PROSPECT 8574

CSR LIMITED

MINERALS EXPLORATION AND DEVELOPMENT GROUP

EXPLORATION LICENCE 4560
MOUNT TOLMER, NORTHERN TERRITORY
DARWIN 1:250,000 SHEET SD 52-8
ANNUAL REPORT
YEAR ENDED NOVEMBER 21, 1985

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KEYWORDS

MOUNT TOLMER	URANIUM
EL 4560	GOLD
NORTHERN TERRITORY	COPPER
SD 52-8	SILVER
GEOCHEMISTRY	STREAM SEDIMENT
WATERHOUSE COMPLEX	ROCK-CHIP

1. SUMMARY

CSR Limited conducted a geochemical exploration programme over Exploration Licence 4560 (Mt. Tolmer) following the discovery of gold within quartz-hematite in the Rum Jungle area. The programme comprised stream sediment sampling, and rock-chip sampling of prospective outcrops.

Analysis of bulk gold stream sediment samples did not produce gold values greater than 0.05 ppm Au. Results from rock-chip samples were also discouraging and no further work for gold was recommended.

2. INTRODUCTION

This report documents the results of a reconnaissance exploration programme carried out by CSR Limited within EL 4560 (Mt. Tolmer).

Title to the area was acquired as part of a reconnaissance exploration programme to examine a number of gold occurrences in the Rum Jungle/Waterhouse area.

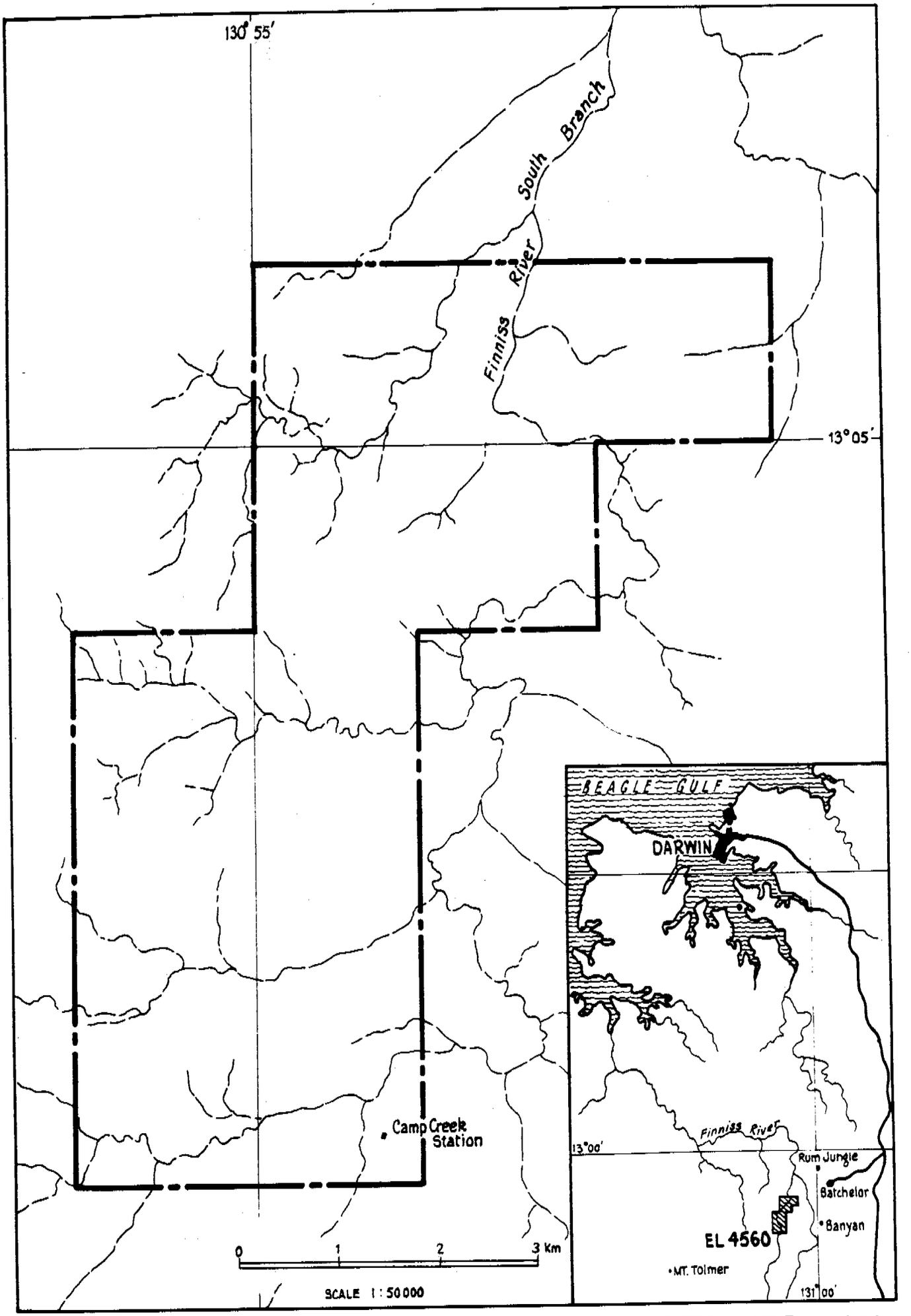

FIG. 1 LOCATION PLAN E.L.4560 MOUNT TOLMER N.T.

3. LOCATION, ACCESS AND TOPOGRAPHY

EL 4560 is located approximately 100 km southeast of Darwin and some 10 km southwest of Batchelor (Figure 1).

Access to the Licence is by sealed all-weather road from Darwin to Batchelor, and then south along unsealed roads to Banyan and Camp Creek stations. Station tracks provide vehicle access within the Licence.

The topography of EL 4560 is relatively flat with an average elevation of approximately 100 metres. Mount Tolmer, after which the Licence is named, is located 22 km to the west of the Licence. Although the area covered by EL 4560 is relatively flat, a plateau rises up to 200 m just to the west of the Licence and many of the creeks which traverse the Licence have their headwaters on the edge of the plateau. These creeks may be incised by up to three metres indicating that active sediments were sampled during the stream sediment sampling programme.

4. TENEMENT

Exploration Licence 4560, covering an area of 35 km^2, or 11 blocks, was granted to CSR Limited on November 22, 1984 for a period of six years.

The northern part of EL 4560 covers freehold land in the Hundred of Goyder, while the southern part covers an Agricultural Lease in the Hundred of Waterhouse.

Exploration Licence 4560 is described as follows:

"All that piece or parcel of land in the Northern Territory of Australia containing an area of 35 square kilometres more or less, the boundaries of which are described as follows, subject to all applications for mining tenements granted or registered and all reserves included within the definition of 'reserve' in Section 7 of the Mining Act 1980.

Commencing at the intersection of latitude 13°04' south with longtitude 130°58' east, thence proceeding south to the intersection of latitude 13°05' south with longitude 130°58' east, thence proceeding west to the intersection of latitude 13°05' south with longitude 130°57' east, thence proceeding south to the intersection of latitude 13°06' south with longitude 130°57' east, thence proceeding west to the intersection of latitude 13°06' south with longitude 130°56' east, thence proceeding south to the intersection of 13°09' south with longitude 130°56' east, thence proceeding west to the intersection of 13°09' south with longitude 130°54' east, thence proceeding north to the intersection of latitude 13°06' south with longitude 130°54' east, thence proceeding east

to the intersection of latitude 13°06' south with longitude 130°55' east, thence proceeding north to the intersection of latitude 13°04' south with longitude 130°55' east, thence proceeding east to the point of commencement at the intersection of latitude 13°04' south and longitude 130°58' east."

5. PREVIOUS EXPLORATION

Exploration Licence 4560 is located 20 km from Rum Jungle. Since the discovery of Whites uranium deposit in 1949 there has been substantial exploration in the region.

During the early 1950's, both the Bureau of Mineral Resources and Territory Enterprises (a subsidiary of what is now CRA) undertook considerable exploration in the region which led to the discovery of the Rum Jungle uranium and base metal deposits (Frazer, 1980). During the period 1955 to 1971, the area was subject to regional and detailed exploration including stream sediment sampling and mapping.

In 1977, Uranerz Australia Pty. Ltd. (UAL) commenced exploration in the Rum Jungle/Waterhouse areas. The principle target was vein-type uranium deposits. UAL held numerous exploration licences, most of which were to the west and southwest of the Rum Jungle and Waterhouse Complexes. The exploration results are summarised in numerous reports, in particular those relating to EL 1298 which covered EL 4560. The work documented by the reports included geological research, airborne radiometric and magnetic surveys, electromagnetic, gravity and IP surveys, geological mapping, rotary air blast drilling, costeaning, and percussion and diamond drilling. Soil gases, including radon and helium, were also tested (Pagel, 1984).

The exploration by UAL led to some significant but small uranium discoveries, many of which showed an association with anomalous copper values. UAL's work included very little gold assaying, although the results from the diamond drilled core that was assayed for gold were negative. UAL's exploration was directed towards discovery of uranium mineralisation, and is detailed in numerous unpublished Uranerz company reports by Coles (1982) and (1983) and Pagel (1983).

TABLE 1 : STRATIGRAPHY OF THE RUM JUNGLE AREA

AGE	GROUP	FORMATION	LITHOGIES
MIDDLE PROTEROZOIC	Katherine River Group	Depot Creek Sandstone	Massive cross-bedded quartz sandstone with pebble bands
			Unconformity
LOWER PROTEROZOIC	Finniss River Group	Burrell Creek Formation	Siltstone, shale and greywacke
	South Alligator Group	Mount Bonnie Formation	Ferruginous siltstone, carbonaceous siltstone, shale, phyllite, argillite and tuff
		Gerowie Tuff	Chert, tuff, argillite, tuffaceous greywacke, chert nodules and bands, and iron formations
		Koolpin Formation	Ferruginous siltstone with chert bands, pyritic carbonaceous shale, silicified dolomite and banded iron formation
			Unconformity
	Mount Partridge Group	Whites Formation	Dolomite, pyritic and carbonaceous shale, minor quartzite and calc-silicate rocks
		Coomalie Dolomite	Dolomite, magnesite, dolomite breccia, tremolite schist, algal structures and evaporitic pseudomorphs
		Crater Formation	Feldspathic sandstone, conglomerate, siltstone
			Unconformity
	Namoona Group	Celia Dolomite	Dolomite, magnesite, silicified or with algal structures, minor sandstone, arkose and carbonaceous sediments
		Beestons Formation	Arkose, conglomerate, siltstone
			Unconformity
ARCHEAN		Waterhouse/ Rum Jungle Complex	Leucocratic granite, gneiss, migmatite, meta-diorite and banded iron formation

6. REGIONAL GEOLOGY

EL 4560 is located on the presently exposed western side of the Pine Creek Geosyncline which comprises rocks of Lower Proterozoic age covering some 40,000 km^2. The geology of the geosyncline has been described by numerous authors and in detail by Walpole et al (1968) and more recently by Needham et al (1980) and (1984). A more detailed geology of the Rum Jungle area has been given by Pagel et al (1984) and by Berkman et al (1980). The geology of the Rum Jungle Uranium field has been described by Frazer (1980).

The stratigraphy of the region is summarised on Table 1.

6.1 Basement Geology

The oldest known rocks in the Pine Creek Geosyncline are represented by Archean granitic complexes which have been dated at 2.5 billion years (Page et al, 1980). The complexes include, in the west, the Rum Jungle and Waterhouse Complexes, and in the east, by the Nanambu Complex. These complexes are typical of high-grade Archean crustal basement and include banded iron formation (Rhodes, 1965).

6.2 Lower Proterozoic Sedimentation

The Archean basement was subject to erosion before the commencement of sedimentation during early Proterozoic times.

The Namoona Group forms the lowest known unit of the Lower Proterozoic sediments and comprises mainly shallow marine sediments including ripple-marked sandstone, arkose and conglomerate. With maturity of this shallow marine environment, massive evaporitic deposits were formed. These units are represented by

the Beestons Formation and the Celia Dolomite respectively, in the area around EL 4560. East of the Rum Jungle area, this sequence is represented by carbonaceous siltstone of the Masson Formation.

The top of the Namoona Group was marked by a hiatus in sedimentation and minor volcanism. Sedimentation re-commenced in extensive alluvial fan systems and resulted in the deposition of the Crater Formation which comprises mostly sandstone and conglomerate. As the depositional environment matured, massive dolomite was deposited as evaporites and stromatolitic carbonate shelf facies, now represented by the Coomalie Dolomite and the Whites Formation in the Rum Jungle area. These units host the known uranium occurrences in the area.

The top of the Mount Partridge Group is marked by an unconformity reflecting cessation of sedimentation with the maturing of the depositional environment. The South Alligator Group which overlies this Group thins towards the Rum Jungle area, and is characterised by distinctive iron-rich sediments, carbonates and tuffs. The Koolpin Formation is characterised by carbonaceous mudstone with less important iron-rich facies, siltstone and limestone. The Gerowie Tuff comprises beds of chert, tuffaceous mudstone and carbonaceous mudstone. The uppermost unit within the South Alligator Group is the Mount Bonnie Formation marking the start of the Finniss River Group which comprises flyschoidal sediments dominated by greywacke. Nicholson et al (1984) provides a detailed description of the South Alligator Group.

This sedimentary sequence was then intruded at 1800 m.y. by the Zamu Dolerite after which regional metamorphism took place. Granite intrusions with associated broad folding occurred in the period

1800-1730 m.y. Stuart-Smith et al (1984) suggests that the volcanics of the El Sherana and Edith River Groups were deposited at the late stage of this granite intrusion.

6.3 Cover Rocks

The whole of the Pine Creek Geosyncline was subject to extensive erosion and peneplanation prior to the deposition of a series of fluvialtile sandstones and volcanics of the Katherine River and Tolmer Groups. These are represented in the Rum Jungle area by the Depot Creek Sandstone.

7. DETAILED GEOLOGY OF EL 4560

As detailed geological mapping of the area covered by EL 4560 was carried out by Uranerz, CSR Limited did not undertake further geological mapping. The UAL mapping is plotted at scales of 1:4000 and 1:2000 on the Riverside area map (Coles, 1983).

EL 4560 is located on the west side of the Waterhouse Complex and is underlain in the east by the Coomalie Dolomite, while in the west a sericitic schist dominates. The area is structurally complex with numerous tectonic breccias, shears and down-faulted blocks.

The Riverside anomalous zone extends for 6 km of strike length within silicified brecciated dolomite and schist. Originally, uranium was found within this zone in a copper-arsenic-uranium association. Brecciation is common although it varies in intensity along strike and UAL has termed this tectonic brecciation. Coles (1983) noted the presence of significant cavities near the dolomite and sericite schist contact and also the presence of nearby hematite quartz breccias associated with the Depot Creek Sandstone Member.

8. EXPLORATION CONCEPTS AND RESULTS

8.1 Exploration Concept

In 1979, Pancontinental discovered a gold occurrence, in a hematitie quartz breccia (HQB), known as the Sundance Prospect near Batchelor, and although the total contained gold at the prospect was small, the grades were of economic interest. The prospect was examined by CSR Limited and a limited programme of regional exploration undertaken to locate larger occurrences.

The exploration model was based on the auriferous karst concept (Boyle, 1979) involving the replacement of limestone and dolomite. There are many regional and local geological features which support such a possible occurrence, these include:

(1) limestone/siltstone interface,
(2) hydrothermal to epithermal activity,
(3) the presence of massive sulphides,
(4) the presence of fine gold (less than 10μ), and
(5) close spacial proximity to the Middle Proterozoic weathering surface.

The prime target was therefore a replacement low-grade gold body similar to more recent epithermal gold deposits, e.g. Kuranakh, USSR (Boyle, 1979). In addition, high-grade eluvial accumulations in karstic depressions would provide a viable target.

8.2 Stream Sediment Sampling

A regional approach was adopted initially covering the whole of the Rum Jungle and Waterhouse areas and in particular the dolomite/siltstone areas. A bulk stream sediment sampling technique was used for this evaluation.

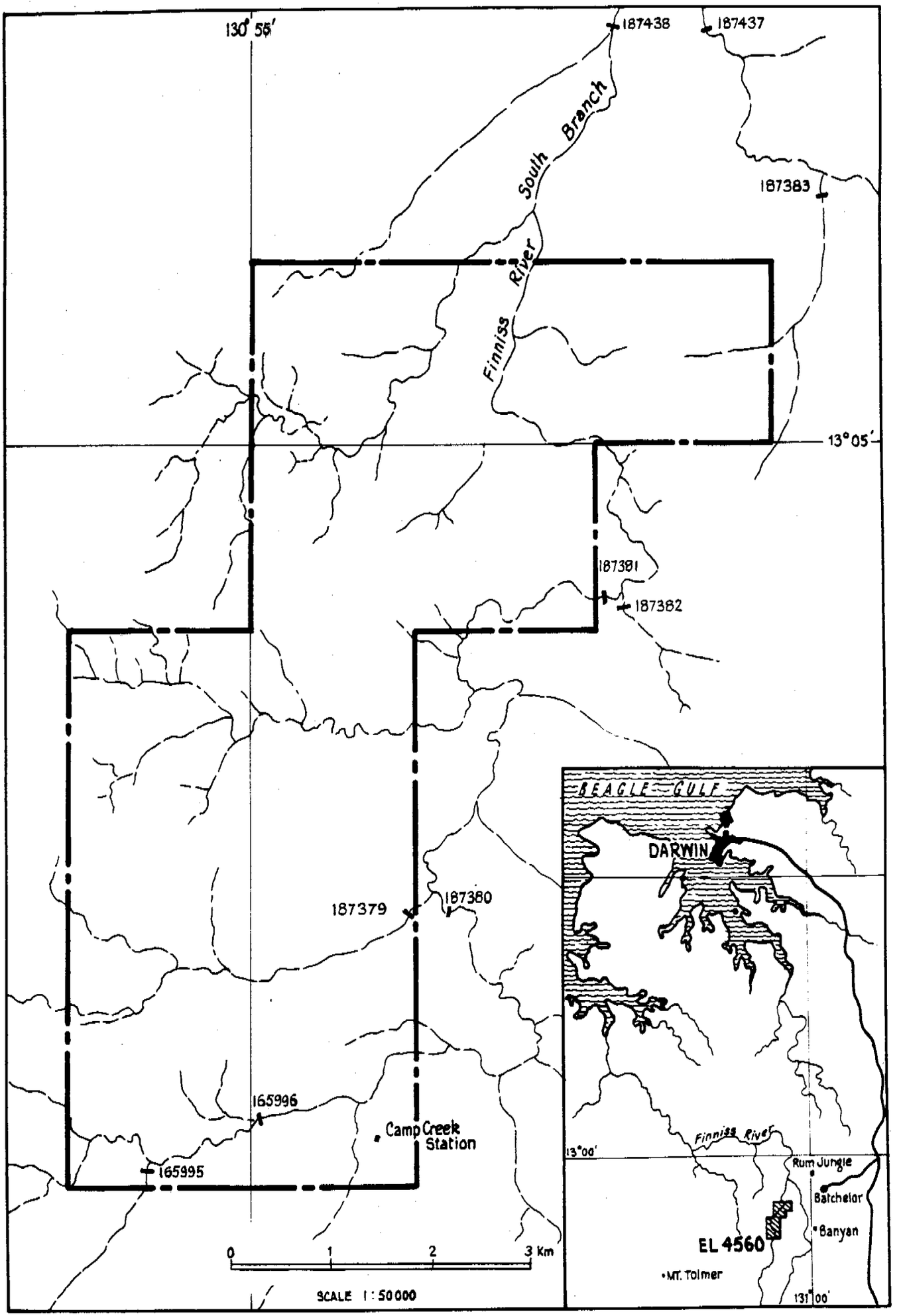

FIG. 2 LOCATION PLAN E.L.4560 MOUNT TOLMER N.T. SHOWING STREAM SEDIMENT SAMPLE LOCATIONS

The technique allows widely-spaced sample site locations, i.e. one per five square kilometres.

A total of 9 samples were collected from creeks draining EL 4560. The sample locations are shown on Figure 2. None of the analytical results from this programme were above the detection limit of 0.05 ppm Au in concentrate. None of the copper or silver results were considered anomalous. The results are presented on Table 2.

TABLE 2
BULK STREAM SEDIMENT RESULTS
Concentrate Values, Results in ppm

SAMPLE	WT. (g)	Au	Cu	Ag
165995	3.23	0.05	32	1
165996	3.90	0.05	56	2
187379	8.65	0.05	52	2
187380	2.95	0.05	64	4
187381	2.99	0.05	48	2
187382	7.60	0.05	105	1
187383	3.11	0.05	125	5
187437	3.21	0.05	28	1
187438	3.23	0.05	56	2

8.3 Rock-chip Sampling

A total of 9 composite rock-chip samples were taken from altered or brecciated outcrops. The locations (Figure 3) were chosen from UAL geological maps. The samples were assayed for a range of elements, including copper, lead,

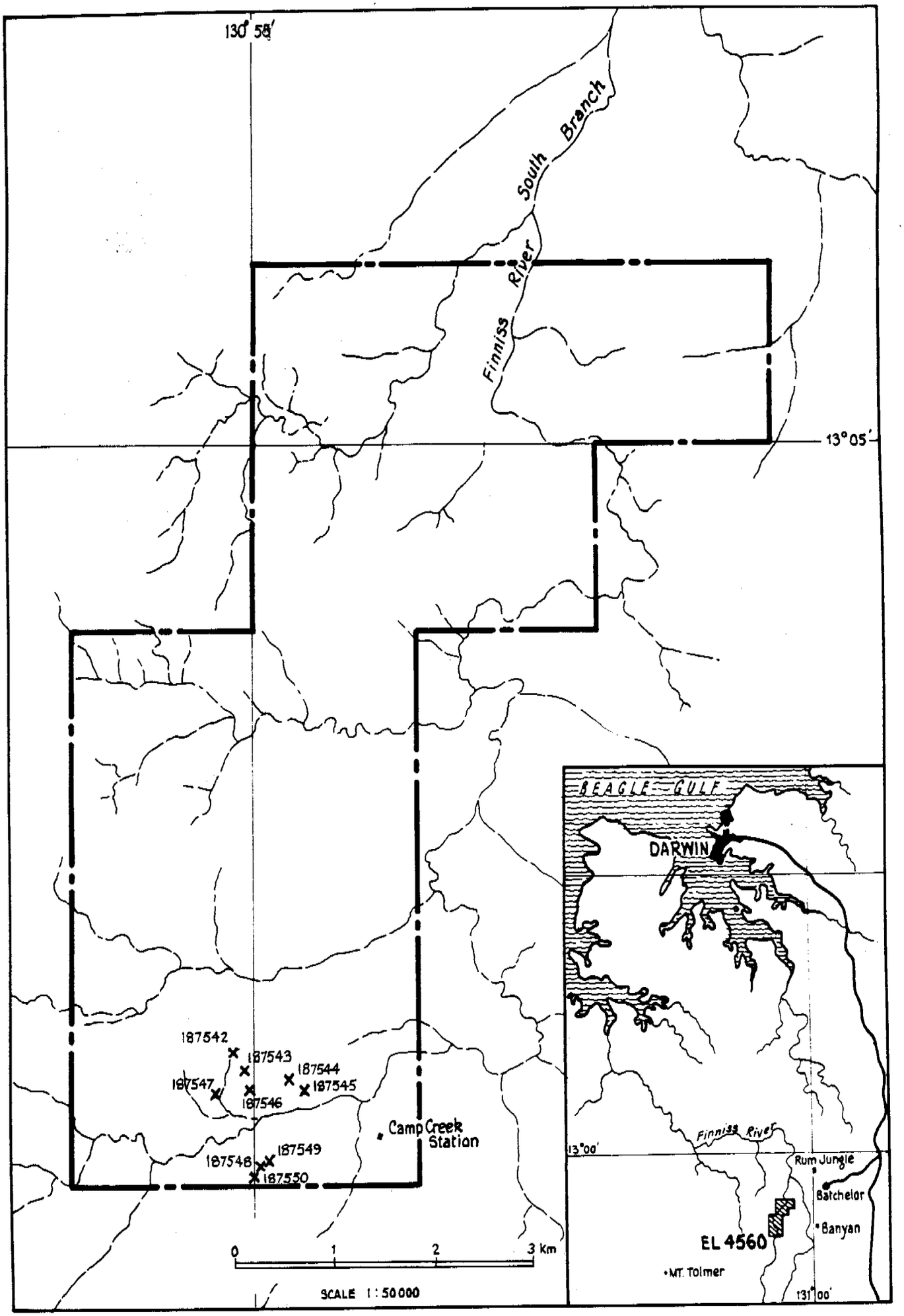

FIG. 3 LOCATION PLAN E.L.4560 MOUNT TOLMER N.T. SHOWING ROCK CHIP SAMPLE LOCATIONS

zinc, nickel, cobalt, bismuth, gold, silver, molybdenum, arsenic, barium, antimony, by Comlabs Pty. Limited of Adelaide.

The method used for analysis for Cu, Pb, Zn, Ni, Co and Bi involved acid digest and atomic absorption spectrophotometry (AAS1). Gold was assayed by AAS SA which includes an aqua regia attack and fire assay (FASI). Silver and molybdenum analyses involved an acid digest and AAS technique (AAS3). Arsenic, antimony and barium analyses involved an X-ray fluorescence spectrometry method (XRFI). The results are presented on Table 3.

Each sample was a 3 to 5 kg composite rock-chip sample of approximately 20 rock-chips taken from each outcrop area. All the results were too low to warrant further work.

One sample (No. 187549) returned anomalous nickel (570 ppm Ni), but this is not considered significant with respect to the mineralisation model. The higher nickel results may be due to a more basic igneous origin of the rock.

TABLE 3

COMPOSITE ROCK-CHIP ANALYSIS RESULTS

Results in ppm

SAMPLE	Ag	Mo	As	Sb	Ba	Cu	Pb	Zn	Ni	Co	Bi	Au
187542	<1	12	12	18	25	22	<4	4	6	<4	<4	<0.05
187543	<1	6	3	8	10	12	<4	4	<4	<4	<4	<0.05
187544	<1	6	4	<4	45	2	<4	4	<4	<4	<4	<0.05
187545	<1	6	5	<4	55	2	<4	4	<4	<4	<4	<0.05
187546	<1	<4	9	8	400	<2	<4	12	<4	<4	<4	<0.05
187547	<1	<4	3	<4	610	<2	<4	6	12	6	<4	<0.05
187548	<1	6	3	<4	100	<2	<4	4	<4	<4	<4	<0.05
187549	<1	<4	7	4	105	16	30	80	570	70	<4	<0.05
187550	<1	6	8	4	45	<2	<4	4	<4	<4	<4	0.10

9. CONCLUSIONS

The bulk stream sediment sampling programme did not locate any significant gold values from creeks draining EL 4560. In addition, no anomalous copper values were obtained which would indicate saturation of the samples by sediments derived from the Depot Creek Sandstone plateau. Rock-chip samples were also discouraging with no gold or arsenic present.

In the context of the regional exploration around the Rum Jungle and Waterhouse Complexes, the model for mineralisation was abandoned and the significance of the Sundance Prospect remains unknown.

No further gold exploration was recommended on the Licence. However, it is considered that there may be potential for uranium vein-type mineralisation within favourable tectonic zones.

Expressions of joint venture interest to investigate the uranium potential have been received and are being pursued.

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