/94

**COMPANY:** CRA EXPLORATION PTY LIMITED

**ENVELOPE:**

**REFERENCES:**

**LOCATION:** Calico Dam

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934

**TARGETS:**

**AGE/ROCK UNITS:**

**EXPLORATION SUMMARY:** CURRENT LICENCE

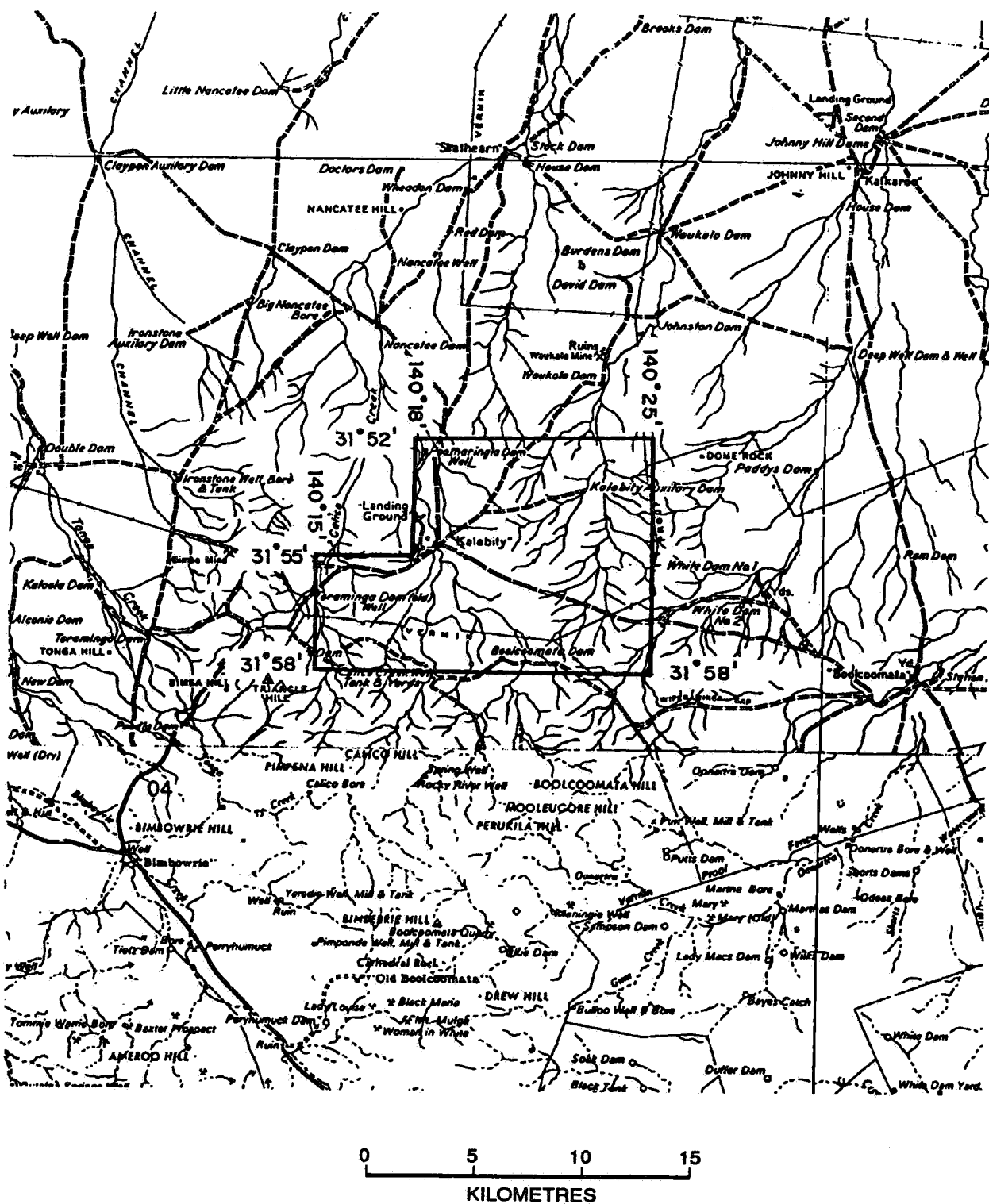


Figure 143

Applicant / Title Holder: CRA Exploration Pty Ltd

Licence N° : EL 1591

DME\_SA 93-1708

**TENEMENT:** EL 1606 (formerly SMLs 279, 415, 612, 694, ELs 121, 189, 457, 848; followed by EL 1676).

**AREA:** 471 sq km

**COMMENCEMENT DATE:** 18/8/89

**EXPIRY DATE:** 17/8/90 (surrendered 1/90)

**COMPANY:** HELIX RESOURCES NL

**ENVELOPE:** 8239

**REFERENCES:**

**LOCATION:** Mingary (Wompinie)

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** MINGARY 7033, MULYUNGARIE 7034

**TARGET:** Platinum

**AGE/ROCK UNITS:** Palaeoproterozoic Willyama Supergroup.

**EXPLORATION SUMMARY:** The area was applied for on the grounds that Liddy (1964) 'Australian Economic Metals' had reported an occurrence of platinum at Mingary and to assess the potential for PGM/gold mineralisation associated with redox front uranium deposits. The area contains three small areas of outcropping Willyama rocks otherwise it is covered with thin quartz gravels of the Mundi Mundi Plain. Field work involved inspection of the limited outcrop and some ground scintillometer traverses.

**MINERALISATION/PROSPECTS:** The EL was quickly relinquished after it was concluded potential for primary platinum group mineralisation was not present in the outcropping rocks, and that previous exploration had shown there was only one possible small Tertiary channel in the area.





<u>TENEMENT:</u>	EL 1608 (formerly SML 514, ELs 66, 385, 549; followed by EL 1693)
<u>AREA:</u>	585 sq km
<u>COMMENCEMENT DATE:</u>	11/9/89
<u>EXPIRY DATE:</u>	10/9/90
<u>COMPANY:</u>	LYNCH MINING PTY LTD
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATION:</u>	Benagerie
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	BENAGERIE 6935
<u>TARGETS:</u>	
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CONFIDENTIAL ENVELOPE

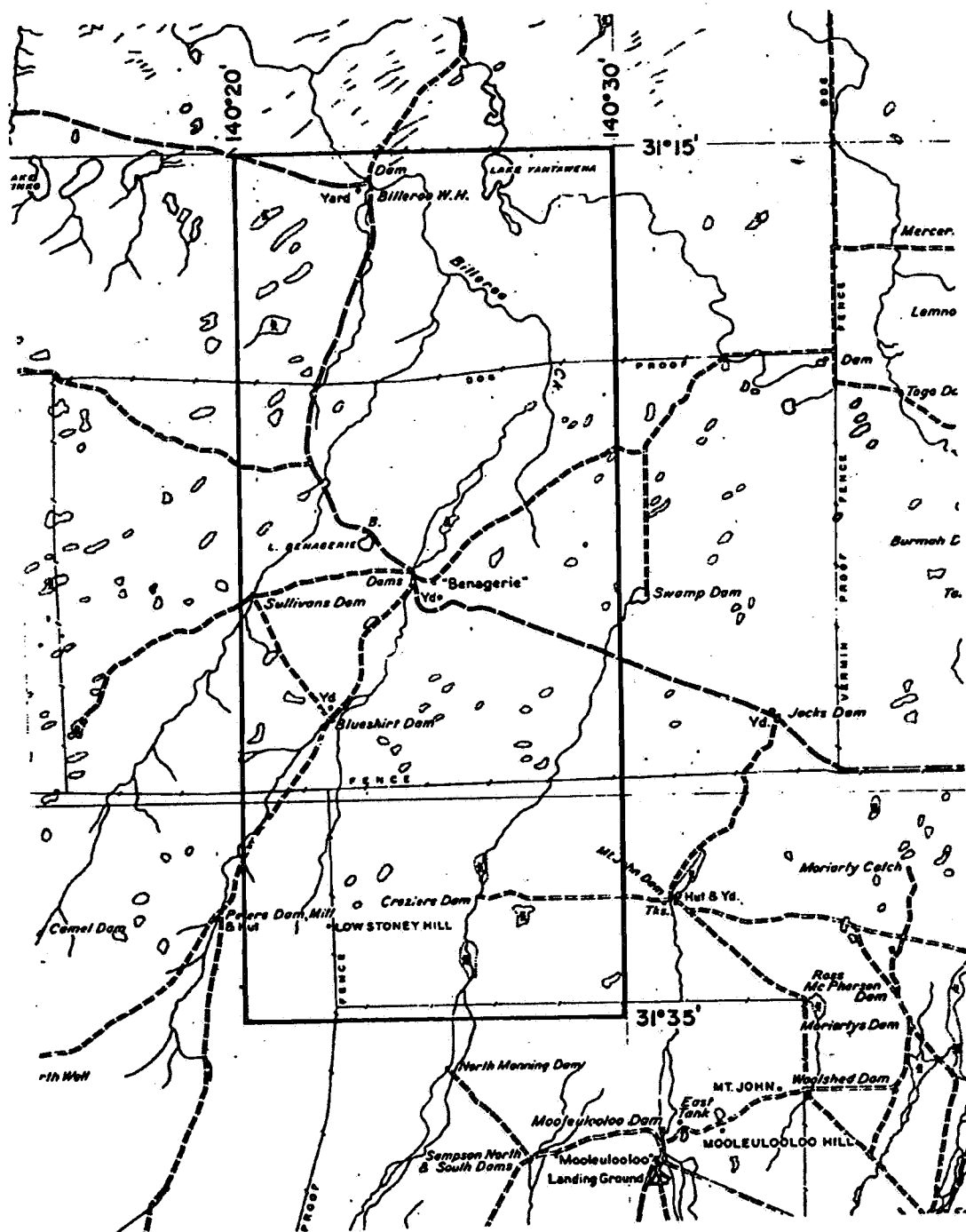


Figure 145

Applicant / Title Holder: Lynch Mining Limited

Licence N° : EL 1608

DME\_SA 93-1710

TENEMENT: EL 1624 (formerly SMLs 279, 415, 612, 694, ELs 121, 189, 457, 848, 1258)

AREA: 1185 sq km

COMMENCEMENT DATE: 13/12/89

EXPIRY DATE: 12/12/93

COMPANY: MOUNT ISA MINES LIMITED

ENVELOPE:

REFERENCES:

LOCATION: Mingary

1:250 000 SHEET: CURNAMONA, OLARY

1:100 000 SHEET: MULYUNGARIE 7034, MINGARY 7033

TARGETS:

AGE/ROCK UNITS:

EXPLORATION SUMMARY: CURRENT LICENCE.

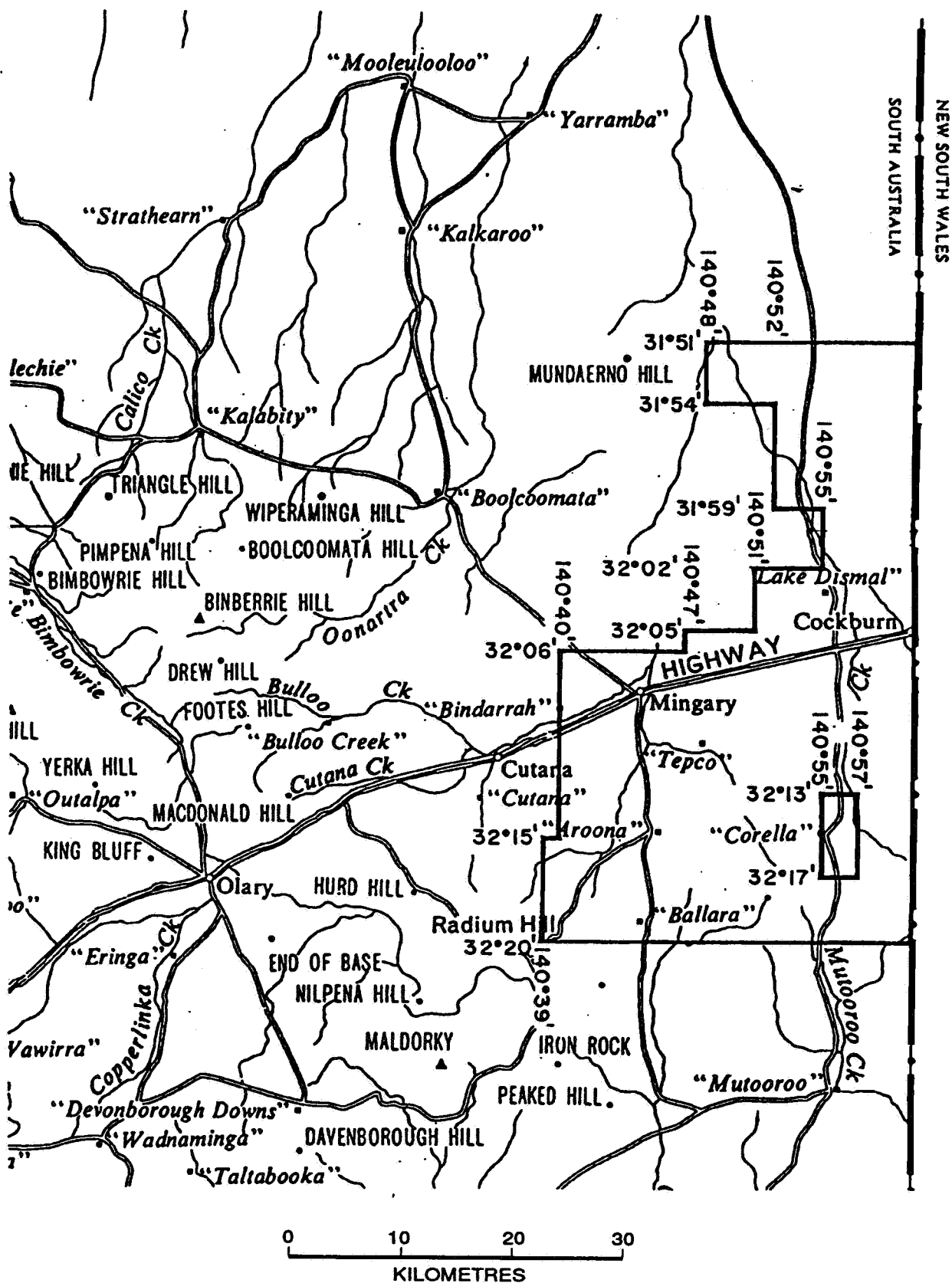


Figure 146

Applicant / Title Holder: Mount Isa Mines Limited

Licence N° : EL 1624

DME\_SA 93-1711

**TENEMENT:** EL 1676 (formerly SMLs 279, 415, 612, 694, ELs 121, 189, 457, 848, 1606)

**AREA:** 471 sq km

**COMMENCEMENT DATE:** 10/9/90

**EXPIRY DATE:** 9/9/94

**COMPANY:** ABERFOYLE RESOURCES LIMITED

**ENVELOPE:**

**REFERENCES:**

**LOCATION:** Wompinie

**1:250 000 SHEET:** OLARY, CURNAMONA

**1:100 000 SHEET:** MULYUNGARIE 7034, MINGARY 7033

**TARGETS:**

**AGE/ROCK UNITS:**

**EXPLORATION SUMMARY:** CURRENT LICENCE.

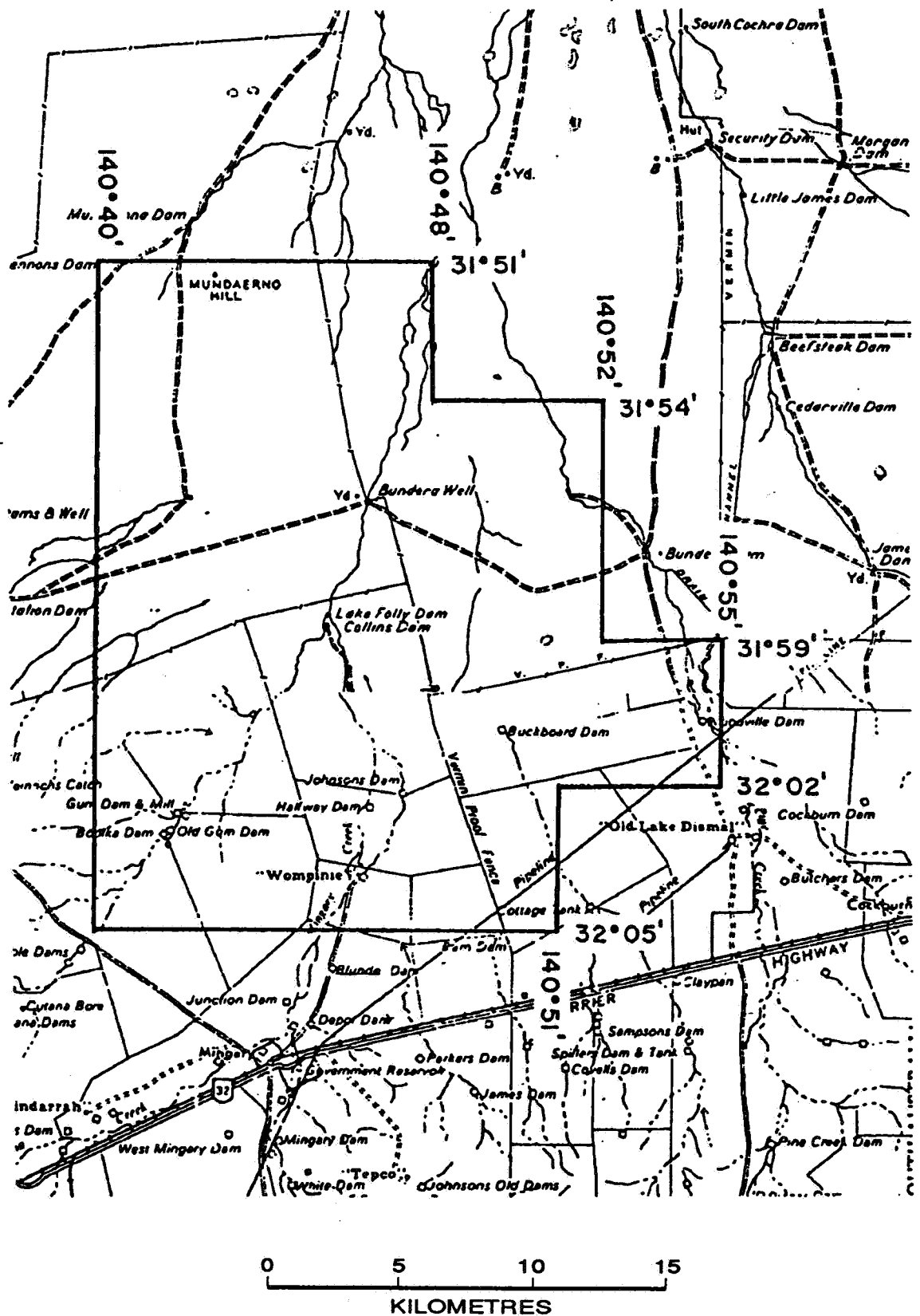


Figure 147

Applicant / Title Holder: Aberfoyle Resources Limited

Licence N° : EL 1676

DME\_SA 93-1712

<u>TENEMENT:</u>	EL 1683 (formerly SMLs 244, 503, 531, 589, ELs 109, 430, 463, 559, 1471)
<u>AREA:</u>	1382 sq km
<u>COMMENCEMENT DATE:</u>	31/10/90
<u>EXPIRY DATE:</u>	30/4/91
<u>COMPANY:</u>	WAKEFIELD MINING AND METALS NL
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATION:</u>	Lake Millyera
<u>1:250 000 SHEET:</u>	COPLEY, FROME, CURNAMONA
<u>1: 100 000 SHEET:</u>	ARROWIE 6736, FROME 6836, COONARBINE 6936, PASMORE 6835, BENAGERIE 6935
<u>TARGETS:</u>	
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CONFIDENTIAL ENVELOPE

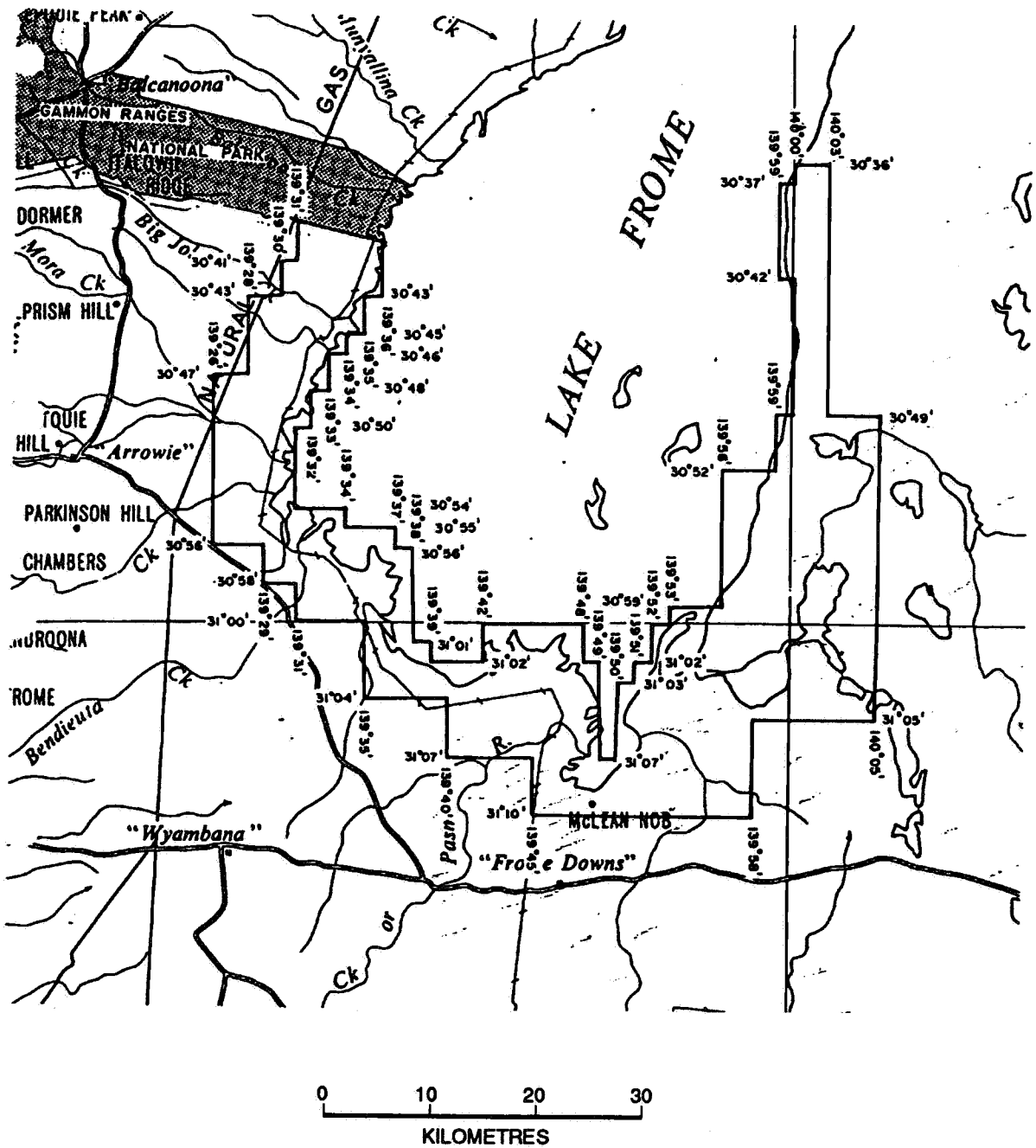


Figure 148

Applicant / Title Holder: Wakefield Mining and Metals N.L.

Licence N° : EL 1683

DME\_SA 93-1713



\*  
**TENEMENT:**

EL 1684 (formerly SML 514, ELs 66, 69, 127, 217, 385, 549, 614, 911, 1203, 1437)

**AREA:**

861 reducing to 466 sq km

**COMMENCEMENT DATE:**

31/10/90

**EXPIRY DATE:**

30/10/92

**COMPANY:**

NEWMONT AUSTRALIA LIMITED

**ENVELOPE:**

8363

**REFERENCES:**

Successive quarterly reports.

**LOCATION:**

Emu Dam

**1:250 000 SHEET:**

CURNAMONA

**1:100 000 SHEET:**

BENAGERIE 6935, KALABITY 6934

**TARGETS:**

Copper, gold, uranium mineralisation associated with intrusive rocks.

**AGE/ROCK UNITS:**

Target rocks are? Mesoproterozoic basement metasediments and volcanics which are overlain by Phanerozoic cover.

**EXPLORATION SUMMARY:** Examination of SADME aeromagnetics identified a major northeast - south west trending tectonic zone in the northeast portion of the licence where depth of cover was expected to be 50 - 100 metres. 200 line km of gridding (200 x 100 metres) covered the zone and ground magnetics and gravity identified six targets. Seven holes were drilled with an average depth to basement of 38 metres. No significant mineralisation was encountered.

**MINERALISATION/PROSPECTS:** Seven holes (754 metres) were drilled using rotary methods in Phanerozoic cover and reverse circulation in basement rocks (samples at 1 metre intervals). 438 samples were analysed for Au (fire), Ag, As, Bi, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, P, Sb, V and Zn (ICP). CMR-1A intersected elevated basemetal values as follows: 17.5 ppm Ag, 260 ppm As, 1280 ppm Cu, 460 ppm Pb, 450 ppm Zn and 165 ppm Bi. Other holes intersected narrow zones of silicification and epidote alteration in basalt (CMR-1A, 2); weathered hematitic basalt (CMR-3); and white kaolinitic clay over quartz rich adamellite (CMR-4, 5) and granodioritic intrusives (CMR-6). The zones of subdued magnetics tested by CMR-6 were due to deep weathering rather than hydrothermal alteration (magnetite destruction). Magnetic and gravity features were adequately explained by the drilling programme.

No gold mineralisation was discovered and only one hole reported elevated base metals.

**DRILLING:** Seven reverse circulation (CMR 1-6, 1A) for 754 metres.



<u>TENEMENT:</u>	EL 1693 (formerly SML 514, ELs 66, 385, 549, 1608)
<u>AREA:</u>	585 sq km
<u>COMMENCEMENT DATE:</u>	7/12/90
<u>EXPIRY DATE:</u>	6/12/93
<u>COMPANY:</u>	LYNCH MINING PTY LTD
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATION:</u>	Benagerie
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	BENAGERIE 6935
<u>TARGETS:</u>	
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CURRENT LICENCE

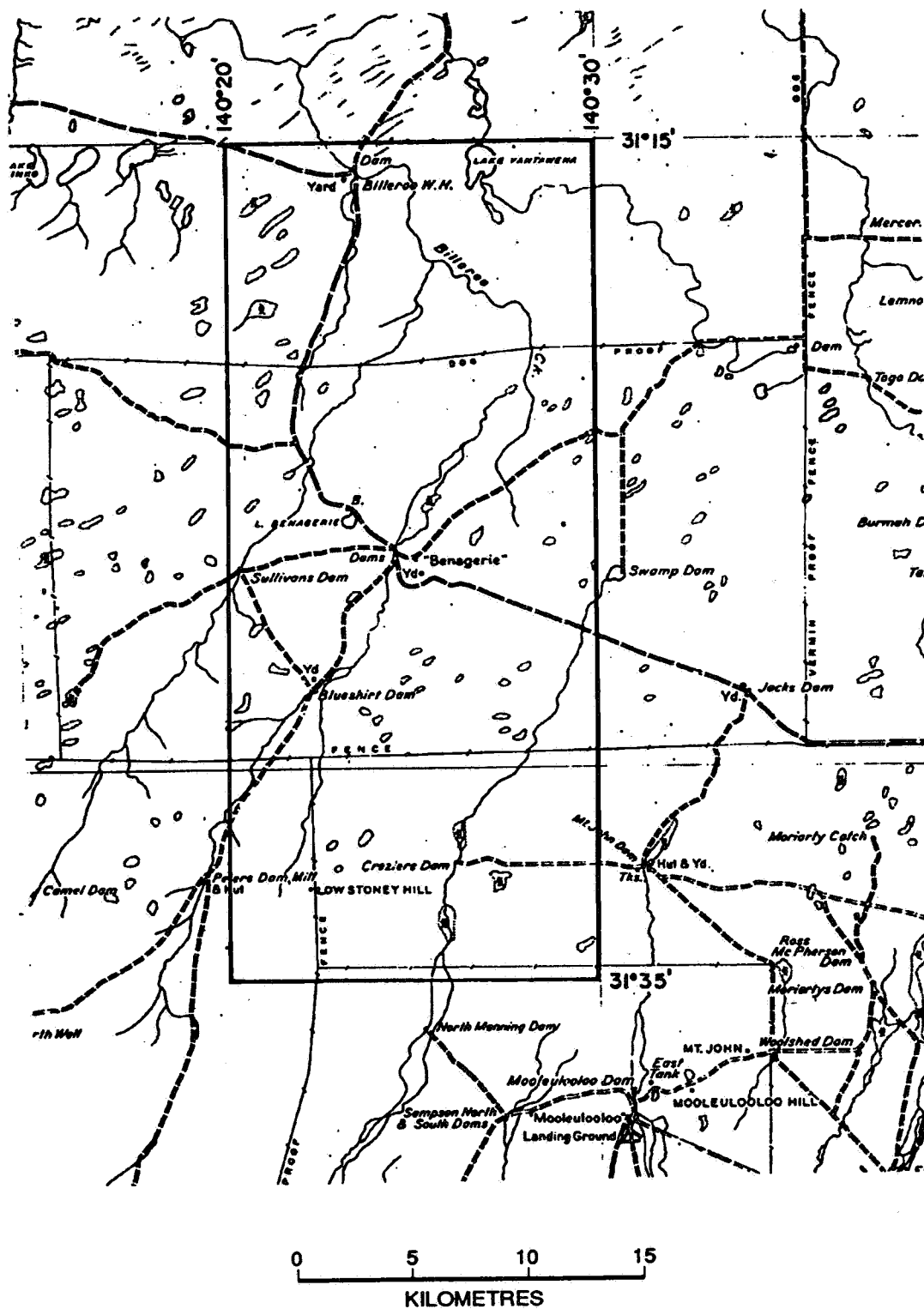


Figure 150

Applicant / Title Holder: Lynch Mining Limited

Licence N° : EL 1693

DME\_SA 93-1715

<u>TENEMENT:</u>	EL 1695 (formerly SMLs 266, 513, ELs 66, 90, 385, 435, 549, 802, 957, 1144, 1252, 1391)
<u>AREA:</u>	668 sq km
<u>COMMENCEMENT DATE:</u>	9/1/91
<u>EXPIRY DATE:</u>	8/1/93
<u>COMPANY:</u>	MOUNT ISA MINES LIMITED
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATION:</u>	Togo Dam
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	LAKE CHARLES 7035
<u>TARGETS:</u>	
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CONFIDENTIAL ENVELOPE

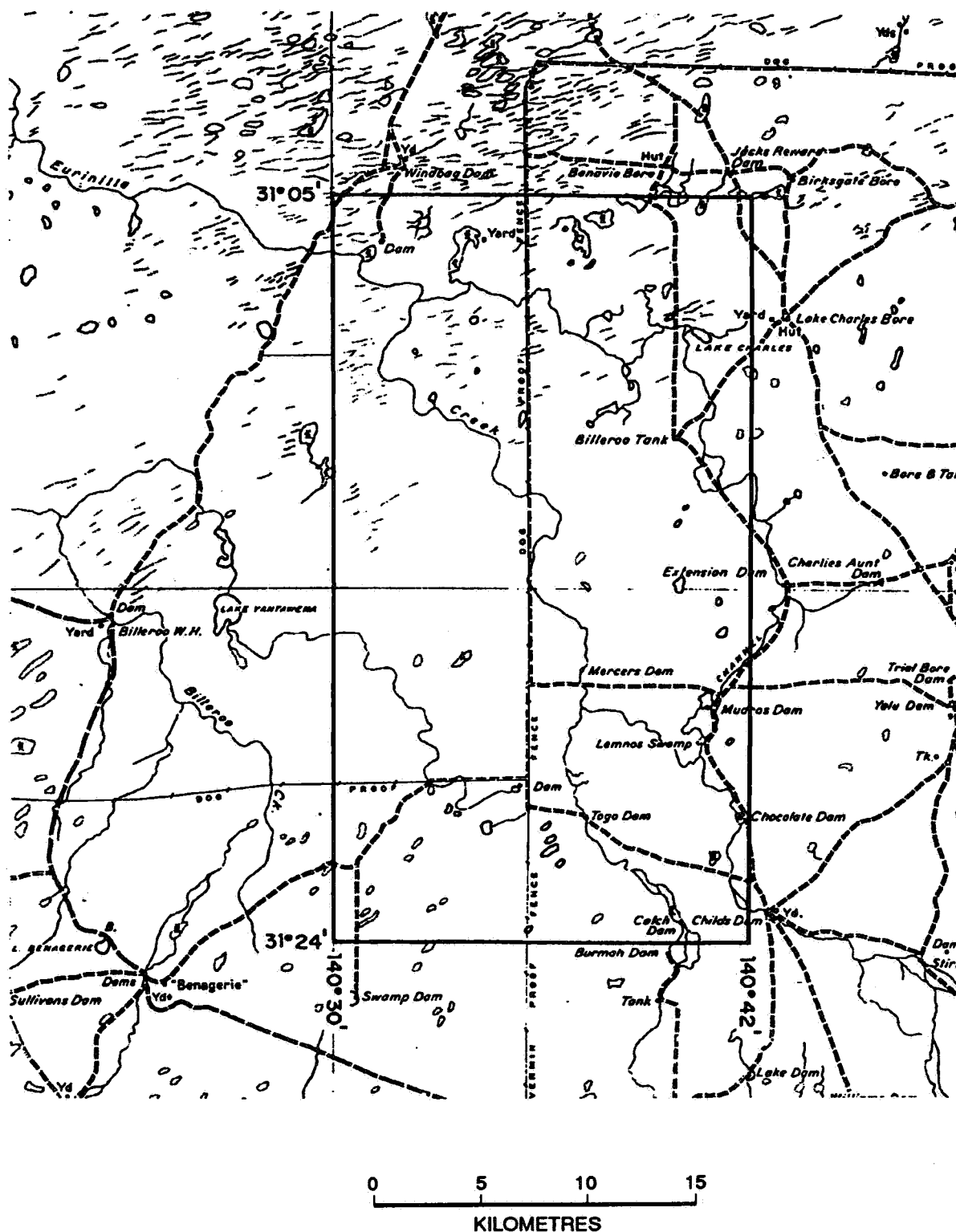


Figure 151

Applicant / Title Holder: Mount Isa Mines Limited

Licence N° : EL 1695

DME\_SA 93-1716

**TENEMENT:** EL 1698 (formerly by SML 514, ELS 59, 69, 127, 171, 217, 614, 911, 1065, 1203, 1487)

**AREA:** 1425 reducing to 820 sq km

**COMMENCEMENT DATE:** 14/2/91

**EXPIRY DATE:** 13/2/93 (Surrendered)

**COMPANY:** CRA EXPLORATION PTY LIMITED

**ENVELOPE:** 8428

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Pioneer Dam.

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** PASMORE 6835, BENAGERIE 6935, CURNAMONA 6834, KALABITY 6934

**TARGETS:** Lead - zinc; copper - gold - uranium..

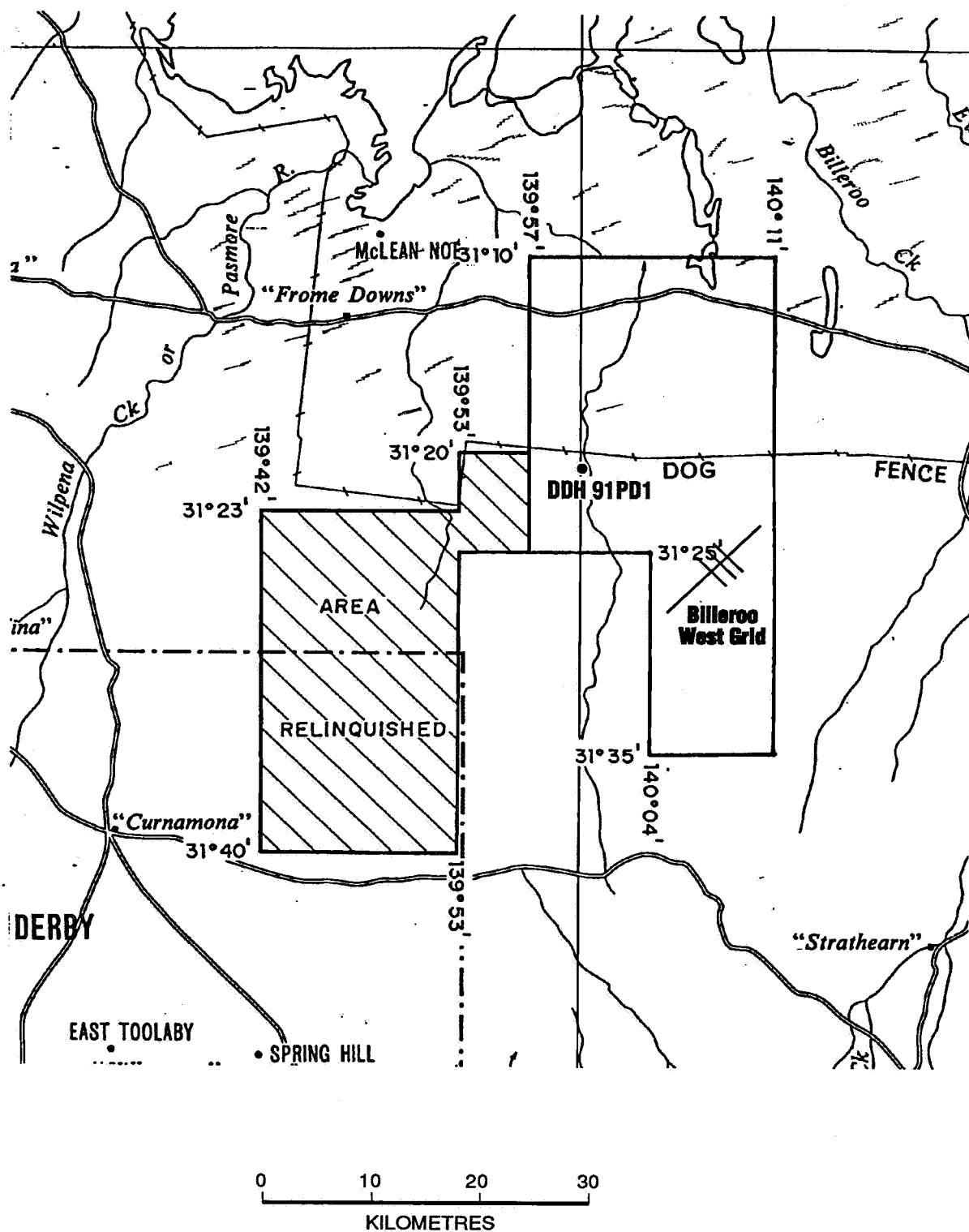
**AGE/ROCK UNITS:** Basal Cambrian carbonates overlying Proterozoic basement and overlain by Tertiary and younger cover.

**EXPLORATION SUMMARY:** Assessment of aeromagnetics, gravity and seismic data indicated a series of fault bounded basement platforms tilted into a series of half grabens had potential to host Mississippi Valley type deposits. One core hole (DD 91D1, 409 m) was drilled to test for carbonate lithologies and gravity (12 line km) and ground magnetics was completed in an attempt to locate targets.

**MINERALISATION/PROSPECTS:** At Confidence Bore prospect the diamond hole was logged for gamma, resistivity and spontaneous potential (SP). An SP anomaly from 150 to 200 metres was possibly caused by aquifers of differing salinities. The hole intersected flat lying calcareous laminated siltstone/shale of the middle Cambrian Balcoracana or Billy Creek Formations. No significant carbonate was located and geochemical response was low (core analysed for Au, As, Pb Ag, Cu, Zn, Fe, Ba, Co, Ni, La, Eu, Er, Yb, Mo).

At Billeroo West a grid was surveyed for gravity and magnetic survey but geophysical modelling of the data did not identify suitable drilling targets.

**DRILLING:** One diamond hole (DD91 PD1) for 409 metres.



DDH 91PD1

Diamond drill hole location and number

Figure 152

Applicant / Title Holder: CRA Exploration Pty Limited

Licence N° : EL 1698

DME\_SA 93-1717



**TENEMENT:** EL 1738 (formerly SMLs 267, 268, 543, 544, ELs 42, 45, 168, 254, 337, 854)

**AREA:** 2339 sq km

**COMMENCEMENT DATE:** 5/8/91

**EXPIRY DATE:** 4/8/92

**COMPANY:** BHP MINERALS LIMITED

**ENVELOPE:** 8501

**REFERENCES:** Successive quarterly reports.

**LOCATION:** Erudina

**1:250 000 SHEET:** PARACHILNA, CURNAMONA

**1:100 000 SHEET:** REAPHOOK 6735, PASMORE 6835, WILLIPPA 6734, CURNAMONA 6834

**TARGETS:** Gold

**AGE/GOLD UNITS:** A Cambrian sequence (Parachilna Formation, Wilkawillina Limestone and Billy Creek Formation overlying the Proterozoic Pound Quartzite was considered to be prospective for fine grained gold of "Carlin - type".

**EXPLORATION SUMMARY:** Reconnaissance geology and stream sediment sampling (22 samples) was completed adjacent to Reaphook Hill. 22 RAB holes (1492 m) were drilled but all failed to reach bedrock and finished in Namba Formation clays. Only two (possibly 3) holes were drilled on CURNAMONA.

**MINERALISATION/PROSPECTS:** Stream sediments collected near Reaphook Hill were analysed for Cu, Pb, Zn, Fe, Mn (AAS), Sb, As (XRF), and Au (BLEG). One sample collected 100 m downstream from a massive "ironstone" reached 0.65 ppb but the ironstone itself did not contain detectable gold. Bottom hole samples (6 m) from the RAB programme were analysed for Au, Pd (BLEG), Au (Fire), Cu, Pb, Zn, Hg (AAS), Sb and As (XRF) but all results were low. Based on GPS readings 2 (possibly 3) holes are on CURNAMONA:

EDP91-1 (48 m) 139° 29.97'E, 31° 45.54'S  
 EDP91-2 (70 m) 139° 32.51'E, 31° 47.97'S  
 EDP91-22 (70 m) 139° 32.60'E, 31° 12.33'S

**DRILLING:** Twenty-two RAB holes for 1492 metres three of which (188 metres) were on CURNAMONA.

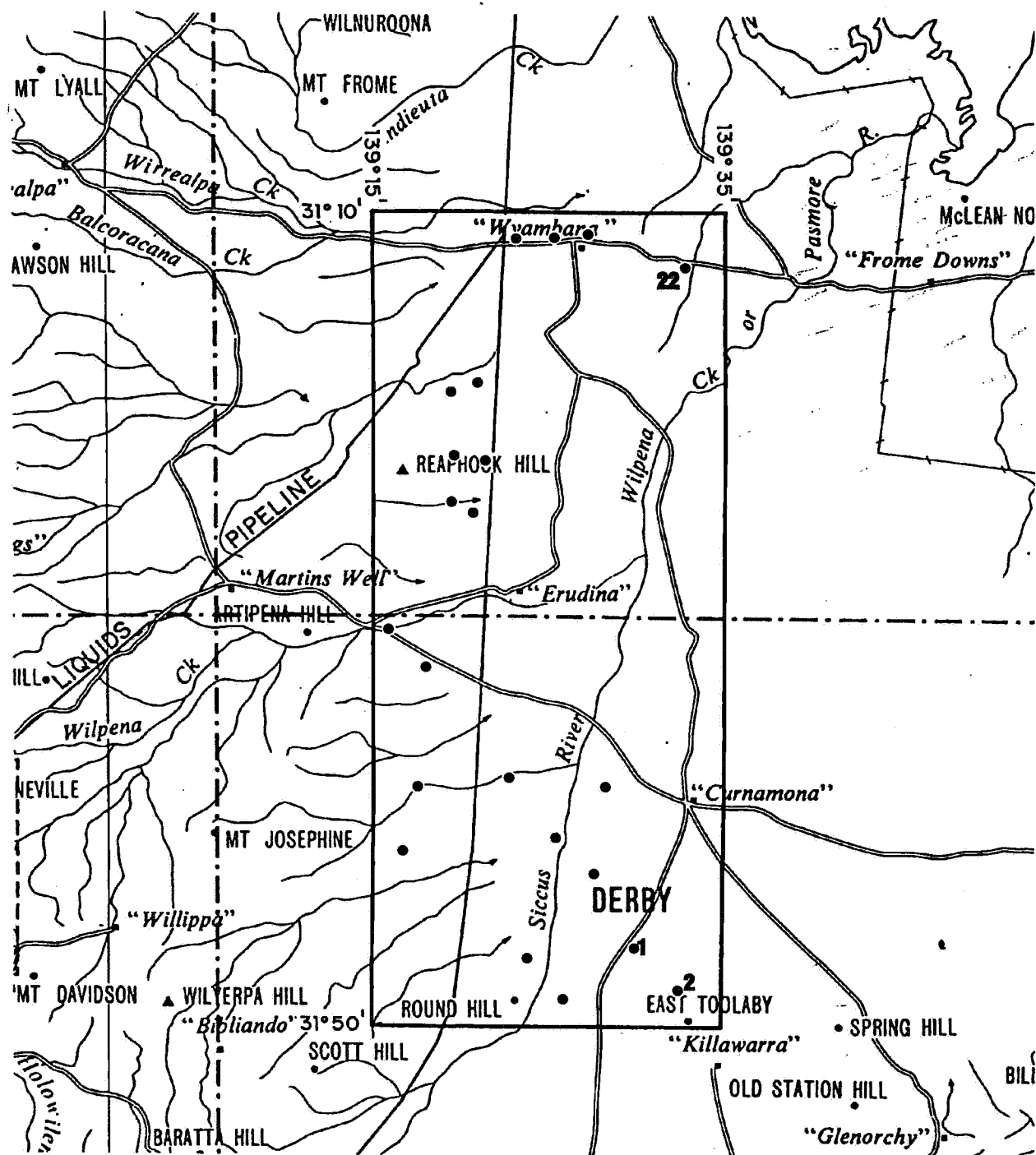


Figure 153

Applicant / Title Holder: BHP Minerals Limited

Licence N° : EL 1738

DME\_SA 93-1718

**TENEMENT:** EL 1748 (formelry SML 118, ELs 159, 263, 450, 848, 970, 1257, 1389, 1444)

**AREA:** 1568 sq km

**COMMENCEMENT DATE:** 20/10/93

**EXPIRY DATE:** 20/10/93

**COMPANY:** CRA EXPLORATION PTY LIMITED

**ENVELOPE:**

**REFERENCES:**

**LOCATION:** Crocker Well

**1:250 000 SHEET:** OLARY, CURNAMONA

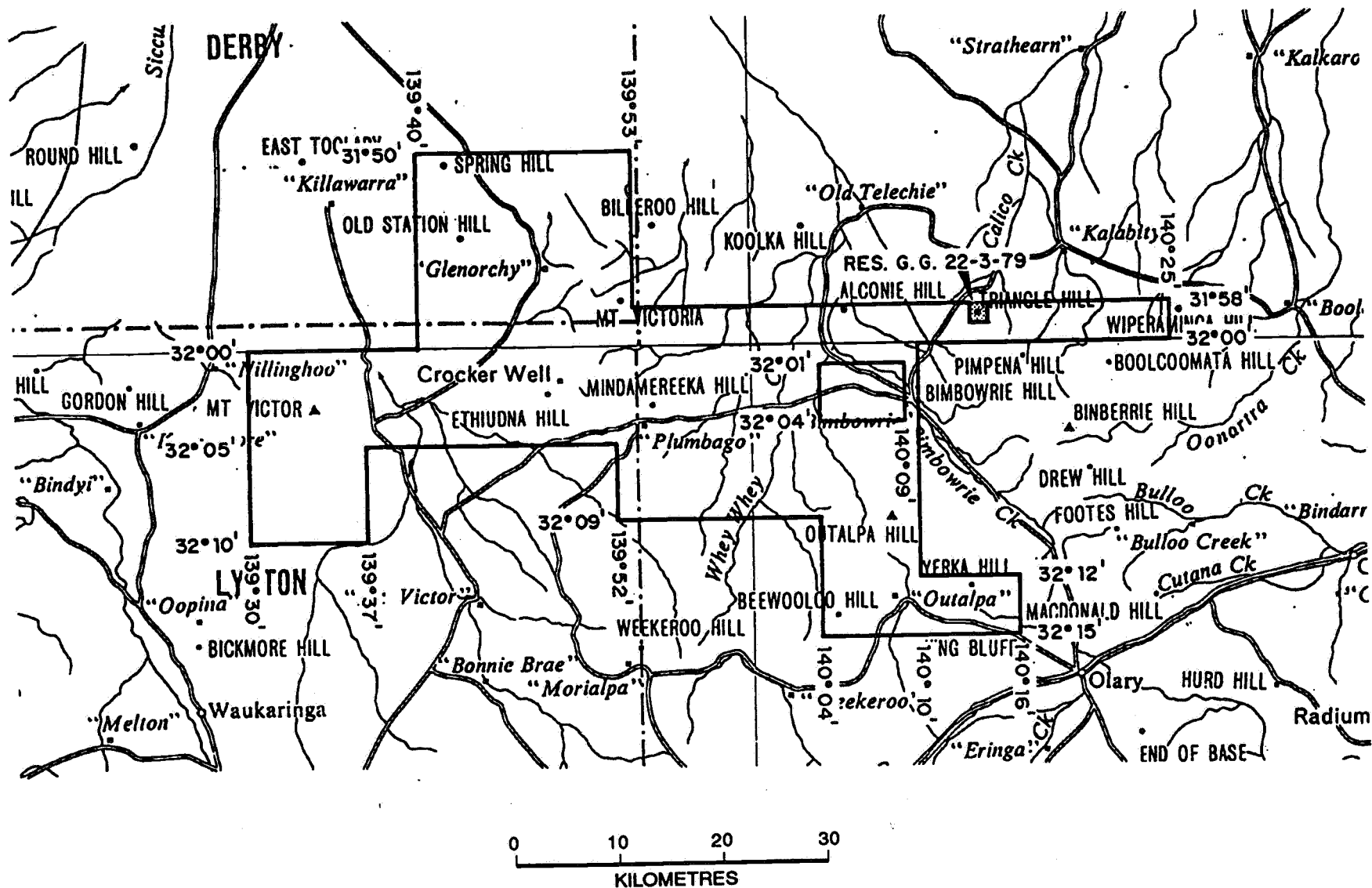
**1:100 000 SHEET:** CURNAMONA 6834, KALABITY 6934, WINNININNIE 6833, OLARY 6933.

**TARGETS:**

**AGE/ROCK UNITS:**

**EXPLORATION SUMMARY:** CONFIDENTIAL ENVELOPE

**Applicant / Title Holder:** CRA Exploration Pty Limited



**Figure 154**

<u>TENEMENT:</u>	EL 1751 (formerly SMLs 118, 209, 209A, 210, 210A, 222, 241, 267, 440, 534, 544, 595, 672, 673, 714, ELs 42, 62, 85, 132, 259, 297, 377, 597, 970, 1004, 1352)
<u>AREA:</u>	1199 sq km
<u>COMMENCEMENT DATE:</u>	18/11/91
<u>EXPIRY DATE:</u>	17/11/93
<u>COMPANY:</u>	PLACER EXPLORATION LIMITED
<u>ENVELOPE:</u>	
<u>REFERENCES:</u>	
<u>LOCATION:</u>	Strathearn
<u>1:250 000 SHEET:</u>	CURNAMONA
<u>1:100 000 SHEET:</u>	CURNAMONA 6834, KALABITY 6934, MULYUNGARIE 7034
<u>TARGETS:</u>	
<u>AGE/ROCK UNITS:</u>	
<u>EXPLORATION SUMMARY:</u>	CURRENT LICENCE

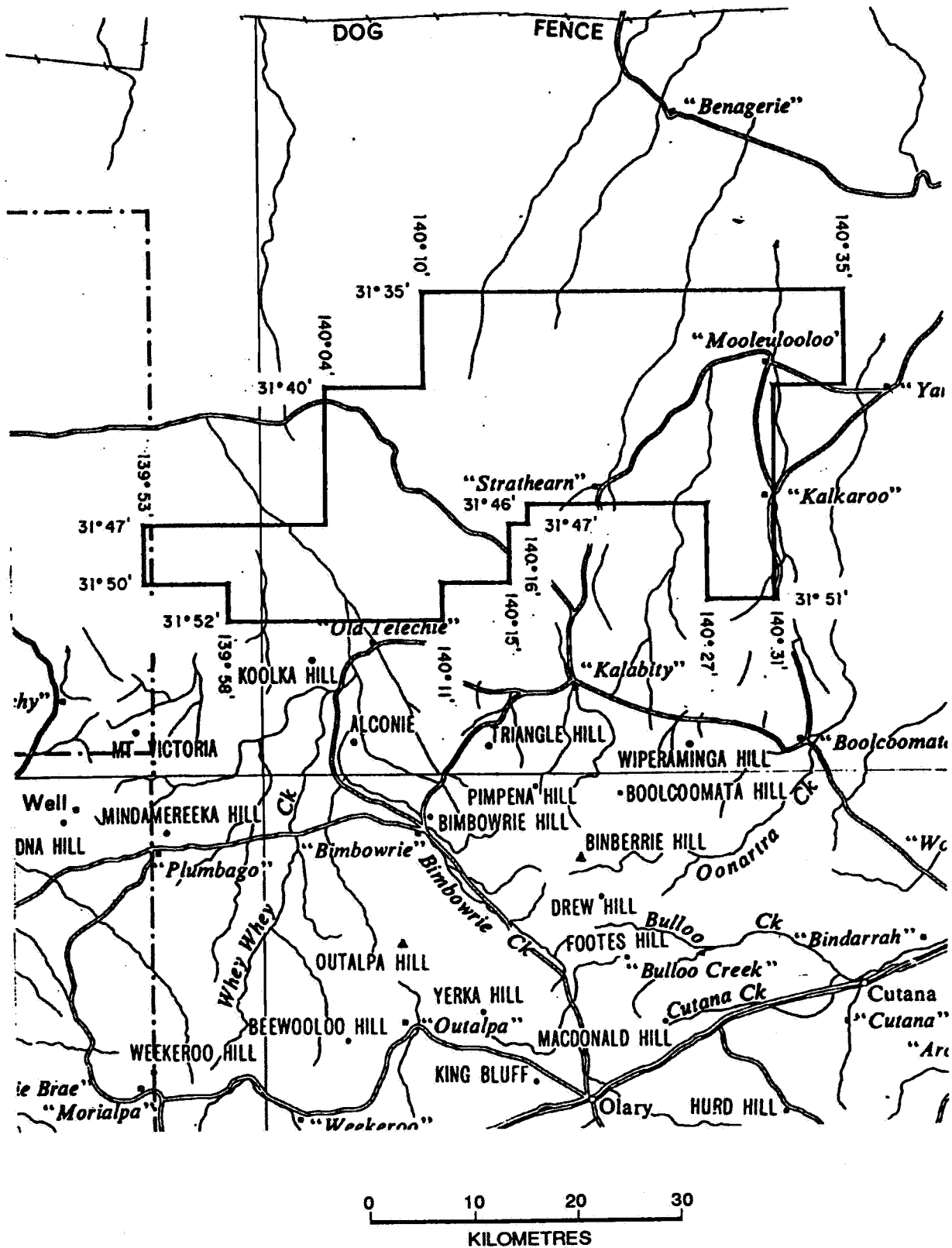


Figure 155

Applicant / Title Holder: Placer Exploration Limited

Licence N° : EL 1751

DME\_SA 93-1720

TENEMENT: EL 1763 (formerly SMLs 279, 415, 580, 696; ELs 98, 238, 412, 712, 1060, 1382)

AREA: 1961 sq km

COMMENCEMENT DATE: 16/3/92

EXPIRY DATE: 15/12/93

COMPANY: PLACER EXPLORATION LIMITED

ENVELOPE: Env 3330 (Data pre Placer involvement)

REFERENCES:

LOCATION: East Kalkaroo (Mulyungarie)

1:250 000 SHEET: CURNAMONA

1:100 000 SHEET: MULYUNGARIE 7034; LAKE CHARLES 7035

TARGETS:

AGE/ROCK UNITS:

EXPLORATION SUMMARY: CURRENT LICENCE

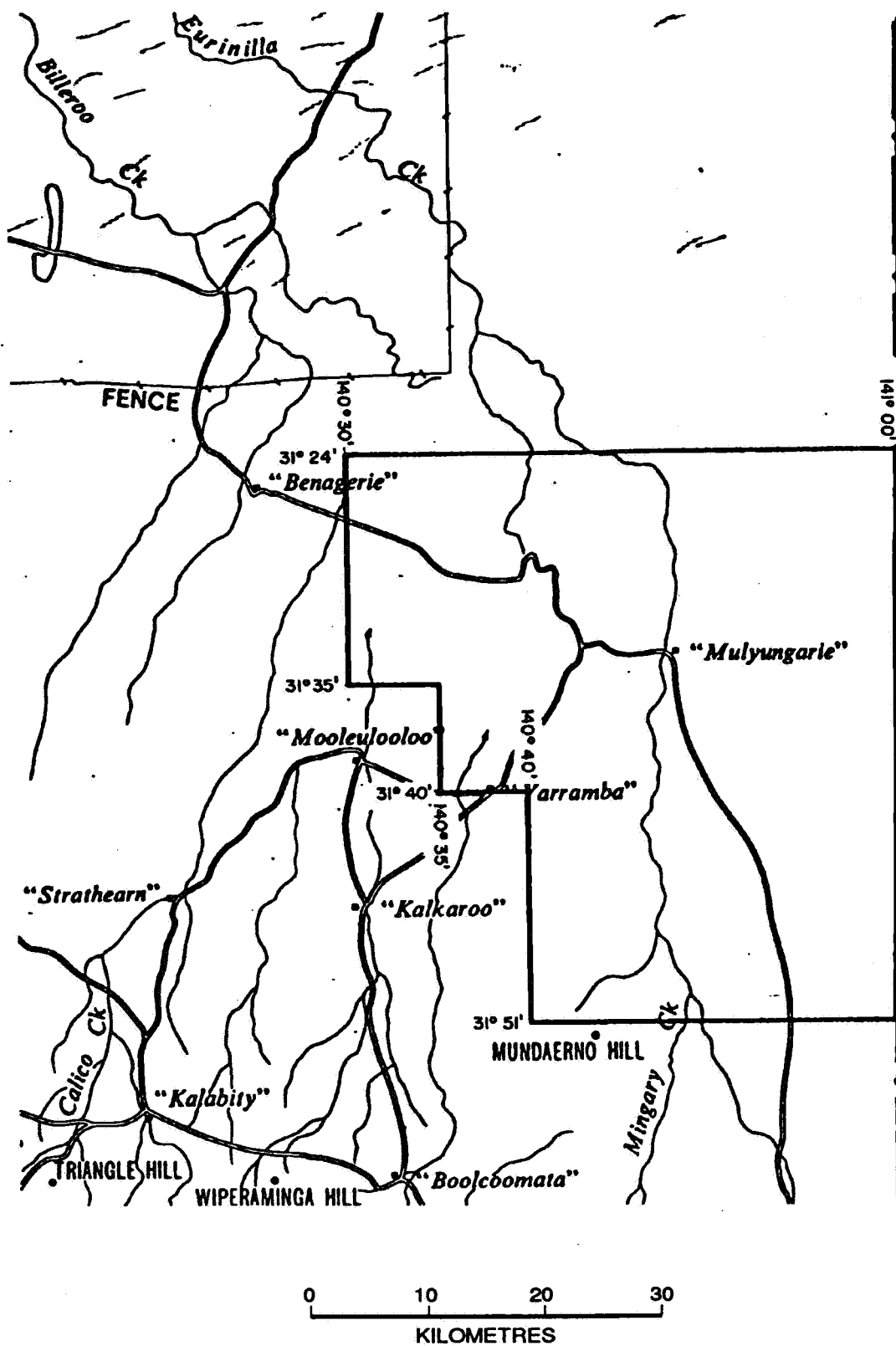


Figure 156

Applicant / Title Holder: Placer Exploration Ltd

Licence N° : EL 1763

DME\_SA 93-1721



**TENEMENT:** EL 1786 (formerly SMLs 222, 440, 595, 714, ELs 85, 132,259, 377, 597, 1004, 1412)

**AREA:** 518 sq km

**COMMENCEMENT DATE:** 7/9/92

**EXPIRY DATE:** 6/9/94

**COMPANY:** PLACER EXPLORATION LIMITED

**ENVELOPE:** 8068

**REFERENCES:**

**LOCATION:** South Eagle

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** KALABITY 6934

**TARGETS:** Sedimentary uranium

**AGE/ROCK UNITS:**

**EXPLORATION SUMMARY:** CURRENT LICENCE

**MINERALISATION/PROSPECTS:** The Honeymoon Uranium Deposit is covered by MPL's 14, 15, and RL's 10, 11, 12 (excluded from EL 1786).

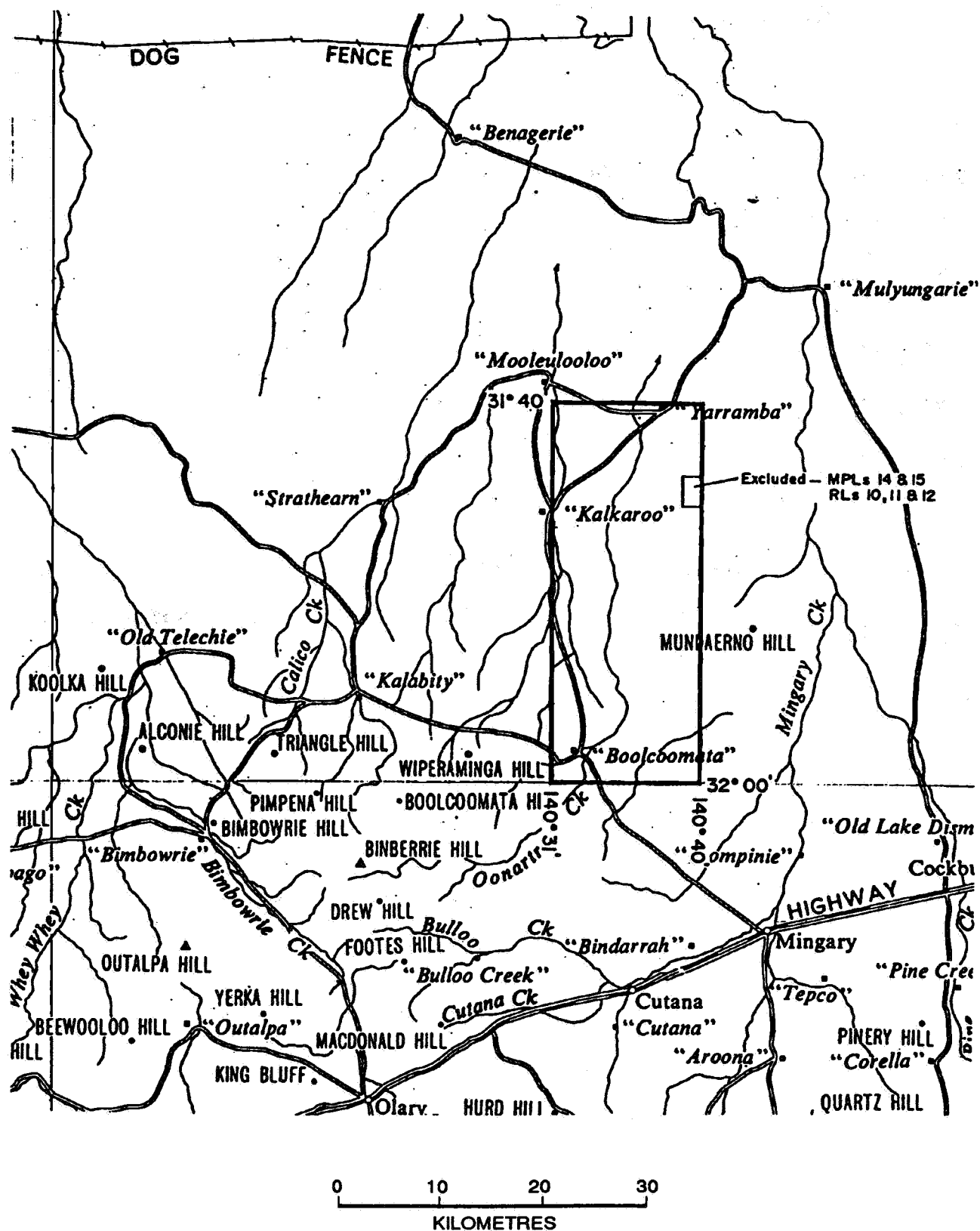


Figure 157

Applicant / Title Holder: Pacer Exploration Limited

Licence N° : EL 1786

DME\_SA 93-1722

**TENEMENT:** EL 1860 (formerly SMLs 513, 514, ELs 66, 217, 385, 549, 614, 911, 957, 1203, 1487, 1684)

**AREA:** 586 sq km

**COMMENCEMENT DATE:** 30/8/93

**EXPIRY DATE:** 29/8/94

**COMPANY:** LYNCH MINING PTY LTD

**ENVELOPE:**

**REFERENCES:**

**LOCATION:** Billeroo Tank

**1:250 000 SHEET:** CURNAMONA

**1:100 000 SHEET:** BENAGERIE 6935, CHARLES 7035

**TARGETS:**

**AGE/ROCK UNITS:**

**EXPLORATION SUMMARY:** CURRENT LICENCE

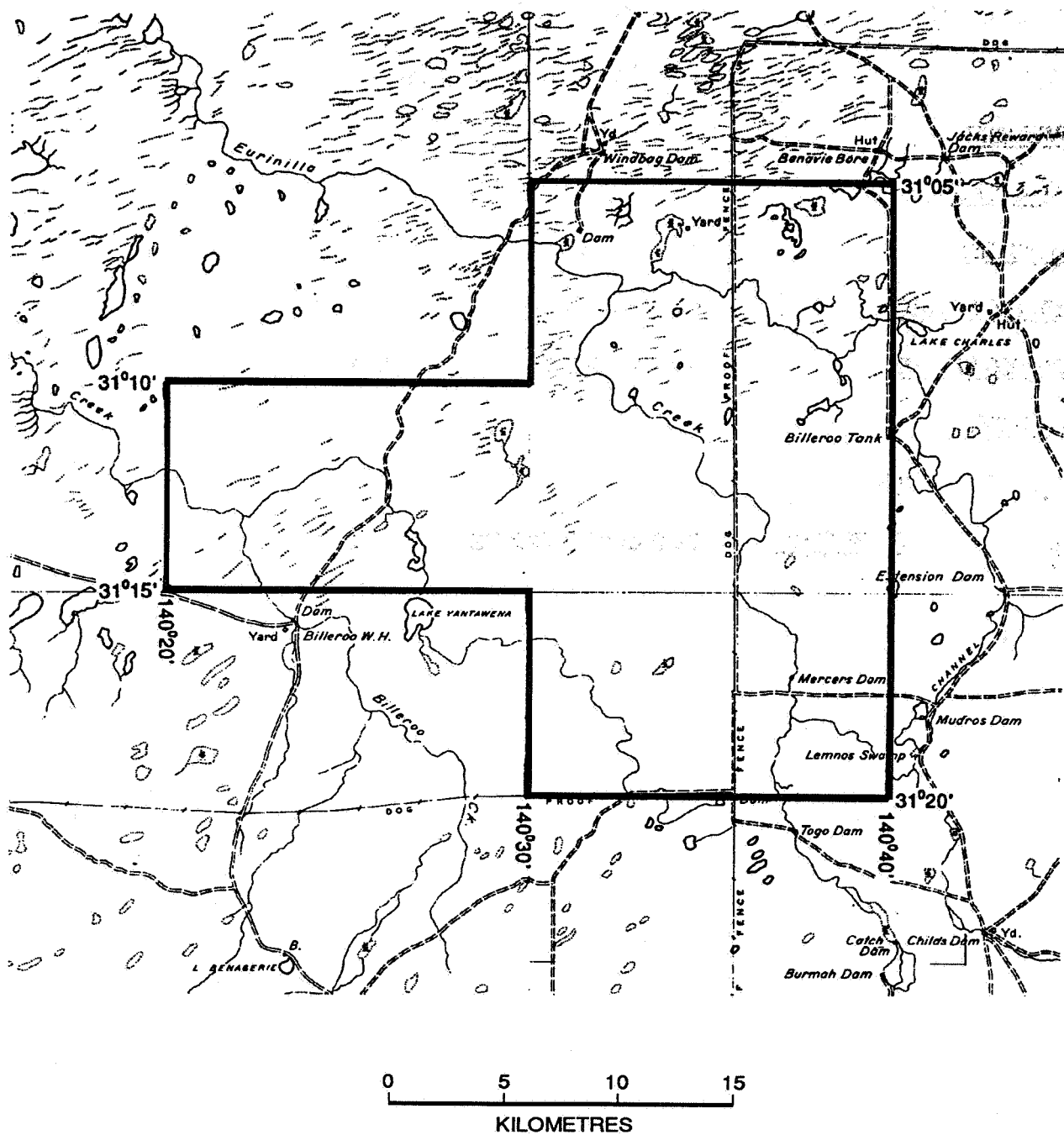


Figure 158

Applicant / Title Holder: Lynch Mining Pty. Ltd.

Licence N° : EL 1860

DME\_SA 94-140

**TENEMENT:**

EL 1864 (formerly SMLs 118, 151, 172, 209, 209A, 210, 210A, 222, 269, 440, 534, 535, 562, 595, 672, 673, 677, 714, Els 47, 62, 85, 132, 259, 423, 794, 1119, 1497)

**AREA:**

822 sq km

**COMMENCEMENT DATE:**

30/8/93

**EXPIRY DATE:**

29/8/94

**COMPANY:**

CRA EXPLORATION PTY LIMITED

**REFERENCES:**

**LOCATION:**

Kalabity

**1:250 000 SHEET:**

CURNAMONA

**1:100 000 SHEET:**

CURNAMONA 68634, KALABITY 6934, MULYUNGARIE 7034

**TARGETS:**

**AGE/ROCK UNITS:**

**EXPLORATION SUMMARY:**

CURRENT LICENCE

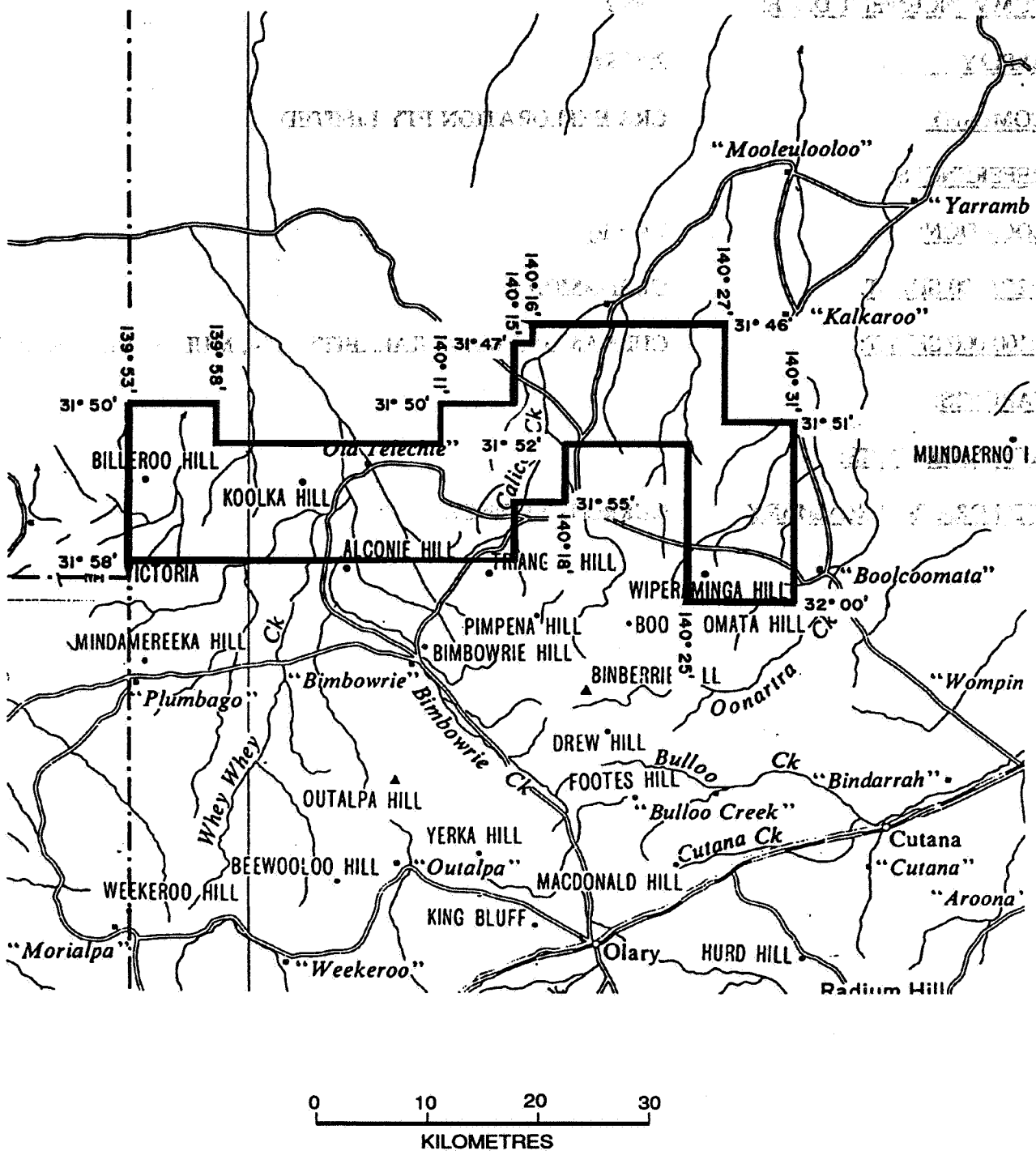


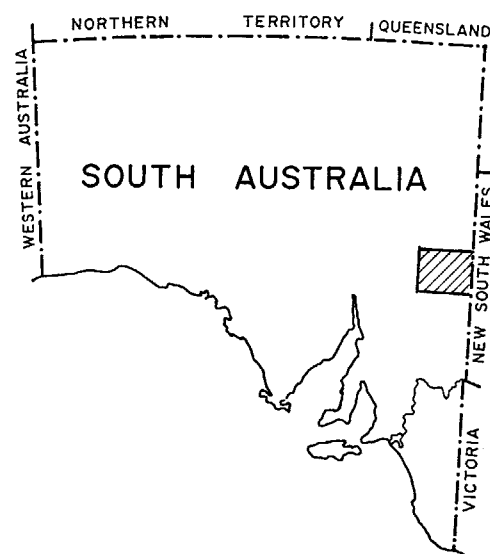
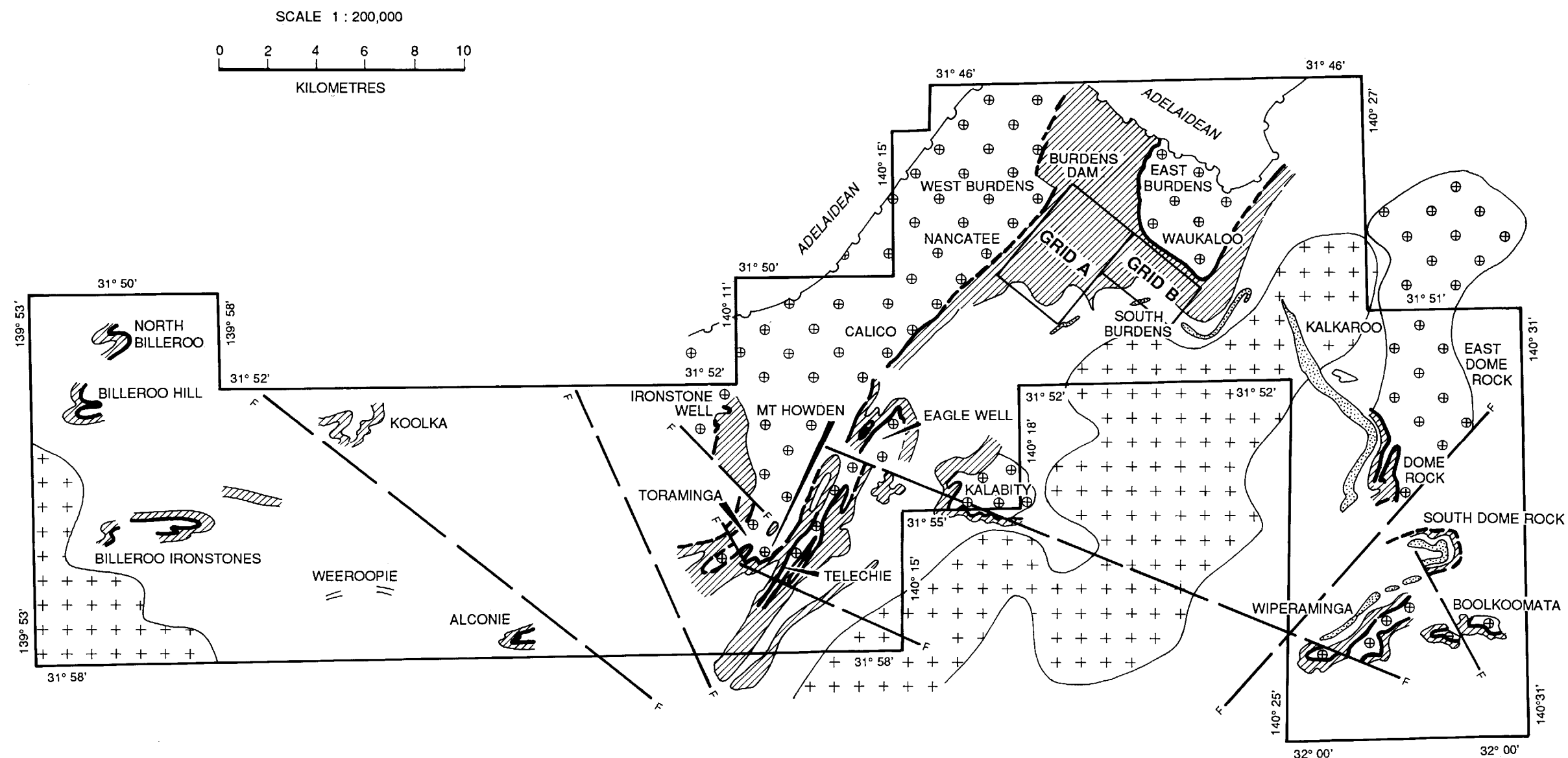
Figure 159

Applicant / Title Holder: CRA Exploration Pty. Ltd.

Licence N° : EL 1864

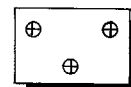
DME\_SA 94-141

27/10/95



#### LOWER PROTEROZOIC STRATIGRAPHY

##### STRATHEARN GROUP

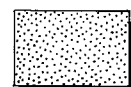


##### CURNAMONA GROUP



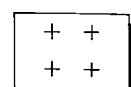
BIMBA FORMATION

UPPER ALBITE FORMATION



LOWER ALBITE FORMATION

##### WIPERAMINGA GROUP



Granite / migmatite

F ————— F ..... Inferred fault

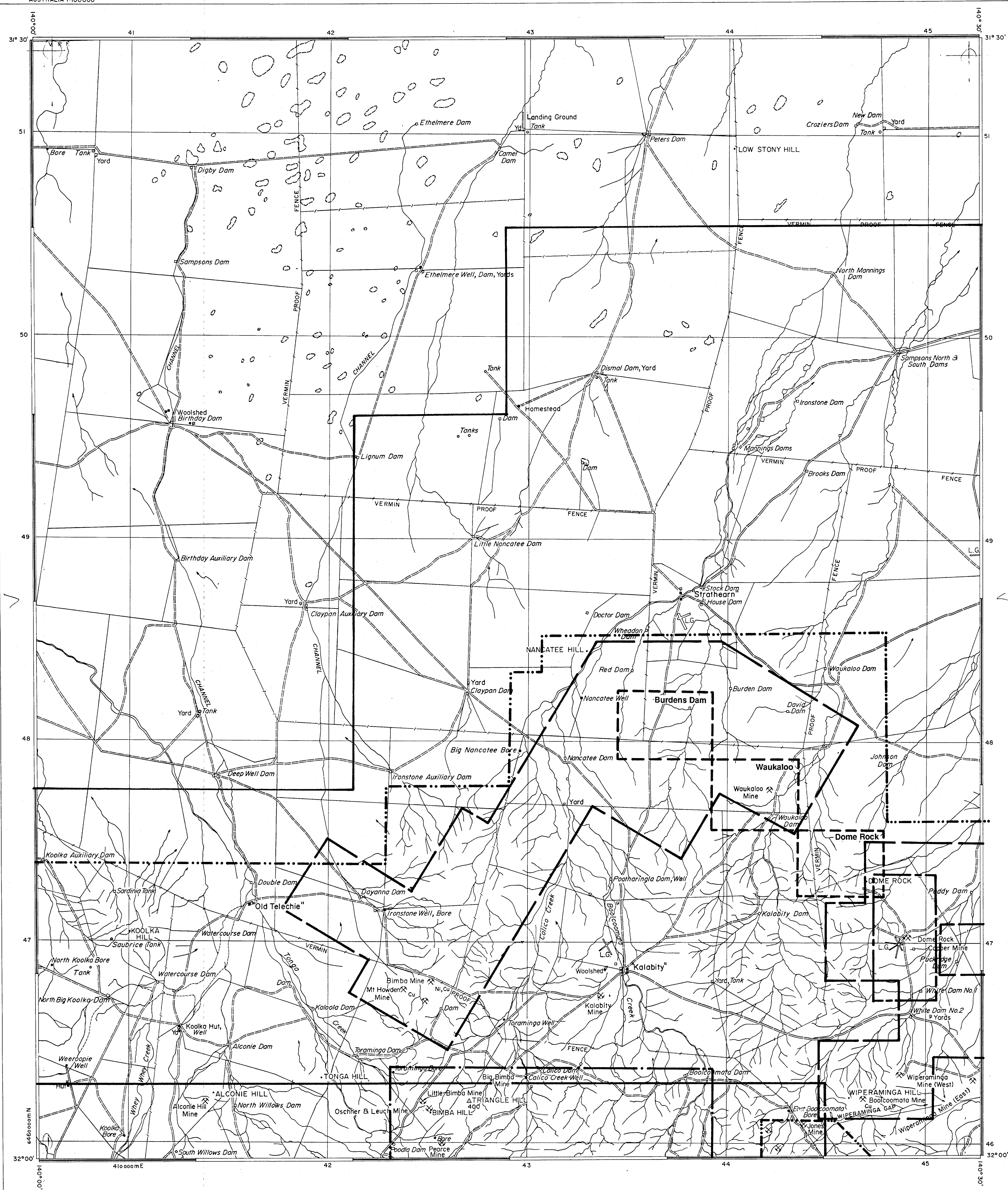
..... Unconformity

CURNAMONA 1:250,000 MAP SHEET  
REVIEW OF MINERAL EXPLORATION  
**LOCATION OF BIMBA PROSPECTS IN KALABITY AREA**

KALABITY  
GEOLOGICAL SURVEY OF SOUTH AUSTRALIA  
DEPARTMENT OF MINES AND ENERGY ADELAIDE

SHEET 6934 ZONE 54

AUSTRALIA 1:100 000

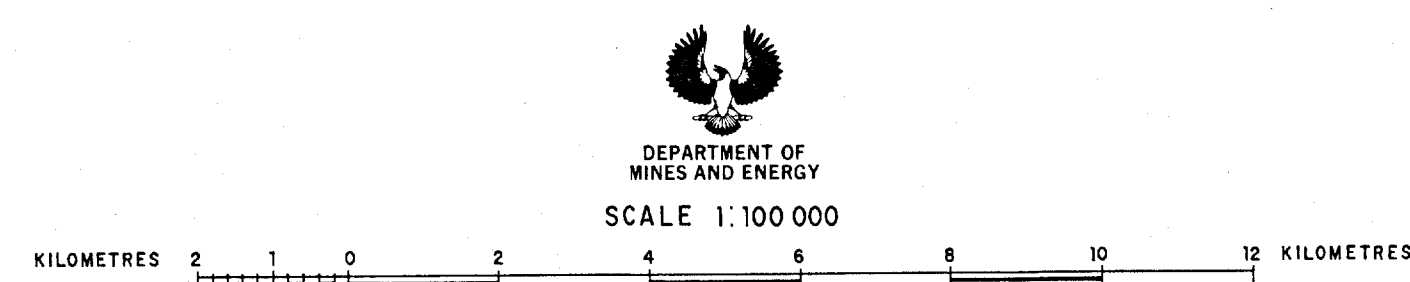


BOUNDARY	TENEMENT	COMPANY	ENVELOPE NUMBER	AREA	SCALE
---	SML289	Trans Aust. Exploration Pty Ltd	1055-3	Dome Rock	1:48,000
---	SML534	Petrocarb/Esso	1569-1	Triangle Hill	1:12,000
---	EL132	CEC	2426 II-3 2426 II-6 2426 III-7	Waukaloo Dome Rock Burdens Dam	1:5,000 1:5,000 1:5,000
---	EL259	CEC	2808 II & III		1:20,000
---	EL423	ESSO	3365 IV 3,4		1:25,000
---	EL423	ESSO	3365 IV 5-14 (inclusive)		1:5025
---	EL450	ESSO	3447 III 18	Putts North	1:10,000

HEAD STATION, OUT STATION, HUT	• • •
NATIONAL ROUTE NUMBER	—
HIGHWAY OR MAIN ROAD	—
SECONDARY ROAD	—
TRACK	—
TRACK ALONG BOUNDARY FENCE	—
RAILWAY AND STATION	—
RAILWAY AND SIDING	—
MAJOR ROAD BRIDGE, RAILWAY BRIDGE	—
BOUNDARY FENCE	—
INTERNAL FENCE	—
VERMIN PROOF, DOG FENCE	V.P.F. D.F.
POWER TRANSMISSION LINE	—
MINERAL FEATURES	—
MINOR MINERAL OCCURRENCE, PROSPECT	• U •
MINE, ALLUVIAL WORKINGS	• X •
OPEN CUT, QUARRY	• O •
YARD	• Y •
TRIG-STATION, ASTRONOMICAL STATION	• T •
IDENTIFIED HILL OR MOUNTAIN, CAIRN, PILE	• I •
SPOT ELEVATION	• 73 •
CONTOURS, DEPRESSION CONTOURS	—
ESCAPMENT	—
EMBANKMENT	—
SAND DUNE	—
DRAINAGE	—
RIVER, CREEKS	—
BRAIDED STREAM WITH FLOOD CHANNEL	—
FLOOD PLAIN BOUNDARY	—
CLAYPAN, SALTPAN (PLAYA LAKE), SWAMP	—
BORE, WELL	—
TANK	—
ARTESIAN BORE	—
SPRING	—
WATERHOLE	—
DAM	—

1:100 000 SHEET INDEX

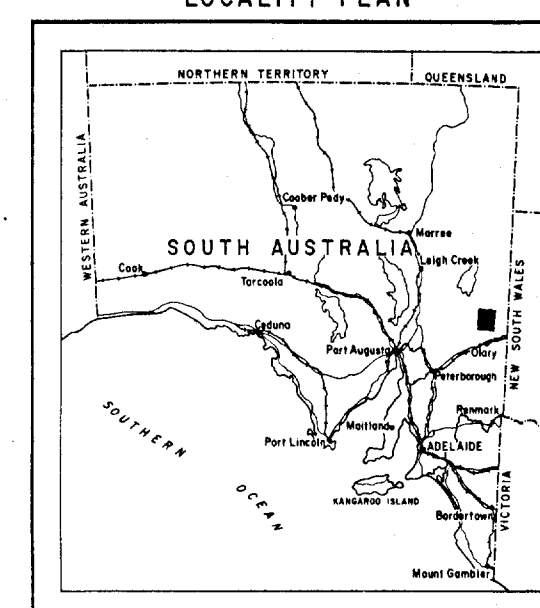
PASMORE	BENAGERIE	LAKE CHARLES
CURNAMONA	KALABITY	MULYUNGARIE



Compiled from material supplied by Division of National Mapping, Canberra.

Prepared by the Drafting Branch for use within the SA Department of Mines and Energy.

LOCALITY PLAN



CURNAMONA 1:250,000 MAP SHEET  
REVIEW OF MINERAL EXPLORATION  
DETAILED GEOLOGICAL MAPPING  
OF KALABITY 1:100,000 SHEET  
(Compiled by K. R. Yates & Associates Pty Ltd)

KALABITY  
6934