AGIP AUSTRALIA PTY LIMITED

FINAL REPORT

TO THE

NORTHERN TERRITORY DEPARTMENT

OF MINES AND ENERGY

EL1197

period ending 9th FEBRUARY 1977 to 8th FEBRUARY 1982

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1. SUMMARY

Emu Cave E.L. 1197 was granted to Agip Australia Pty. Ltd. on February 9th, 1977.

A total of 3,579 metres were drilled in 29 holes, comprising 3,123 metres of percussion drilling in 25 holes and 456 metres of diamond coring in 4 holes.

Geological mapping, ground radiometric and gravity surveys were also carried out.

Minor radiometric anomalies at surface and in drill holes occur within the basal sequence of the Mt. Eclipse Sandstone in the extreme western portion of the Exploration Licence.

2. INTRODUCTION

2.1 Description of the Area

Emu Cave E.L. 1197 was granted to Agip Australia pty. ltd., on February 9th, 1977. In accordance with the statutory requirements of the Northern Territory mining ordinance, the original 69.22 sq. km. was halved in 1979 and 1980 and again in February 1981.

The following are descriptions of the E.L. in 1977 and in 1981.

Description of Area - 1977

The Emu Cave E.L. 1197 area comprises "all that piece or parcel of land in the Northern Territory of Australia containing an area of 26.88 square miles more or less, the boundary of which is described as follows:-

Commencing at the intersection of latitude 22 degrees 20 minutes with longitude 131 degrees 25 minutes thence proceeding to the intersection of latitude 22 degrees 20 minutes with longitude 131 degrees 28 minutes thence proceeding to the intersection of latitude 22 degrees 23 minutes with longitude 131 degrees 28 minutes thence proceeding to the intersection of latitude 22 degrees 23 minutes with longitude 131 degrees 33 minutes thence proceeding to the intersection of latitude 22 degrees 24 minutes with longitude 131 degrees 33 minutes thence proceeding to the intersection of latitude 22 degrees 24 minutes

with longitude 131 degrees 20 minutes thence proceeding to the intersection of latitude 22 degrees 23 minutes with longitude 131 degrees 20 minutes thence proceeding to the intersection of latitude 22 degrees 23 minutes with longitude 131 degrees 25 minutes thence proceeding to the intersection of latitude 22 degrees 20 minutes with longitude 131 degrees 25 minutes, subject to all mining tenements granted or registered and all reserves included within the definition of "reserve" in Section 7 of the Mining Ordinance."

Description of Area - 1981

ALL THAT piece or parcel of land in the Northern Territory of Australia containing an area of 2.44 square miles (6.33 sq. km) more or less, the boundary of which is described as follows:-

Commencing at the intersection of latitude 22 degrees 23 minutes with longitude 131 degrees 20 minutes thence proceeding to the intersection of latitude 22 degrees 23 minutes with longitude 131 degrees 22 minutes thence proceeding to the intersection of latitude 22 degrees 24 minutes with longitude 131 degrees 22 minutes thence proceeding to the intersection of latitude 22 degrees 24 minutes with longitude 131 degrees 20 minutes thence proceeding to the intersection of latitude 22 degrees 23 minutes with longitude 131 degrees 20 minutes, subject to all applications for mining tenements and excluding there from all mining tenements granted or registered

and all reserves included within the definition of "reserve" in section 7 of the Mining Act.

2.2 Location and Access

E.L. 1197 is located approximately 380 km, by road, northwest of Alice Springs (Ref. Fig. 1). Access is via sealed Stuart Highway for 20km north of Alice Springs, thence on the partly sealed Tanami Highway, via. Yuendumu, for 310km and thence via formed station tracks.

2.3 Physiography

Landforms within the E.L. area fall within 4 main physiographic groups:-

1. Sand plains cover much of the E.L. area. The vegetation type is mainly spinifex (Triodia sp.).
2. Flood plains cover the majority of the south western area. They are made up of a clay with fine to coarse aeolian and water-borne sand.
3. Isolated higher areas of the E.L. are mainly formed by outcrops of Mt. Eclipse Sandstone with profiles dictated by the stratification of the sediments.
4. Mountain ranges and ridges are deeply dissected with accompanying alluvial fans and erosional tributory slopes.

2.4 Climate and Hydrology

The climate is semi-arid, sub-tropical and the area lies within the savanna zone of natural vegetation. Rainfall is about 300mm per annum, falling mainly in the summer months.

Vegetation types consist of spinifex (Triodia sp.) and mulga scrub (Acacia sp.) with scattered desert oak (Casuarina sp.).

No major watercourses transect the E.L. area. Water of barely potable quality is available from Cusacks Bore, some 20km from the E.L. area. The nearest developed sources of potable water are at Yuendumu, Vaughan Springs and Bigrlyi Camp.

3. PREVIOUS WORK

Prior to the acquisition of the licence by AGIP, no systematic mineral exploration had been carried out in the area.

The B.M.R. mapped the area as part of the 1:250,000 Mt. Doreen sheet (1972).

Central Pacific Minerals carried out some regional prospecting during 1973/74 resulting in the discovery of minor carnotite in Mt. Eclipse Sandstone west of the present licence area.

The Australian Atomic Energy Commission apparently carried out regional track etch surveys during 1975/76 but no results are available.

4. GEOLOGY

4.1 Regional Geology

E.L. 1197 lies on the eastern flank of the Wanabi basement Salient within the northern margin of the Ngalia Basin. The Wanabi salient is defined by the North east trending Yuendumu Fault. South-east of the fault, i.e. the area of E.L.1197, the relatively thin Quarternary cover is underlain by Upper Devonian Mount Eclipse Sandstone which is considered to be a probable basal section. The structural style is similar to that of the north western edge of the Basin.

4.2 Stratigraphy

The entire area of the E.L.with the exception of a few hundred square metres in the south-west corner of the E.L. is underlain by the Devonian-Carboniferous Mt. Eclipse Sandstone which is host to all the main uranium occurences of the Ngalia Basin.

An area of a few hundred square metres in the lower southwestern part of the E.L. is underlain by possible Precambrian "basement" rocks. The rocks are correlated with the Vaughan Springs Quartzite and possibly the Mt. Doreen Formation. Both formations crop out immediately outside the E.L. further southwest.

4.3 Structure

The structure in the north of the E.L. area is complex. It consists of an asymmetrical synclinorium with the western limb overturned and open folds to the east. In the extreme east an anticlinal structure occurs with axial plane faulting, thrusting and strike faulting, which

has produced a series of disconnected structural blocks. Similar processes explain klippen-style structures observed in isolated outcrops.

In the southern portion of the E.L. the sediments comprising the actual Emu Cave and surrounding outcrops have horizontal to low southerly dips. The Mt. Eclipse Sandstone unconformably overlies the Wanabi Basement Salient in the south-west. The simplest structural interpretation is that of a tight syncline against the basement salient.

4.4 Geology of E.L. 1197

Within the E.L. area the Mt. Eclipse Sandstone consists of a cross-bedded sequence of sandstone, siltstone and shale. The sandstone is sub-feldspathic and arkosic.

Within the E.L. the Mt. Eclipse Sandstone has been subdivided for practical mapping into the following geochemical facies units:-

Pwo White facies, oxidized. Kaolinitic and limonitic.

Pwo Fresh white reduzate facies. Pyrite, carbon, minor chlorite and fresh feldspar.

Pfo Transitional red to white facies. Oxidized, with haematite, limonite, chlorite and kaolinite.

Pft Fresh transitional facies. Chlorite, haematite and very minor scattered pyrite and carbon.

Pmo Mottled red facies (oxidized). Red facies with reduzate mottles; with limonite, haematite, chlorite and kaolinite.

Pmo Mottled red facies (fresh). With haematite, chlorite, and feldspar.

Pro Red facies oxidized. With limonite, haematite, and kaolinite.

Prf Red facies fresh. With haematite, and feldspar.

5. EXPLORATION ACTIVITIES

A summary of drilling activities is given in Table 1.

5.1 1977

A 1:25,000 scale base map (No. 1197/1) and a 1:46,500 scale base map (No. 1197/2) were produced. A ground scintillometer survey was carried out on a grid in the extreme southwest of the licence. Nine holes totalling 1060m were drilled by Rockdril Contractors. The holes were drilled by rotary percussion methods and were logged by Geoscience Associates for gamma, resistivity and density. The quality of electric logs obtained was poor. No anomalous radioactivity was detected although drilling did encounter thick sequences of reduzate facies Mt. Eclipse Sandstone.

Details of the above work were previously given in the Annual Report for 1977.

5.2 1978

The main exploration activities in 1978 consisted of stratigraphic percussion drilling and diamond drilling. Diamond drill holes E.C.D. 10, 1I, 12 and 26 were drilled to test basal, coarse-grained reduzate facies of the Mt. Eclipse Sandstone. No major anomalies were found. Holes E.C.P. 13 to 25 were regional scout holes drilled to assess the potential for development of significant mineralization within the Mt. Eclipse Sandstone. A few holes intersected Pyritic and carbonaceous bands in the Mt. Eclipse Sandstone but no significant mineralization was discovered. A total

Table 1. DRILLING SUMMARY 1977 - 1980 EMU CAVE E.L. 1197

YEAR	DRILLING METHOD	NO. OF HOLES	TOTAL METRES	CONTRACTOR	RIG TYPE	GEOPHYSICAL LOGGING	AVERAGE M/PER DAY
1977	Percussion	9	1060	Rockdril	Gryphon	1000m.	44
1977	Diamond						
1978	Percussion	13	1863	Rockdril	Gryphon	1801m.	81.45
1978	Diamond	4	456	Glinderman & Kitching	Foxmobile	260m.	8.5
1979	Percussion	2	100	Davis Drilling	Schram	98.6m were logged by Agip using SIE T450 logging unit.	100
1979	Diamond						
1980	Percussion	1	100	Rockdril	Gryphon	100m logged by Geoex.	50
1980	Diamond						

of 2,062m was geophysically logged, both by Agip personnel and by Geoscience Pty. Ltd.; 262m of the diamond and 1800m of percussion drill holes were logged.

Results of this work have been given in the Annual Report for 1978.

5.3 1979

Exploration activities completed during 1979 on E.L. 1197 consisted of percussion drilling with two holes drilled for a total of 100 metres and of downhole geophysical logging totalling 98.6m. No zones of anomalous radioactivity or of reduzate facies sediments were intersected in the drilling programme.

Drilling and geophysical logs have been given in the Annual Report for 1979.

5.4 1980

A total of 100 metres percussion drilling was completed in one hole. This was geophysically logged for natural gamma to 100 metres. The drill-hole intersected a minor radiometric anomaly in a mottled sandstone siltstone sequence at a depth of 65 metres. (refer to Annual Report for 1980).

5.5 1981

Field work during 1981 consisted of survey levelling of 2 line-km across the E.L. by Agip personnel and a subsequent gravity survey which was carried out by contractors Wongela Geophysical Pty. Ltd.

The bouger anomaly profile showed only the normal regional gradient for the area with no additional features to suggest structural complexities within either the pre-Mt. Eclipse Sandstone units or the overlying Mt. Eclipse Sandstone.

The E.L. also formed part of the field work evaluation of the sedimentology of the Ngalia Basin carried out by Dr.B.G. Jones of the University of Wollongong.

In addition, the drill holes data was further evaluated by consultant A.E. Saucier as part of a general study of the sedimentary uranium potential of the Ngalia Basin.

6. CONCLUSIONS

Throughout the drilling programmes only minor anomalous radioactivity was detected mainly in the extreme western portion of the Exploration Licence where the most prospective units of the Mt. Eclipse Sandstone are present.

The gravity survey failed to provide additional structural targets for further drilling assessment.

7. EXPENDITURE

Expenditure incurred on E.L. 1197 from February 1977 to November 1981 was as follows:

Labour	$ 39,727
Purchases	11,673
Drilling & Logging	71,936
Bulldozing	2,206
Geological Studies	4,775
Laboratory Analysis	282
Hire of Equipment	921
Other Services	1,013
Miscellaneous	8,610
Alice Springs Office Costs	19,750
TOTAL:	$ 160,893

Appendix I

Operational Report - Gravity Survey

C.. B. Murano
B. Morris 3.11.81

Wongela Geophysical PTY. LTD.

22 KURRABA ROAD, NORTH SYDNEY, N.S.W. AUSTRALIA 2060

OPERATIONAL REPORT

1981 NGALIA BASIN GRAVITY SURVEYS
NORTHERN TERRITORY

Summary.

Production commenced	-	22nd September, 1981
Production completed	-	26th September, 1981
Days worked in field		5
Calculations		1
Travel days		2
Total ...		8 days
Total stations observed	-	324 (spacing 100 m to 500 m)
Total kilometres of control	-	101.8

Traverse details.

Line	From	To	Stns.	Kms.	Remarks
	S to N				
Emu Cave	22	16	11	2.0	Spacing 200 m
Camel Flat	11	5	11	2.0	Spacing 200 m
Hiraji Bore	100	22	78	19.5	Spacing 250 m
81-1	67	14A	59	22.3	Spacing 250, 500 m
81-2	41	1	41	20.0	Spacing 500 m
81-3	34	1	34	16.5	Spacing 500 m
81-4	20	1	20	1.9	Spacing 100 m
81-5	48	1	48	15.5	Spacing 48-41 500 m 41-21 100 m 21-1 500 m
81-6	22	1	22	2.1	
	Totals		324	101.8	

Personnel - B.S. Riddler Gravity observer
R. Gorter Geologist/assistant

Equipment - LaCoste Romberg Gravity Meter G80
Toyota Landcruiser

Operational Procedure.

The traverses had been previously pegged and levelled by Agip personnel. Stations were observed in closed loops of control either from a base at the Yungarra camp or from sub-bases on traverses tied to the Yungarra camp base.

Reduction of Results.

Gravity.

All gravity readings were reduced in the field and observed gravity differences were calculated relative to the Yungarra camp base. Final observed gravity values used are relative to the BMR station at Central Mount Wedge, assigned a value of 0.00 milligals.

The gravity value of the Yungarra camp base was established relative to Central Mount Wedge in 1980.

Mount Wedge → Yungarra = - 43.62 milligals

Elevation.

Elevations provided by Agip for all lines except those at Emu Cave and Camel Flat are in metres relative to a datum of 0.00 metres at the Central Mount Wedge base which has an elevation of 558.70 metres above AHD. An arbitrary elevation datum has b een used for each of the Emu Cave and Camel Flat lines.

The reduction density used is 2.25 gm/cm^3 and the elevation correction factor is 0.2144 mg/metre.

Reduction of Results contd.

Station locations and Latitude corrections.

The traverse lines were located by Agip personnel. Latitude corrections are based on the 1930 International Ellipsoid, and have been computed by Agip personnel relative to a datum of 0.00 milligals at Central Mount Wedge for the lines 81-1 to 81-6 inc. and Hiraji Bore.

The Mount Wedge latitude is 22° 44' 14" South and the latitude correction is based on a gradient of 0.579 mg/km computed using this latitude value.

An arbitrary datum for the latitude correction has been used for the lines at Emu Cave and Camel Flat.

Presentation of Results.

The survey results are presented as Bouguer anomaly and elevation profiles at a horizontal scale of 1:10 000 for Emu Cave, Camel Flat and Lines 81-4, 81-6 and a small portion of 81-5. Hiraji Bore and Lines 81-1, 81-2, 81-3 and 81-5 are presented at a horizontal scale of 1:50 000.

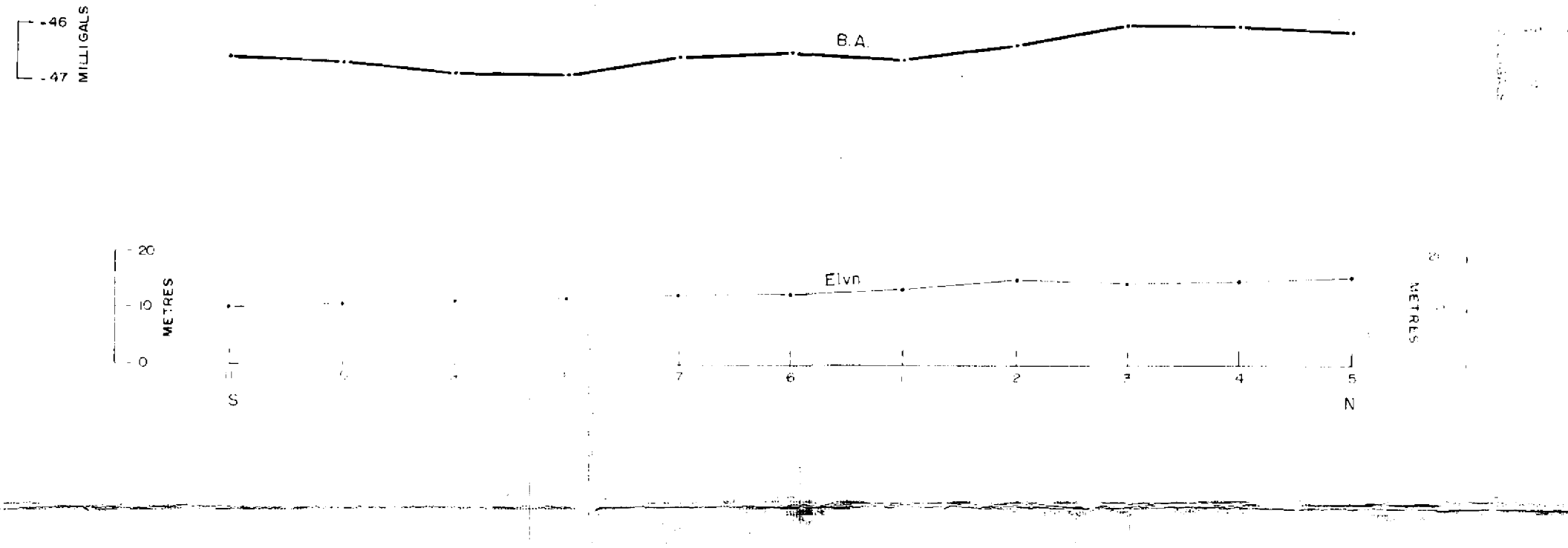
The vertical scales are: 1 milligal = 1 cm
10 metres = 1 cm

Lindsay N. Ingall

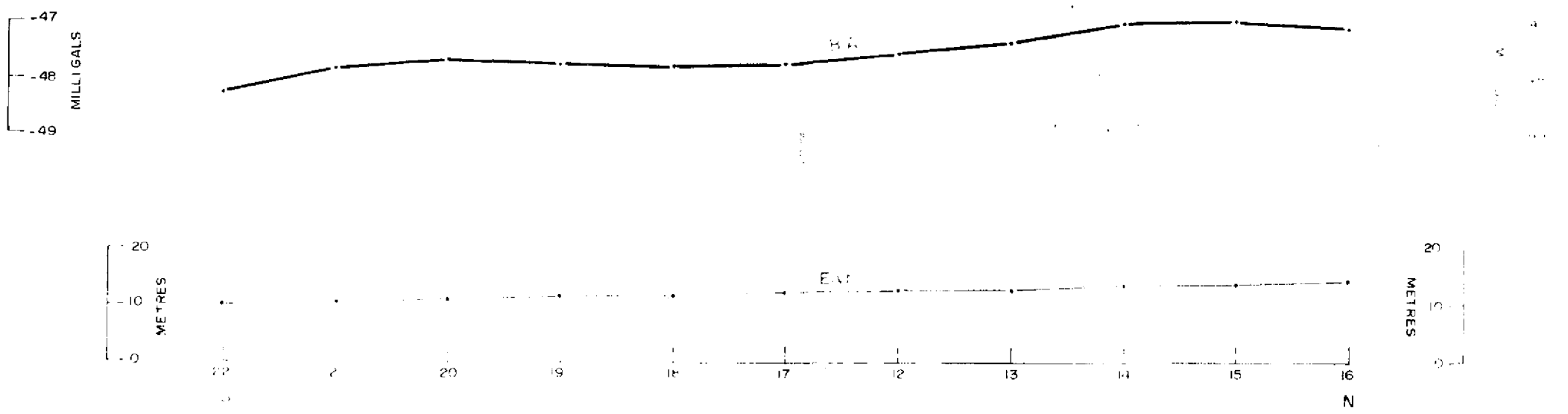
Geophysicist.

October 1981.

CAMEL FLAT



EMU CAVE SOUTH



AGIP AUSTRALIA PTY. LTD.

GRAVITY SURVEY 1981

WESTERN NGALIA BASIN

NORTHERN TERRITORY

CAMEL FLAT AREA – E.L. 1200
EMU CAVE SOUTH AREA – E.L. 1197

BOUGUER ANOMALY & ELEVATION PROFILES

DENSITY : 2·25 gm/cm³

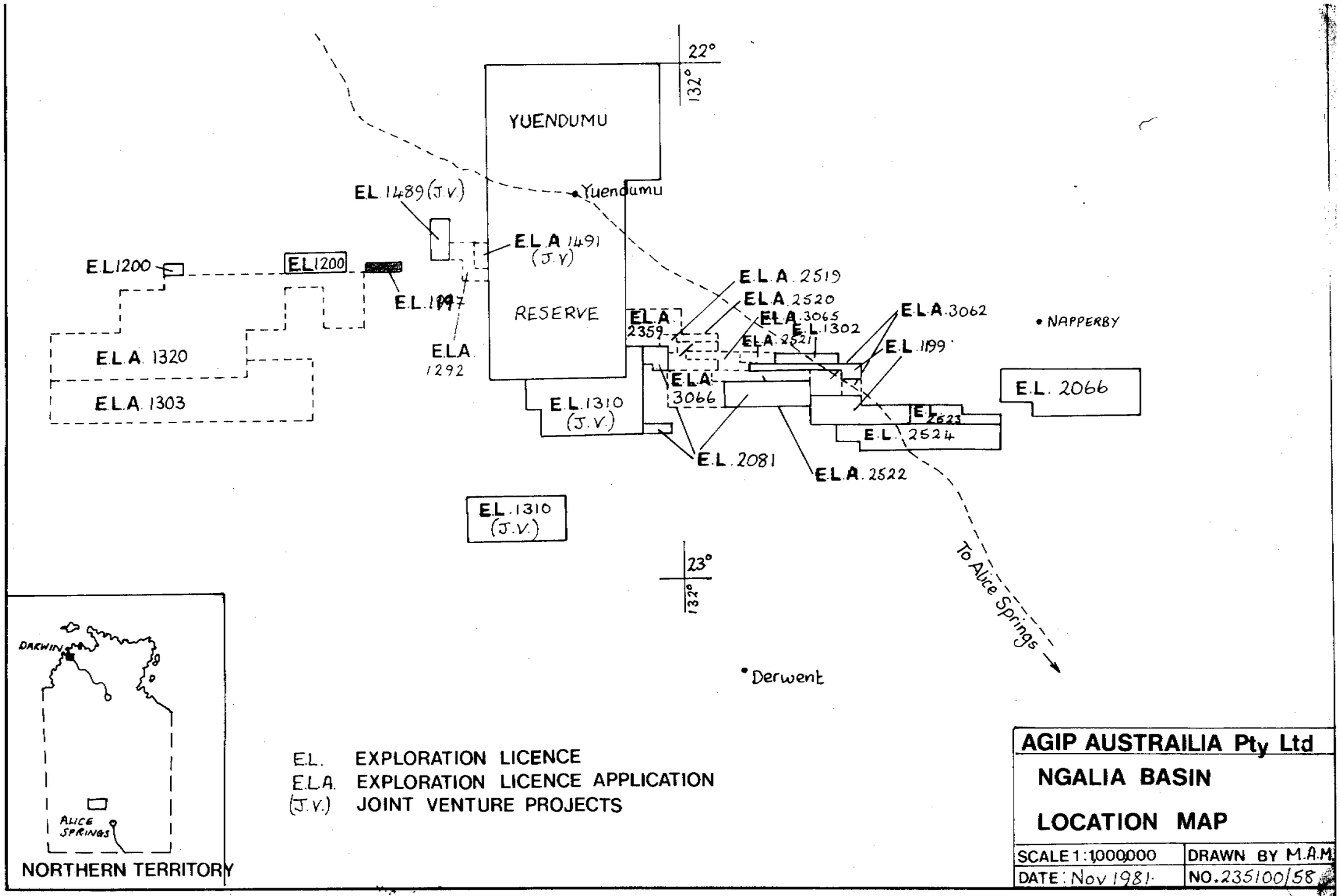
DATUM : Arbitrary

HORIZONTAL SCALE 1 : 10,000

VERTICAL SCALE : 10 mm = 1 Milligal
10 mm = 10 Metres

[illegible] GEOPHYSICAL PTY LTD. [illegible]

Appendix 1: Plan 1
CR 1982-0014


22°
132°
YUENDUMU
Yuendumu
EL 1489 (J.V.)
ELA 1491 (J.V.)
EL 1200
EL 1200
EL 1197
ELA 1292
RESERVE
ELA 1320
ELA 1303
ELA 2519
ELA 2520
ELA 3065
EL 1302
ELA 2521
ELA 2359
ELA 3062
EL 199
NAPPERBY
ELA 3066
EL 1310 (J.V.)
EL 2066
EL 2623
EL 2524
EL 2081
ELA 2522
EL 1310 (J.V.)
23°
132°
To Alice Springs
Derwent
DARWIN
ALICE SPRINGS
NORTHERN TERRITORY
E.L. EXPLORATION LICENCE
E.L.A. EXPLORATION LICENCE APPLICATION
(J.V.) JOINT VENTURE PROJECTS
AGIP AUSTRAILIA Pty Ltd
NGALIA BASIN
LOCATION MAP
SCALE 1:1,000,000
DRAWN BY M.A.M.
DATE: Nov 1981
NO. 235100/58

CR1982-0014

AREA_B

AREA_A

EL 1197

131°20'15"
-22°22'47"

131°26'16"
-22°22'23"

9820 N
8820 N
7820 N
6820 N
5820 N
4820 N
3820 N
2820 N
1820 N
820 N

2000 E
4000 E
6000 E
8000 E
10 000 E
12 000 E
14 000 E
16 000 E
18 000 E
20 000 E
22 000 E
24 000 E

M.N.

REFERENCE

- Cz — Quaternary (Undifferentiated)
- Pzt — Mount Eclipse Sandstone (Undifferentiated)
- Ptv — Kerridy Sandstone
- Ptd — Djagamara Formation
- Ptb — Bloodwood Formation
- Ptw — Wolbiri Dolomite
- Ptu — Yuendumu Sandstone
- Ptmq — Mount Doreen Formation
- Ptw/Ptt — Vaughton Springs Quartzite / Trauer Member
- pCp — Patmungala Beds
- pCg — Granite
- Quartz veins
- NOD NT 80-1 — Petrological sample.

Dip and strike of bedding
F—F Fault line
Anticline
Syncline
Lineament
Photo centre
Geological Boundary
Track
Seismic Line
Creek
Fence
E.L. Boundary, (approximate)

Relinquished Area (1979)*

*Boundaries are plotted on a distorted photo base map

NORTHERN TERRITORY
Darwin
Alice Springs

SHEET INDEX

22° 22·5'
151° 90'

Fig 2

Agip Nucleare Australia pty. ltd. — Sydney, N.S.W.

PROJECT: EMU CAVE N.T. E.L. 1197

TITLE: Geological Base Map & Drill Hole Locations

Geologist:	N. SCRIVEN		
Drawing No.:	1197/	Scale:	1:25,000
Date:		Drawn by:	C.S.

OR 1982-004

131° 25'

131° 30'

131° 35'

22° 20'

22° 25'

Clay Pan

Section II Anomaly

Section I

Line O.P.

SCALE 1: 46,300

5 0 1 2 3 4 5 6 7 8 9

Kilometres

LEGEND

- Qa — Alluvium
- Qs — Sand, Sand dunes
- Qr — Red soil, alluvium
- Qt — Salt pans and evaporites
- Cz — Silcrete, ferricrete
- Pzt — Mt Eclipse Sandstone, undifferentiated
- pfg — Granite (Pre-Cambrian)
- Quartz veins
- Geological boundary, position accurate
- Geological boundary, position approximate
- Geological boundary, position inferred
- F—F Fault, position accurate
- F— —F Fault, position inferred
- Anticlinal axis, with plunge
- Synclinal axis, with plunge
- Strike with angle of dip
- Strike with angle of overturned dip
- Trend of bedding
- Photo centres
- Drainage channels, creeks
- Road
- Track
- Fence
- ⊗ 422 Shot hole
- E.L. Boundary approximate

NORTHERN TERRITORY

Darwin

Birdum

Alice Springs

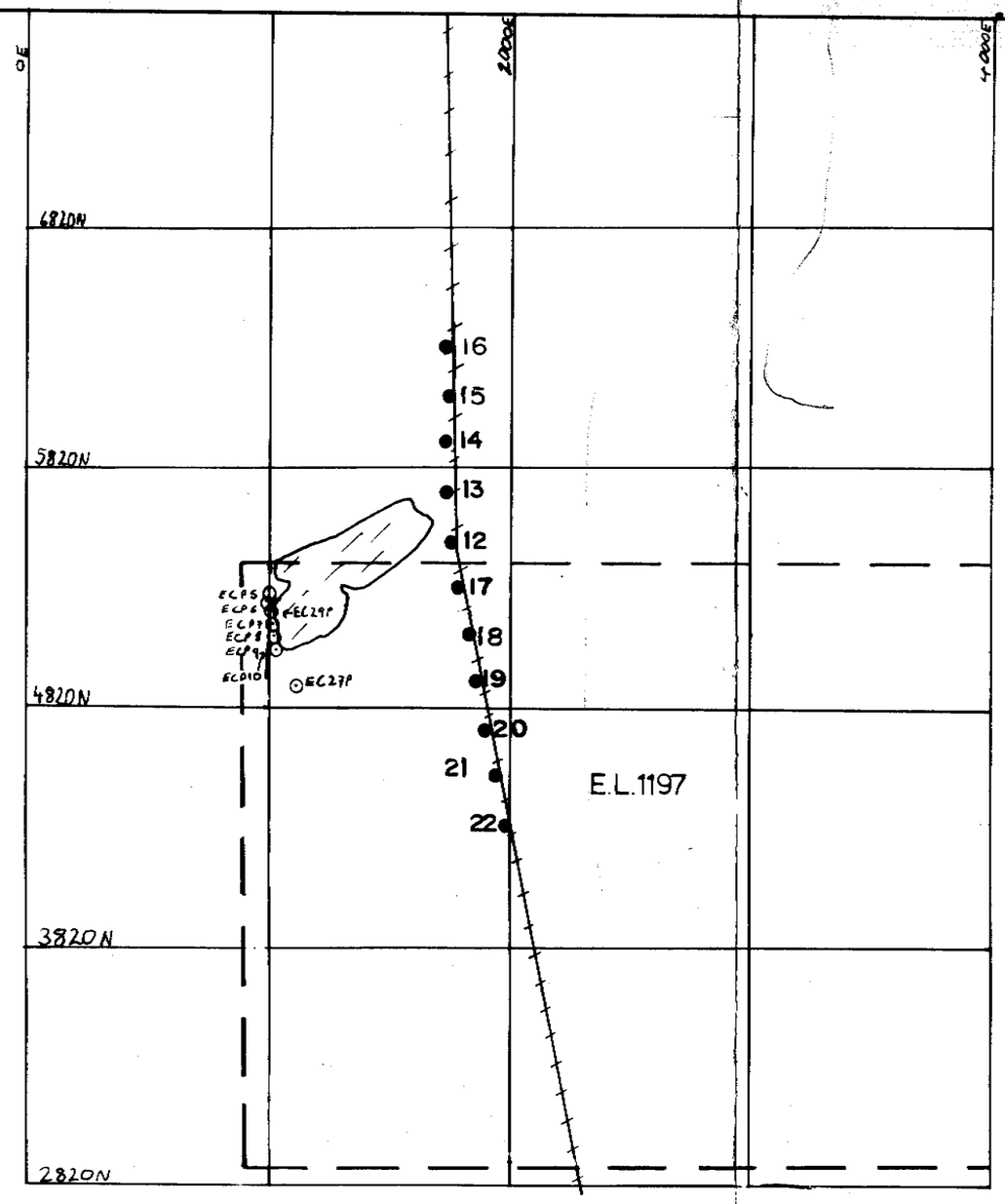
AGIP NUCLEARE AUSTRALIA PTY. LTD. — Sydney - N.S.W.

PROJECT: EMU CAVE EL. 1197

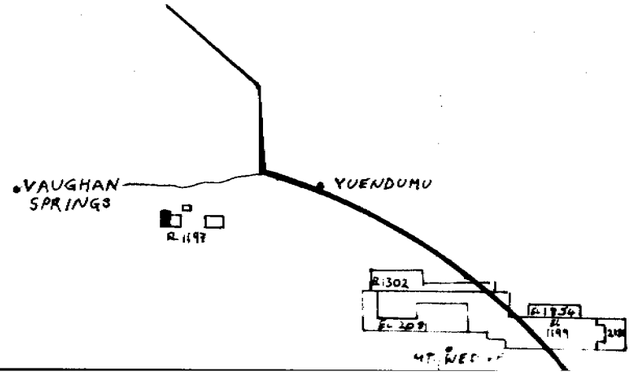
TITLE: Geological Base Map

Geologist: R. VOOYS	
Drawing No.: 1197.2	**Scale:** 1:46,300 approx.
Date: 28.4.1977	**Drawn By:** E.B.

CR1982-0014



LOCATION DIAGRAM



LEGEND

fence

approximate E.L. boundary

12● gravity stn. & number

EC27P⊙ drill hole & number

outcrop

CR1982-0014

Agip Australia pty. ltd.

EMU CAVE GRAVITY LINE 1981

E L 1197

Map No. 1197/14

GEOLOGIST: RMG	SCALE: 1:25,000