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EL 1127

WILLIAMSTOWN

PROGRESS AND FINAL REPORTS TO LICENCE EXPIRY FOR THE PERIOD 28/3/1983 TO 29/3/1984

Submitted by
Australian Industrial Minerals NL
1984

Enquiries: Customer Services Branch
Minerals and Energy Resources
7th Floor
101 Grenfell Street, Adelaide 5000

Telephone: (08) 8463 3000
Facsimile: (08) 8204 1880

Government of South Australia
Primary Industries and Resources SA

CONTENTS ENVELOPE 5145

TENEMENT: E.L. 1127 - Mt. Crawford.

TENEMENT HOLDER: Australian Industrial Minerals No Liability.

AUSTRALIAN INDUSTRIAL MINERALS NO LIABILITY

QUARTERLY REPORT FOR EXPLORATION LICENCE NO 1127
1st QUARTER ENDING 28th JUNE, 1983.

REPORT BY:

ALLAN YOUNGER
GEOLOGIST

DATE:

19th AUGUST 1983

AUSTRALIAN INDUSTRIAL MINERALS NO LIABILITY

QUARTERLY REPORT FOR EXPLORATION LICENCE NO 1127

INTRODUCTION

Australian Industrial Minerals N.L. were granted an Exploration Licence No. 1127 of approximately 63 sq km on the 28/3/83 on an area to the south and south east of Williamstown. This is over the Springfield mines and the inferred portential surrounding area. (Fig 1)

EXPLORATION CONCEPT

The Exploration Licence was taken because the developed reserves in the Springfield mines are virtually depleted and to develop further ore at depth would involve a consequent rise in extraction costs.

Work done within the main mines indicated that the host rocks were not of Adelaidean age and were probably part of the Barossa Complex. The work showed that the hosts were part of a nor-northwest/sou-southeast trending zone.

The concept therefore was that other deposits of the Kaolin-Sillimanite type would be confined to this zone.

PREVIOUS WORK

There have been numerous reports on the developed Williamstown clay deposits; sensu stricto; and generally authors have then considered the broad regional aspects.

The most relevant works on the local geology appears to be A.R. Alderman (1942); who made a limited study of the areas immediately nor-northwest and sou-southeast of the Springfield mine.

K.J. Mills (1963, 1973) studied in detail the area immediately south of the Warren Reservoir, and was able to resolve the complex structural setting.

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He did not consider the economic aspects to any major extent.

In recent years C. Conor and I.J. Townsend have updated and altered the geology of the Springfield mines.

Mr. I.J. Townsend is currently engaged in mapping in the area of the mines.

GEOLOGY (Fig 2)

A photo lineament study was completed over the entrie E.L. In several places it has been possible to trace and define specific units although this was not the primary thrust of the exercise.

This was used as a structural/trend framework for the regional reconnaissance traverses.

The Adelaidean sequence in the E.L. has a strong linear character; essentially a representation of bedding.

Ground review to this stage has concentrated on public road traverses; and these confirm the trends generally seen in the air photos. Ground observations indicate that there is substantially more small scale drag and flexure folding than can be seen in the air photos.

Using the ground observations in conjunction with the Onkarparinga 1:50,000 sheets it is possible to infer the Burra group units which occur within the Exploration Licence.

In the eastern half of the E.L. these units are (youngest at top), the

- Stonyfell Quartzite (Ebu), the
- Woolshed Flat Shale (Ebh), the
- Castambul Dolomite (Ebk), and the
- Aldgate Sandstone (Ebr).

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ALDGATE SANDSTONE

The area covered by this unit has only been partially studied; the most definitive feature of it appears to be the heavy mineral banding in the sandy phases. The other common phase is a sandy micaeous phyllites.

CASTAMBUL DOLOMITE

The field expression of this unit is generally as a major quartizite phase and several thin underlying calc-silicate phases. Some micaeous siltstones and phyllites also occur.

WOOLSHED FLAT SHALE

This unit is generally recessive with limited outcrops, where seen it is usually sandy micaeous phyllites or micaeous siltstones.

STONYFELL QUARTZITE

The occurrence of this unit appears to be confined to the south east corner of the E.L. The phases seen are a fine-graded grey quartzite near the base with siltstones becoming more common higher in the sequence.

INTRUSIVES

The only intrusive rocks seen have been some very small pegmatites.

ECONOMIC ASPECTS/CONCLUSIONS

With the aim of finding more Kaolin-Sillimanite deposits; the eastern half of the Exploration Licence can be discounted at this stage.

There were no areas of interest seen during the photo interpretation study and the ground study showed the eastern half to be entirely of Adelaidean sequence with Cainozoic cover.

Even if the Barossa Complex part of concept is wrong, none of the rocks seen in the field approached the metamorphic grade for there to be sillimanite occurrences in the vicinity.

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Hence the eastern portion of the E.L. now has a very low potential.

Future work will be concentrated in accessible parts of the western portion of the Exploration Licence No. 1127.

Allan Younger,
GEOLOGIST.

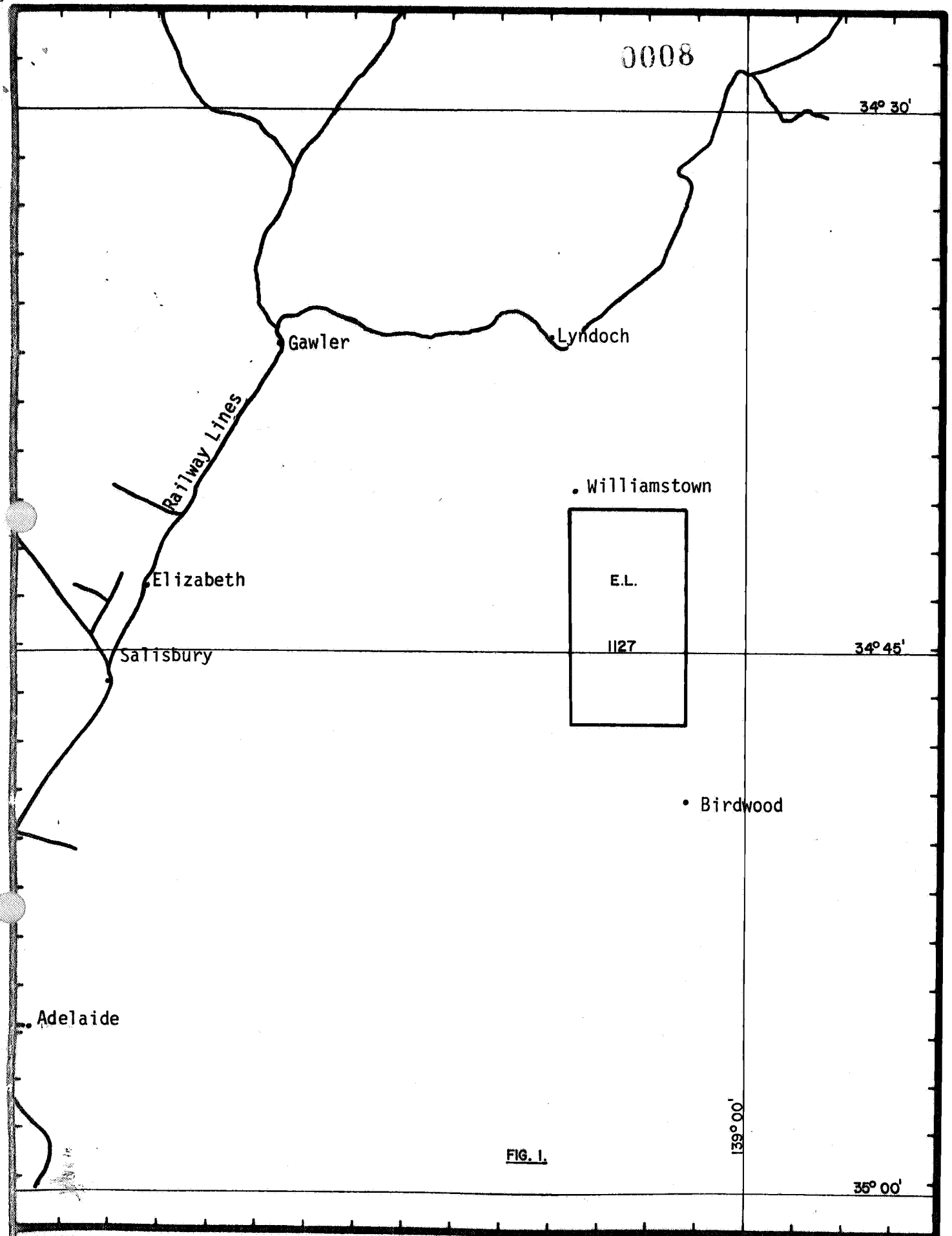

FIG. 1.

LEGEND:

AUSTRALIAN INDUSTRIAL MINERALS N.L.

Scale: 1:250,000

Nº K

DATE:
GEOL:
DWN:
CHKD:

Location Plan of
Exploration Licence No. 1127
Williamstown Area, S.A.

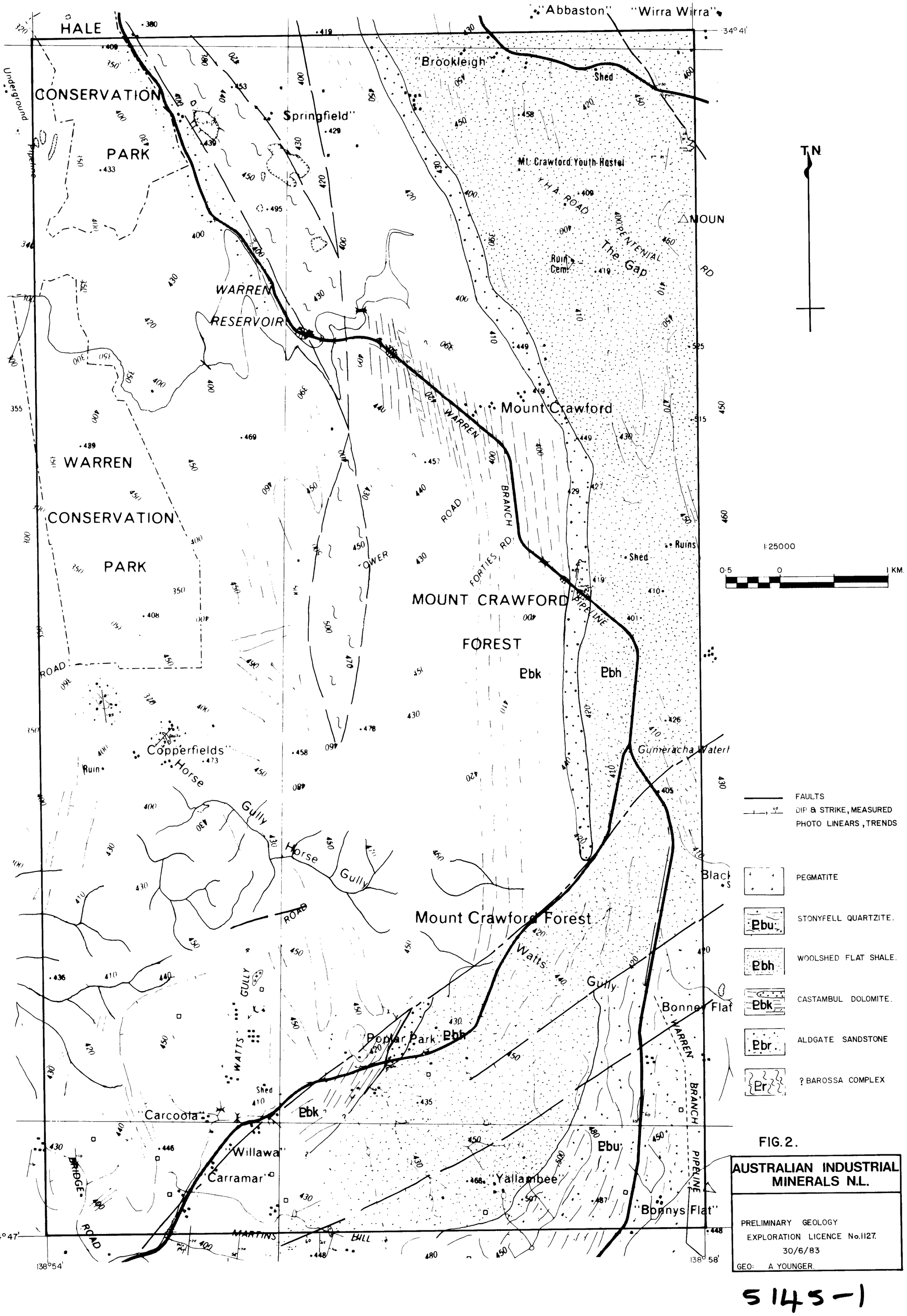

FIG. 2.

AUSTRALIAN INDUSTRIAL MINERALS N.L.

PRELIMINARY GEOLOGY
EXPLORATION LICENCE No.1127.
30/6/83
GEO: A YOUNGER.

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AUSTRALIAN INDUSTRIAL MINERALS NO LIABILITY

(INCORPORATED IN SOUTH AUSTRALIA)

3rd FLOOR,
8 VICTORIA AVENUE, PERTH
WESTERN AUSTRALIA. 6000

MINE:
WILLIAMSTOWN S.A. 5351
TELEPHONE: (085) 246305

Correspondence to:
G.P.O. BOX E 221,
PERTH, 6001
TELEPHONE: (09) 325 2333
TELEX: 94458

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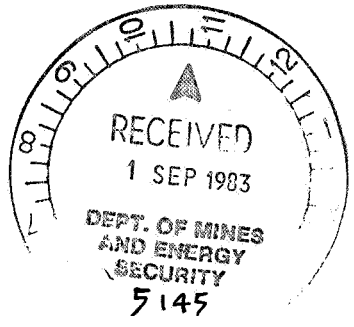
STATEMENT OF EXPENDITURE FOR QUARTER ENDING 28/6/83

EXPLORATION LICENCE NO. 1127

Rentals	$ 104.00
Aerial Photographs	$ 470.96
Salaries	$ 798.98
	$1,373.94



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AUSTRALIAN INDUSTRIAL MINERALS NO LIABILITY

(INCORPORATED IN SOUTH AUSTRALIA)

3rd FLOOR,
8 VICTORIA AVENUE,
PERTH, WESTERN AUSTRALIA

MINE:
WILLIAMSTOWN, S.A. 5351
TELEPHONE: (085) 24 6305

Correspondence to:
G.P.O. BOX E221,
PERTH, WESTERN AUSTRALIA, 6001
TELEPHONE: (09) 325 2333
TELEX: 94458

19th January, 1984.

The Director General,
Dr. R.K. Johns,
South Australian Department of Mines & Energy,
P.O. Box 151,
EASTWOOD SA 5063

Dear Sir,

RE : EXPLORATION LICENCE No. 1127

We wish to advise that expenditure on E.L. 1127 for quarter ended 30th September, 1983 amounted to $1,706.00.

The work done was confined to reporting and administration expenditures due to staff leave.

Yours faithfully,

R.H. FRITH
ACCOUNTANT

AUSTRALIAN INDUSTRIAL MINERALS NO LIABILITY

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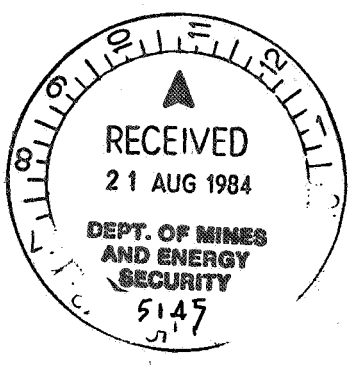
FINAL REPORT

FOR

EXPLORATION LICENCE NO. 1127

COMPILED BY:

Allan Younger
Geologist



DATE:

30TH APRIL 1984

AUSTRALIAN INDUSTRIAL MINERALS NO LIABILITY

FINAL REPORT FOR EXPLORATION LICENCE NO. 1127

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LIST OF FIGURES

AUSTRALIAN INDUSTRIAL MINERALS NO LIABILITY

FINAL REPORT FOR

EXPLORATION LICENCE NO. 1127

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SUMMARY

The geological mapping of Exploration Licence No. 1127 has shown that the only potential areas for damourite mica or kaolinised sillimanite deposits are Private Mine Area 13 and just south of the Warren Reservoir.

The mapping indicated the existence of a Pre-Adelaidean Barossa Complex basement inlier, known as the Warren Inlier, and that the host rocks for the kaolinised sillimanite deposits of Private Mine Area 13 are part of the Barossa Complex units.

The zone of damourite mica schists south of the Warren Reservoir is substantial, but the existence of water works reserves, private dwellings and forestry reserves limits the potential area for future exploration or exploitation.

The bulk of the area within Exploration Licence No. 1127 is covered by Adelaidean sequence units. Their potential to host either damourite mica schists or kaolinised sillimanite deposits is now regarded as nil.

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RECOMMENDATIONS

In the light of the exploration work done the following work program is recommended:-

1. Obtain leasehold tenure over the area of damouritic schists south of the Warren Reservoir as a longer term exploration project.

2. Arrange compensation and permits as necessary with the private landowner and the Woods and Forests Department to allow exploration to proceed.

3. Costean the prospective area, specifically to the south of the old workings, to define and expose the sequence.

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KEY WORDS

Barossa Complex
Warren Inlier
Damourite Mica
Kaolinised Sillimanite
Mount Crawford
Adelaidean Sequence
Aldgate Sandstone
Williamstown

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INTRODUCTION

Australian Industrial Minerals N.L. was granted Exploration Licence No. 1127 on the 28th March, 1983 covering an area of interest around Williamstown. Fig. 1.

Exploration activities were initially concentrated in the southern and eastern portions of the Exploration Licence. The economic potential of this area was found to be negligible and is covered by Quarterly Report to 28th June, 1983.

Exploration activities in the latter part of the year have concentrated on the northern portion of the reserved area.

PREVIOUS WORK

The existence of a Pre-Adelaidean Basement Inlier in the area of the Warren Reservoir has been vigorously debated for many years.

Brown and Woodward (1886) showed the existence of two metamorphic sequences in the enclosed area of the Gumeracha Goldfields. Howchin (1906 and 1926) recognised the existence of an older basement sequence but also included some of the Adelaidean sediments in his series. Hossfeld (1935) refuted much of Howchin's work but accepted the existence of Basal Adelaidean units in the area.

Miles (1950) showed that some highly metamorphosed Adelaidean system rocks overlay the basal units and are faulted against lower metamorphic grade Adelaidean rocks of higher stratigraphic level.

Alderman (1942) regarded the Mt. Crawford clay-mica deposits as being derived from metasomatic alteration of the original sequence. Campana (1953) and Campana et al (1955) regarded the entire basement sequence schists of Howchin as being a wide spread zone of metasomatism. This was called the "Aluminous metasomatic zone of South Warren Reservoir" on the Gawler Geological Sheet: Campana accepted Howchin's view that the sequence to the east was Adelaidean.

Mills (1963) in his initial study of the area regarded the Inlier as being part of lower Adelaidean sequence that had been highly altered. Mills (1973) was able to prove the miceous schists and gneisses of Howchin's basement have been

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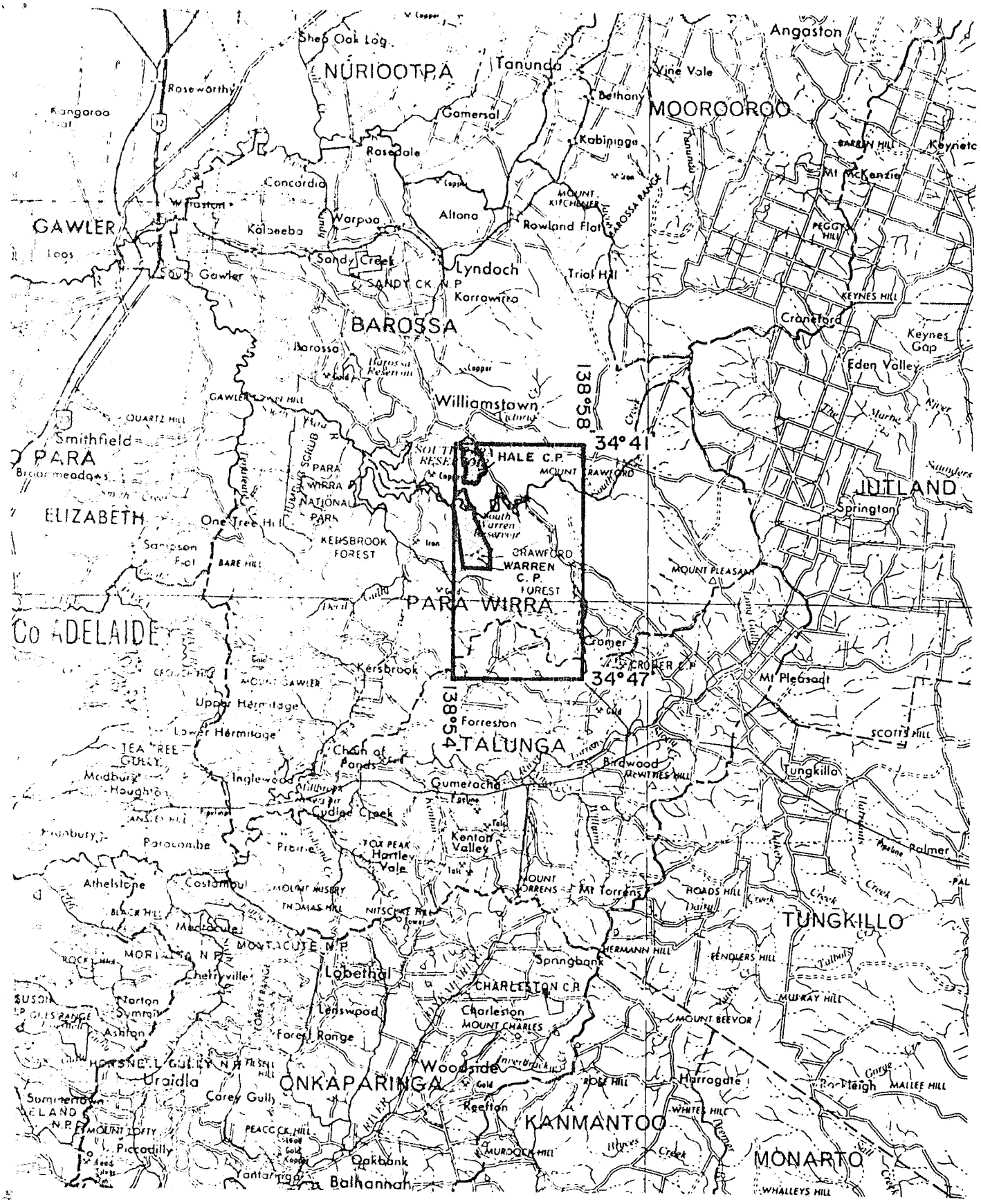

AUSTRALIAN INDUSTRIAL MINERALS NO LIABILITY

AREA: 64 square kilometres (approx.)

250000 PLANS: ADELAIDE

LOCALITY: MOUNT CRAWFORD AREA – Approximately 36km northeast of Adelaide.

EL No: 1127

"Abbaston" "Wirra Wirra"

34°41'
6160

HALE CONSERVATION PARK

Underground Pipeline

"Springfield"

"Brookleigh"

Shed

Mt. Crawford Youth Hostel

Y.H.A. ROAD

PENTENIAL RD

The Gap

Ruin Cem.

MOUN

WARREN RESERVOIR

WARREN CONSERVATION PARK

WOODSIDE - MEADOWS FAULT

ROAD

WILLIAMSTOWN

Mount Crawford

WARREN ROAD

BRANCH

FORTIES RD

TOWER

PIPELINE

Ruins

Shed

MOUNT CRAWFORD FOREST

Pbk

Pbh

MURRAY VALE THRUST

Copperfields

Horse Gully

Gunneracha Water

Mount Crawford Forest

Watts Gully

Bonney Flat

Poplar Park Pbh

Pbu?

Carcoola

Pbk?

Willawa

Carramar

Yallambee

Pbu

"Bonnys Flat"

MARTINS ROAD

HILL

BRIDGE

WARREN BRANCH PIPELINE

6150

34°47'

138°54'

310

138°58'

TN

1:25000

0·5 0 1 KM.

Faults, Inferred
Dip & Strike
Unconformity

Adelaidean

Stonyfell Quartzite (Pbu)

Woolshed flat Shale (Pbh)

Castambul Dolomite (Pbk)

Aldgate Sandstone (Pbr)

Barossa Complex

Undifferentiated

Granite Gneiss

Damourite Mica Schists

Biotite Schists

FIG. 2.

AUSTRALIAN INDUSTRIAL MINERALS N.L.

INTERPRETED GEOLOGY
FINAL REPORT
EXPLORATION LICENCE NO. 1127

GEO: A. YOUNGER. Date: 30.4.84

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PREVIOUS WORK CONT...

subjected to more deformation events than the overlying sandstones. The locating of numerous angular unconformities confirmed the exposure of the Pre-Adelaidean basement; the Warren Inlier.

Conor (1977) proposed that the mine series rocks of the Mt. Crawford kaolin-sillimanite deposits were metamorphosed equivalents of the Adelaidean sequence. Specifically the metamorphosed units were considered to be part of the Castambul Dolomite and the Woolshed Flat Shale.

Townsend et al (1983) proposed that the hosts of the Mt. Crawford deposits were part of the metamorphosed Barossa Complex basement and the Warren Inlier.

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GEOLOGY

PREAMBLE

The existence of the Warren Inlier unconformably underlying the basal Adelaidean unit; the Aldgate Sandstone; indicates a relatively thin depth to basement for the north western part of E.L. 1127.

The Adelaidean has been subjected to three periods of strong compressive deformation and significant metamorphism.

Thrust faults or high angle reverse faults and strike faults were associated with the second deformation. These have brought low grade amphibolite facies metamorphic rocks into contact with much higher grade complexly deformed sillimanite facies of the Warren Inlier.

WARREN INLIER

The Warren Inlier consists of a core zone at undifferentiated coarse-grained knotted schists and granitic gneiss. On the northern western and southern sides this core zone is directly overlain by the unconformable Adelaidean Aldgate Sandstone.

On the eastern side of the core zone is a sequence of biotite mica schists and damourite mica schists. These are in turn bounded on the eastern side by an intrusive granite gneiss mass.

The eastern boundary of the granite gneiss is in direct contact with later Adelaidean sequence units due to the major Murray Vale thrust fault.

The Barossa Complex Warren Inlier and the unconformable basal Adelaidean unit; the Aldgate Sandstone; form a fault bounded block which has been uplifted by later high angle thrust or reverse faults. On the western side, it is the major Williamstown - Meadows fault and to the southern, eastern and northern sides, it is the Murray Vale thrust.

During the mapping of the E.L. area south of the Warren Reservoir generally only minor alterations to Mills (1963, 1973) work have been proposed.

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WARREN INLIER CONT...

The main feature of difference is the mapping of a significant fault trending southwesterly from the new bridge over the Warren Reservoir. This fault is the southern limit of the Aldgate Sandstone in this area, and on the basis of photo lineaments, it trends across the Warren Inlier to the complex Horse Gully area midway down the western boundary of the E.L. It appears to join the Williamstown - Meadows fault in this area. In terminating the Aldgate Sandstone to the north against biotite schists of the Barossa Complex to the south the indicated movement is north block down across the fault. Near the southern boundary of the Warren Conservation Park photo interpretation indicates dislocation of the contact unconformity between the Aldgate Sandstone and the Barossa Complex. This dislocation can also be explained by the relative movement across the fault of north block down.

The Barossa Complex forming the core of the Warren Inlier has not been differentiated into specific units. The resolving of the complex structures being beyond the scope of the company requirements. Traverses indicate the core of the Inlier is composed essentially of coarse grained knotted schists and granitic gneiss.

Mills (1973) mapped the contact between the core zone and the schist sequence as being a major thrust fault; which he named the Wirrianda Thrust. Conceivably the fault exists but no evidence of it was found during the current project.

The biotite schist sequence to the east shows little variation in the area south of the Warren Reservoir. The main minerals are quartz, plagioclase, biotite, muscovite, chlorite and sericite in almost any proportion. North of the Warren Reservoir in general outcrop only biotite schists and variants are seen. In the open cuts on Private Mine Area 13, various units exist which are not seen elsewhere. Quartz - sillimanite meta quartzites and quartz, kyanite, muscovite schists are frequently interbedded with more orthodox quartz, biotite schists.

Within the biotite schist sequence are a group of profoundly different schists. The miceous mineral is damourite; (Alderman 1942) again with varying amounts of quartz, feldspar and muscovite.

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WARREN INLIER CONT...

South of the Warren Reservoir the damourite schist zone appears to be about 200m wide, as a single zone occurring from the Reservoir to the Tower Hill road. Whether the lensing out is due to structural controls or chemical changes is unknown.

In the area north of the Warren Reservoir in Private Mine 13 the damourite schist zones are much narrower (up to 50m) and appear very limited in strike length outside the various open pits.

The granite gneiss of the Warren Inlier is limited to the area south of the Warren Reservoir.

Mills (1963) was able to prove the granite gneiss was the result of granitization and recrystallization of the schists which form the Inlier.

Mineral composition is essentially quartz, microcline, plagioclase, biotite and muscovite regardless of specific rock types. Varieties include coarse grained and fine grained types, schistose zones and partially assimilated xenoliths.

Pegmatites occur throughout all units of the Warren Inlier with some minor amphibolite dykes occurring within the granite gneiss complex.

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ADELAIDEAN SEQUENCE

Mapping in the northern and western portions of the E.L. have generally been confined to the Pre-Adelaidean Barossa Complex and the Aldgate Sandstone. However, it has been possible to show that the Castambul Dolomite sequence occurs to the north of the Springfield mining areas. This places it in direct contact albeit faulted, with the Aldgate Sandstone to the west.

Thus the stratigraphic sequence remains, with youngest to the top:-

- the Stonyfell Quartzite (Pbu),
- the Woolshed Flat Shale (Pbh),
- the Castambul Dolomite (Pbk), and
- the Aldgate Sandstone (Pbr)

In none of the above units was any evidence found to indicate that the Adelaidean units had been metamorphosed to amphibolite facies grade. Metamorphism appears to have only reached lower green schist facies in this area, with the formation of schists and phyllites.

ALDGATE SANDSTONE

The Aldgate Sandstone as mentioned rests unconformably on the Warren Inlier and is remarkable for its uniformity. Apart from some very minor pebble horizons towards the base of the unit; it is essentially a coarse, well bedded sandstone with the common cross bedding feature being illuminated by the detrital hematite.

Structurally the unit reflects the influence of the basement inlier with the bedding generally showing an off lapping nature and dipping away from the core as would be expected.

CASTAMBUL DOLOMITE

This unit is essentially miceous siltstones and phyllites with only minor calc-silicate phases. It is generally recessive in outcrop except for the major quartzite phase which marks the stratigraphic top of the unit. The softer units also occur to the west of the Williamstown - Meadows fault which effectively follows the western boundary of the E.L.

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CASTAMBUL DOLOMITE CONT...

The contact with the underlying Aldgate Sandstone is known to be faulted for all except a small area to the northwest of Carcoola in the southwest of the E.L. However the existence of a strike fault cannot be discounted.

WOOLSHED FLAT SHALE

This unit is generally sandy miceous phyllites and miceous siltstones. It has a recessive nature and only seen in limited outcrops.

STONYFELL QUARTZITE

This unit is confined to the southeast corner of the E.L. The basal units appear to be quartzites which grade into siltstones within the area of the Exploration Licence.

INTRUSIVES

Small pegmatites seem to intrude all Adelaidean units.

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ENVIROMENTAL ASPECTS

The only area found during mapping of E.L. 1127 outside Private Mine Area 13 with potential as a source of damourite mica or kaolinised sillimanite clay is the area just south of the Warren Reservoir.

This zone of damouritic mica schists extends southward from the Reservoir for about 2.5 km and averages about 200m wide. It follows a broad open valley for about 1.2 km of which at least half is with a Water Board Reserve area.

The other 0.6 km of this section is past, under and around private farm dwellings, buildings and fixtures.

Mining activity is excluded from the close catchment areas of reservoirs and is not permitted within 150m to 200m of existing dwellings or out buildings.

The remaining area is partly in freehold pasture and partly in the buffer zone of the Mt. Crawford pine forest.

The forest area covers about 0.8 km of the remaining area and mining activity is possible as this area is under eucalypt scrub.

Changes in policy could alter this position. The application of unreasonable conditions and compensation agreements by either the landowner or the Forestry, could also severely influence the economics of any potential mining operation.

GEOLOGICAL HISTORY

Whilst the area has undergone several structural and metamorphic events the history of the area is readily discernible.

1. Deposition of the Barossa Complex units as essentially shales and siltstones.

2. Deformation of the Barossa Complex; folding and metamorphism forming the schists and granite gneiss by reaching the high grade amphibolite facies and with the formation of sillimanite.

3. Erosion of land mass. (Cross Section Sketch 1).

4. Deposition of Adelaidean sequence around and over a slight basement high corresponding to the core of the later Warren Inlier. (Cross Section Sketch 2).

5. Deformation and metamorphism of both the Adelaidean and basement complex. Deformation was in three compressive phases and gave rise to the high angle reverse thrusting and tight folding and refolding in both the basement and the Adelaidean. The major Williamstown - Meadows and Murray Vale faults were formed during this period. Metamorphic grade was the lower green schist facies with the formation of schists and phyllites.

No at least mid amphibolite metamorphism in Adelaidean units

6. Prolonged erosion and denudation to the present day. (Cross Section Sketch 3).

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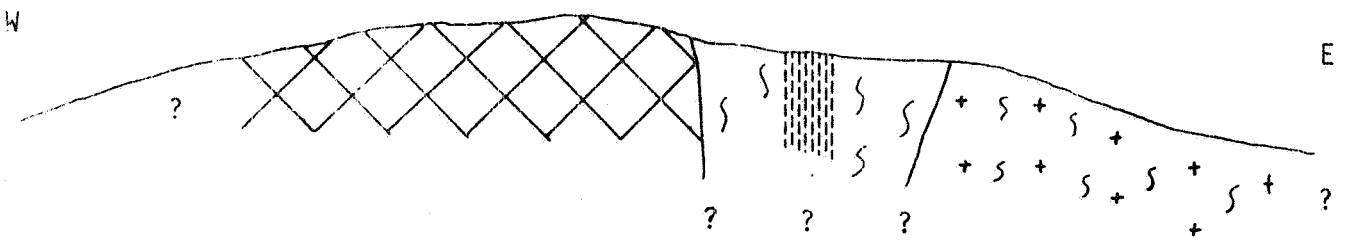
SKETCH 1



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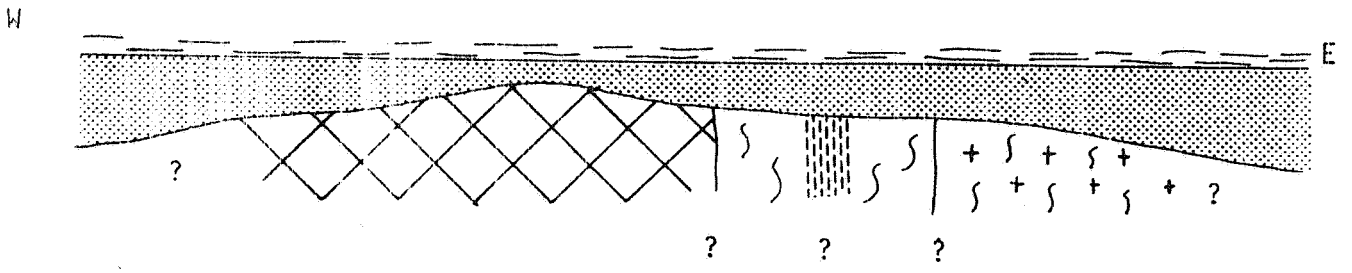

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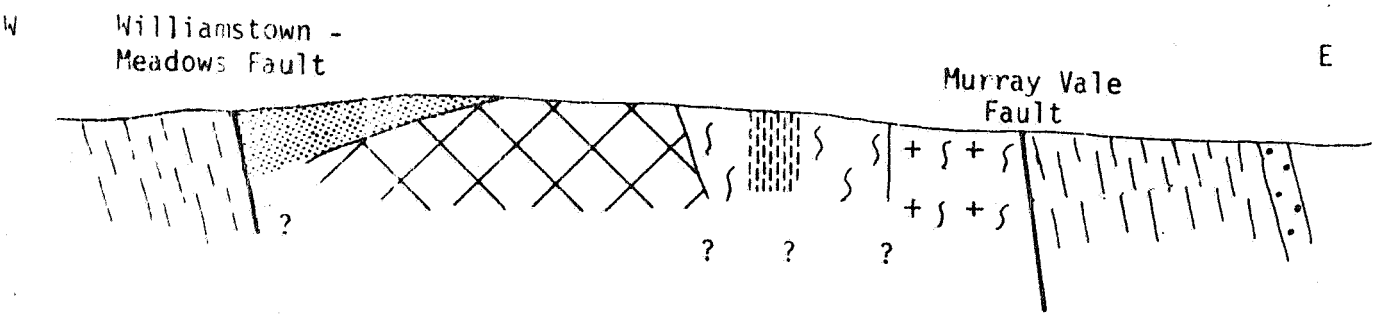

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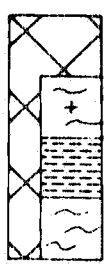
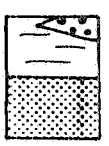


Barossa Complex

Undifferentiated

Granite
Gneiss
Damourite Mica
Schists
Biotite
Schists



Adelaidean

Castambul Dolomite (Pbk)

Aldgate Sandstone (Pbr)

CONCLUSIONS

Exploration of Licence No. 1127 indicated the existence of a zone of damourite mica schists which warrant further detailed investigation.

The zone is part of a Pre-Adelaidean basement high which has been upthrusted to a higher level by a series of major faults.

In the area of Private Mine 13 there appear to be four separate zones of damourite schists; because of fault movements this seems to be at a higher "stratigraphic" position relative to the zone south of the Warren Reservoir. To the immediate north of Springfield homestead the Barossa Complex is fault terminated against the Adelaidean sequence.

Hence at this stage the areas of potential for kaolinised sillimanite clay and damourite mica deposits are limited to Private Mine 13 and the zone immediately south of the Warren Reservoir.

ALLAN YOUNGER
GEOLOGIST

30TH APRIL, 1984

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31.03.77 - 06.05.77
06.05.77 - 01.07.77
01.07.77 - 21.10.77
21.10.77 - 13.01.78
13.01.78 - 05.05.78

AUSTRALIAN INDUSTRIAL MINERALS NO LIABILITY

STATEMENT OF EXPENDITURE

EXPLORATION LICENCE NO. 1127

FROM 28.3.1983 TO 28.3.84

Geologist's Salary & Disbursements	$10,851
Aerial Photographs	$ 470
Transport	$ 380
Rentals	$ 104
TOTAL EXPENDITURE	$11,805

No Administration costs have been charged to the Exploration of E.L. 1127.