

Date: 16 June 1992
Ref: R25.92

**REPORT ON EXPLORATION ACTIVITIES
FLAT TOP HILL
EL 5659
FOR YEAR TO 21 MAY 1992
VICTORIA RIVER DOWNS - DALY WATERS
1:250,000 SHEET AREAS
NORTHERN TERRITORY**

by

R W A Crowe

**Licence Holders:
Ross Wilson Armfield &
Terrence Royle McNair**

CR 92 / 359

For: Licence Holders (1)
Department of Mines & Energy, Northern Territory (1)

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Signed:



**R W A Crowe
Director**

Received
24/6/92
0800 hrs
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SUMMARY

Work for the 1991-1992 year on EL 5659 has consisted of a landsat and air photo study to identify prospective targets, followed by two field visits and collection of bulk samples for evaluation in Perth.

CONTENTS

SUMMARY

- 1.0 INTRODUCTION
- 2.0 LICENCE ADMINISTRATION
- 3.0 FIELDWORK CONDUCTED ON THE AREA
 - 3.1 20 September to 8 October 1991 Field Trip
 - 3.2 21 April to 12 May 1992 Field Trip
- 4.0 AIR PHOTOGRAPH AND SATELITTE IMAGE STUDY
- 5.0 CONCLUSION

REFERENCES

FIGURES

- Figure 1 Location of EL 5659

PLATES

- Plate 1 Typical low breakaway outcrops of Mullaman Beds: the cover rock in EL 5659
- Plate 2 Close-up view of Cretaceous Mullaman Beds. Opal is expected close to the buried contact with Montiginni Limestone.
- Plate 3 Creek-sediment collection site
- Plate 4 Auger-sample site for bulk collection
- Plate 5 Landsat image of prospect area containing EL 5659. The main road is visible in the image which shows the outline of the area shown in Appendix 1.

APPENDICES

- APPENDIX 1 Air photograph and Landsat Interpretation
Top Springs Area, Northern Territory
by R Russell & Associates

1.0 INTRODUCTION

EL 5659 was applied for following a rumour of semi-precious stones that had been discovered in a drilling survey some 10-15 years previously. In the first year of the licence, reconnaissance strips were made to the area to assess the similarity to the rumoured description of the area by drillers (see Crowe, 1990). In addition, detailed literature searches were made to locate previous information relating to the area and recommendations were made for further reconnaissance work in the licence, and a shallow auger drilling survey. This work highlighted an area of interest around Pussy Cat Bore as the most likely place for follow up work.

The second year of activity concentrated on assessing the general potential of the area by making comparison to the opal fields at Coober Pedy and several site visits to assess the targets on the ground.

This report records the further work conducted on the lease for the year to 21 May 1992 and contains recommendations for further work.

2.0 LICENCE ADMINISTRATION

Exploration Licence 5659 for the year under review consisted of 28 graticular blocks as shown in Figure 1.

In accordance with the regulations controlling Exploration Licences in the Northern Territory the area of the licence has now been reduced to 14 graticular blocks around the main zone of interest. A map showing this area will be received from the Mines Department, once the current report has been reviewed.

3.0 FIELDWORK CONDUCTED ON THE AREA

3.1 20 September to 8 October 1991 Field Trip

A field trip was undertaken between 20 September to 8 October 1991 by one of the licence owners travelling from Perth. The purpose of the trip was to reconoitier suitable sample sites, collect some surface samples by shovel, and pan-off concentrates for examination in Perth. A second purpose of the trip was to reconoitier all areas that were due for drop-off in the following Autumn. No precious stones were found either within the area being retained, or the area being dropped off.

3.2 21 April to 12 May 1992 Field Trip

A second field trip was made to the licence area during late April to early May 1992, by both licence holders. The purpose of this trip was to collect bulk samples for evaluation in Perth. Following the identification of target areas from an air photograph study conducted by an independent consultant (see below), targets were sampled with an auger and bulk composites made up. These composites have now been transported back to Perth and from them heavy mineral concentrates will be prepared, and the samples examined for any precious or semi-precious stones. No results from this evaluation are yet available.



Plate 1 Typical low breakaway outcrops of Mullaman Beds; the cover rock in EL 5659



Plate 2 Close-up view of Cretaceous Mullaman Beds. Opal is expected close to the buried contact with Montiginni Limestone.



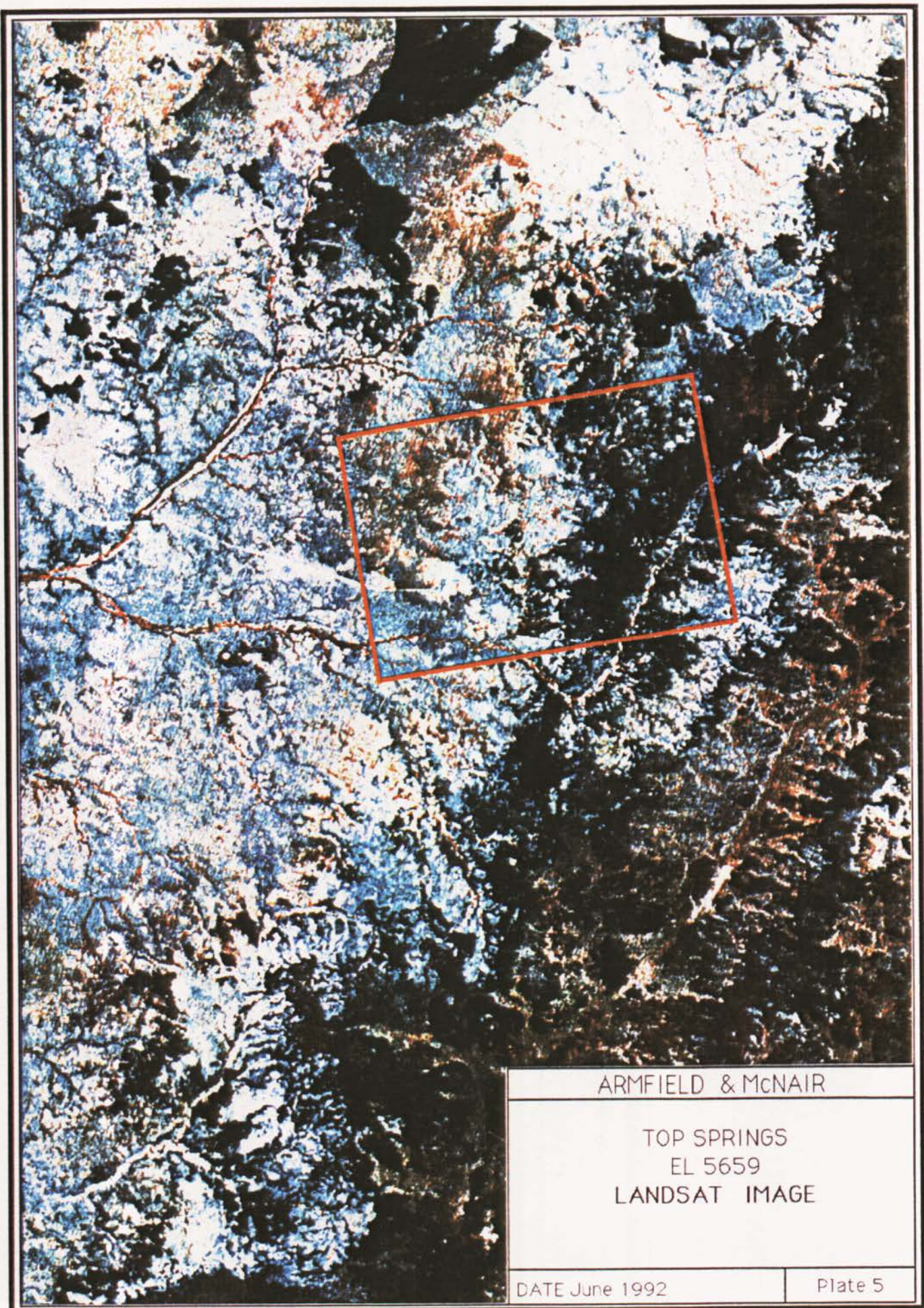
Plate 3

Creek-sediment
collection site

Plate 4 (below)

Auger-sample site for
bulk composite





ARMPFIELD & McNAIR

TOP SPRINGS
EL 5659
LANDSAT IMAGE

DATE June 1992

Plate 5

4.0 AIR PHOTOGRAPH AND SATELLITE IMAGE STUDY

An air photograph and Landsat interpretation was commissioned for the Top Springs area from R Russell & Associates and a copy is appended (Appendix 1). The study identified a number of targets for opal and other precious stones, but the details of these locations have been withheld from the consultants report for strategic reasons at present. Details will be released when the various targets have all been followed up.

5.0 CONCLUSION

Although the various field trips conducted on EL 5659 have as yet failed to discover any precious or semi-precious stones on the licence area which might confirm the original rumour of a discovery in that area, the studies have confirmed the general prospectivity of the licences and it is the intention of the licence holders to continue their exploration effort. The next round of exploration will involve deeper drilling which should access the targets beneath the surface Mullaman Beds. This appears to be acting as cover for all of the targets in the area meaning that they are effectively blind. Therefore, the lack of confirmation from the surface and auger sampling conducted so far may not necessarily have written off the targets.

REFERENCES

- Crowe, R W A, 1991, Report on Exploration Activities Flat Top Hill EL 5659 for Year to 21 May 1991, Victoria River Downs - Daly Waters, 1:250,000 Sheet Areas, Northern Territory, R27.91
- Crowe, R W A, 1990, Report on Exploration Activities Flat Top Hill EL 5659 for Year to 21 May 1990, Victoria River Downs - Daly Waters, 1:250,000 Sheet Areas, Northern Territory, R40.90

APPENDIX 1

**Air photograph and Landsat Interpretation
Top Springs Area, Northern Territory
by
R Russell & Associates**

R. Russell and Associates
11 Mertz Court,
Hillarys W.A. 6025
Ph. (09) 401 0807

10th April 1992

Attn: Ross Armfield

Re: Air Photograph and Landsat Interpretation,
Top Springs Area, Northern Territory.

1 THE MAPS

I have completed the air photo and Landsat interpretations of the Top Springs area and the photo-maps are enclosed.

1.1 Landsat Image and Interpretation

Our image is a 1:250,000 MSS photo dating from 16th July '83. The quality is very good. I have marked the Top Springs exploration area on the photo. The image is useful for giving a regional picture of the area which is not possible to get from the air photos and hard to get from the maps. The Landsat map is included at the rear of these notes as Enclosure 1.

The most important points from the map are as follows:

- i) Palaeo drainage on the old land surface. The Tertiary land surface to the east of the Exploration area once carried an extensive dendritic drainage system which is now completely silted up. The trunk stream flows westward about 50km to the south of Top Springs. The westward end of this channel lies just off the edge of the Landsat and the 1:250,000 maps. From the 1:2.5 million maps the channel appears to end at a breakaway on the edge of the Cretaceous rocks near Mt. Williams. I recommend a) locating the eroding channel (phase 1 exploration) and b) sampling the gravels (phase 2). These gravels are a great opportunity for sampling a huge area: the heavy mineral concentrate from the gravels will give a sort of summary of any mineralisation in the vast palaeo-catchment to the east. The rocks are quite young so I guess the prospects are not that good (the rocks probably cover the orebodies). Nevertheless, the diamond pipes at Ellendale (for example) are about the same age as the surface (Miocene). If any of these are in the area, we should pick them up in the palaeochannel.
- ii) West-northwest Faulting and Arching. A major northwest trending fault crosses the Landsat image 45km north of the Top Springs area. Movement on the fault is probably Proterozoic (older than 600my): the fault zone is buried

even by the Cambrian rocks. However, recent (post 30my) arching has occurred along the fault to give the unusual erosional patterns along the trend of the fault. If any diamond bearing intrusions occur in this area, they have probably been directed up the fault. The surface arch would therefore be the place to start looking for heavy mineral indicator minerals (HMI's). A couple of the creeks that cross the arch may be worth sampling as shown on the map.

- iii) Recent Arching has occurred to the east of the Armstrong Fault (name given here) in the project area and on a parallel trend to the southeast. In fact, erosion along the scarp of the Tertiary Land Surface shows that general uplift has occurred to the south of the exploration area (notice how fresh the erosion along the southern scarp is compared to the scarp to the north which is relatively 'dead'). This arching is probably not significant in our mineral search.
- iv) The Deep Weathered Zones along the exposed Cretaceous outcrop in the exploration area show as light areas against a blue background. It is these patches that we think are most prospective for opals (see air photo section). On this basis, four other good areas for opals can be mapped from the Landsat (Areas A, B, C and D).

1.2 Air Photographs

The central part of the map is interpreted in stereo. I have included the mono interpretation (no stereo overlap) on the left and right edges of the map so the mapping here is less accurate. The photos are of good quality. The scale at 1:50,000 is a little small for our purposes although I realize we were lucky to get our hands on them in the first place. It's no problem to see everything, its just a problem getting it onto the map!

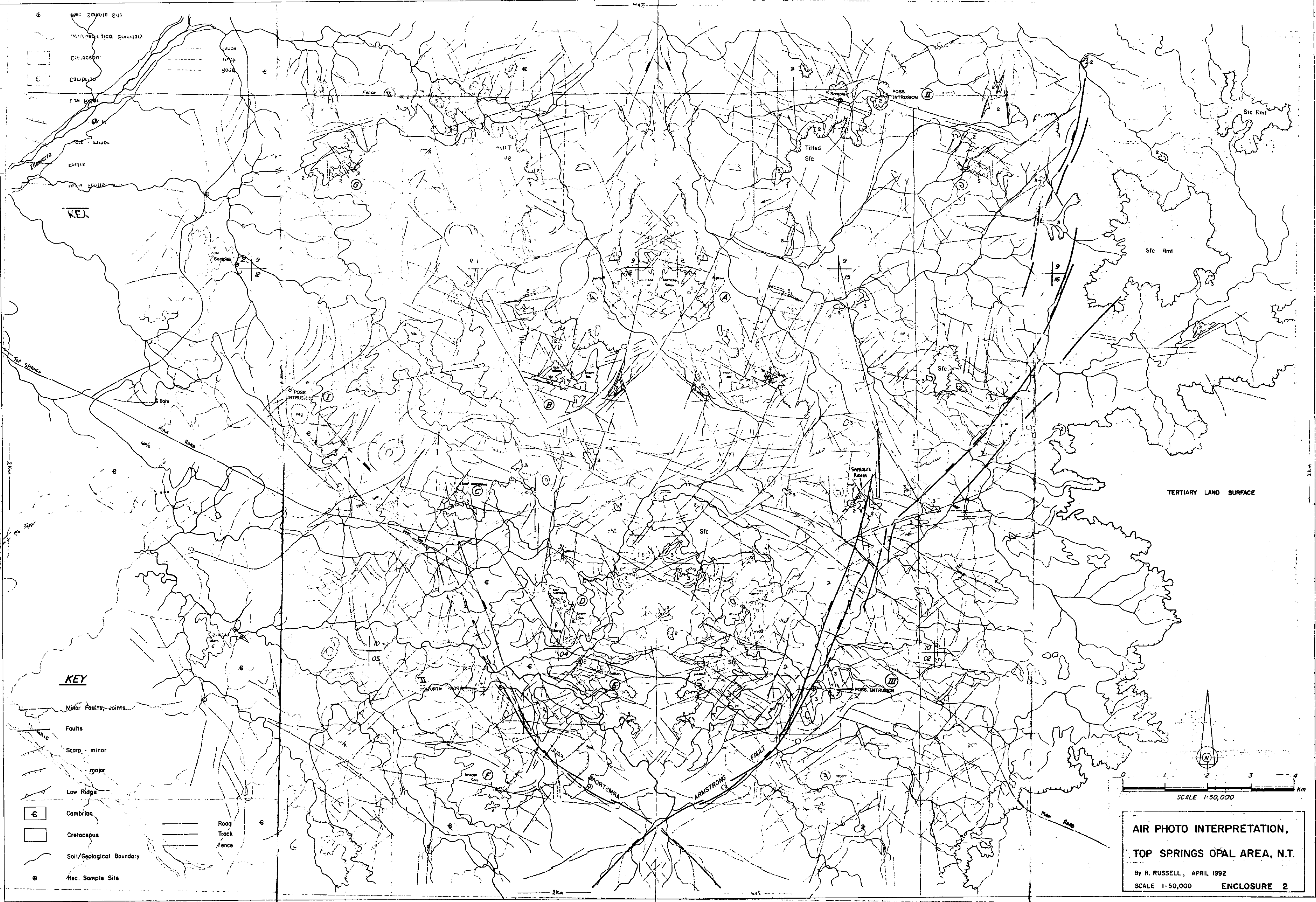
I have gridded the map with a 2km square grid. I am not sure of the north-south/east-west accuracy of the grid lines. Navigation will be difficult especially in the western parts of the area. Locating yourselves accurately on the ground relative to the map will be a problem and I hope the grid helps a bit.

2 THE GEOLOGY

Structurally the area is dominated by the big northeast trending fault (termed the "Armstrong Fault" here) and the rugged Cretaceous rocks surrounding it. The fault line has been eroded out by the headwaters of the Armstrong River. The Cretaceous rocks erosionally pinch out towards the west where the Cambrian sequence is exposed. A modern erosion wave is working back eastward up the Armstrong catchment.

I have resisted the temptation to clutter the map with too much stratigraphic information but important aspects of the Cretaceous are as follows:

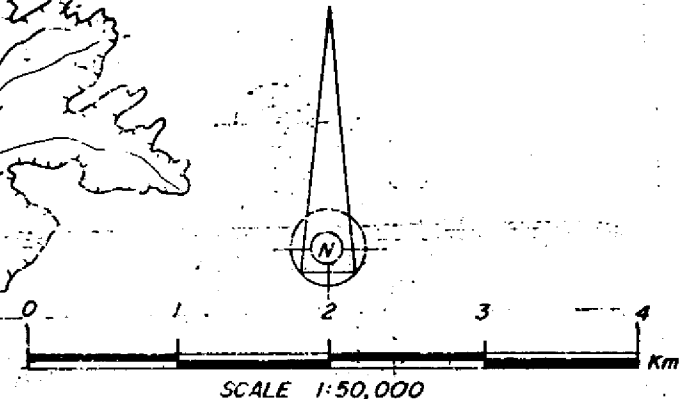
- i) The Cretaceous is cut flat in the east by an older land surface (probably the 'Wave Hill' land surface, about Miocene age; + 22 my old). This surface is probably the key to the formation of the opals in the area. The long term leaching of the silica from the surface rocks and the precipitation in lower horizons where the water table has been at a more or less constant level would favour the formation of opals.
- ii) The 'Tertiary' deposits in the area are actually weathered products of the Cretaceous (Mullaman Beds) and are not really a depositional unit in their own right. The 'rubbly ironstone' described in the 'Notes to Accompany Daly Waters Sheet' is a pretty accurate description of what is seen on the photographs especially around the Armstrong Fault zone.
- iii) The upper parts of the Cretaceous (Mullaman Beds) are resistant to erosion and appear to be quite siliceous. These are probably the rocks you have brought back and appear on the photograph you took. They look good for opal: porcellinized and with a fair amount of silica. It just depends on how mobile the silica has been in the past. Apart from silica, iron, glauconite and other mobile minerals have probably also leached out to form the thick saprolite layers we see below the Tertiary weathering cap. Therefore, it does not necessarily follow that opal occurs in this precipitate zone. I guess these Cretaceous rocks are shallow marine siltstones and sandstones.
- iv) The lower part of the Cretaceous appears to be more fine grained and erodes more easily. It is possible that these rocks could be marginal marine deposits related to the advancing Cretaceous sea. I suspect that our best chances for opals may be in two environments: at the base of the Tertiary weathering profile and along the contact between the 'upper' and 'lower' beds. At Govt. Bore 14 (location 'D'), the upper Cretaceous has been removed by erosion exposing a bleached horizon which may represent some sort of bedding plane or stratigraphic contact along which the opal gels have been formed. Other areas where this scenario is repeated are listed from A to G. (See paragraph 3).
- v) Soil from the eroding Cretaceous blurs the contact with the Cambrian so the mapped contact between the two units is very approximate.



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KEY

- Minor Faults, joints
- Faults
- Scarp - minor
- major
- Low Ridge
- Cambrina
- Cretaceous
- Soil/Geological Boundary
- Rec. Sample Site
- Road
- Track
- Fence



AIR PHOTO INTERPRETATION,
TOP SPRINGS OPAL AREA, N.T.
 By R. RUSSELL, APRIL 1992
 SCALE 1:50,000 **ENCLOSURE 2**