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OPEN FILE

NORTHERN TERRITORY GEOLOGICAL SURVEY

CR78/117
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Location of Licence

EL 1584 was granted to Otter Exploration NL for 12 months from the 10th August 1977. It covers an area of approximately 215 square miles, and is about 200 miles north-east of Alice Springs (fig. 1). Access to the area is via the Plenty River Highway, to Jervois Station.
Regional Geology

The EL is situated near to the regional unconformity between the Archaean Arunta Complex, and the Upper Proterozoic - Paleozoic sediments of the Georgina Basin.

The Archaean Arunta Complex is represented in part by the Bonya Sequence which consists of mica-schist, metamorphosed intermediate volcanics, calc-silicate gneiss, marble, amphibolite and quartz-magnetites. The whole sequence has been metamorphosed (greenschist - upper amphibolite grade).

The Harts range Group of the Arunta Complex outcrops to the south of the region. This consists predominantly of quartz-feldspar-mica gneiss, and garnet-mica-feldspar gneiss. In the Plenty River Mica Field, numerous pegmatites and biotite schists occur.

During the Lower Proterozoic a number of quartz-feldspar-muscovite granites intruded the Bonya Sequence units. Genetically associated with the granites is a swarm of quartz reefs, generally trending west-north-west to north-north-west.

Sedimentation was initiated in the Upper Proterozoic with the (tillitic) Mt Cornish Formation. This was followed by a sequence of clastic and dolomitic sediments, peaking with the Upper Cambrian massive dolomites and oolitic limestones of the Arrinthuranga Formation. Ordovician and Devonian sediments are confined to calcareous siltstones, sandstones and dolomites.

The major structural feature in the region is the (Lower Proterozoic?) Delny - Mt Sainthill Fault System. This is a series of west-north-west trending faults, the major component being vertical, such that the nothern block has moved up with respect to the southern. This fault system appears to have economic significance, as all metalliferous mineral occurrences known to date are located north of this system. Eg. Molyhill Mine, Jervois Mines and Bonya Copper and scheelite district. South of the fault system is the Plenty River Mica Field, an otherwise barren network of pegmatites intruding Archaean gneiss and schist of the Harts Range Group.

There are a number of mineral deposits of economic significance in the region. East of Mt Sainthill is the Molyhill scheelite mine, currently producing scheelite and molybdenite. The ore occurs in roof pendants of calc-silicates and skarn in the Jinka Granite.

The Jervois Copper Mines occur in sheared calc-silicate gneiss and sericitic schists - the mineralization appears to be due to hydrothermal activity along fault planes. Other metals, in order of importance are lead, silver, zinc and tungsten.

The Bonya Scheelite District contains numerous copper and scheelite prospects. These occur in calc-silicates and amphibolites of the Bonya Dequence, and appear to be associated with the numerous scattered granite intrusions.
The Box Hole Bore Lead Prospect differs from the other mineral occurrences in that it occurs in the Upper Cambrian Arrinthrunga Formation and appears to be syngenic.

Regional Magnetic Interpretation

The Delny - Mt Sainthill Fault System is represented by a somewhat discontinuous trend between the northern magnetically active Bonya Sequence, and the southern, magnetically quiet Harts Range Group.

The Jinka Granite, where it outcrops over the Jinka Plain is magnetically quiet, whereas the granite to the south-west (also Jinka Granite) is magnetically anomalous. This may be due to the presence of a large number of outcropping units of the Bonya Sequence, probably representing roof pendants. This is the granite with which the Molyhill scheelite deposits are associated.

The contacts between the Marshall Granite and the intruded Archaean schists are anomalous, possible indicating metasomatic alteration of the country rock, with the formation of magnetite.

The Jervois Granite, plus the smaller granites, do not show up against the magnetically active background of the Bonya Sequence.
**Geology of Licence Area**

Quaternary sand and alluvium covers most of the area, however the contact between the "tillitic" Mt Cornish Formation (Upper Proterozoic) and the Bonya Sequence (Archaean) is exposed in the north east corner of the EL. The air photos show the Mt Cornish Formation to form a series of gently easterly plunging anticlines.

The Lower Proterozoic Jervois Granite has been mapped by the BMR in the south western quarter of the area.

Most faults in the area appear to be associated with the north-west trending major fault system north of Mt Cornish.

A north-east trending fracture runs across the north west corner of the licence area.
Work Completed

In May 1977, a reconnaissance flight was made over the area. An onboard spectrometer detected one anomaly, near the unconformity between the Mt Cornish Formation and the Bonya Sequence, west of Mt Cornish.

It's second reconnaissance flight in August 1977 failed to detect this anomaly.

In August 1977, an airborne spectrometer survey was undertaken.
AIRBORNE SURVEY - EQUIPMENT AND FLIGHT DETAILS

Aircraft: Cessna 182
Line Spacing: 1 kilometer
Aircraft Speed: 40-80 nautical miles per hour
Mean Terrain Clearance: 400 feet.

Detector System: 4 crystal thallium activated sodium iodide sensor, total volume 452 cubic inches, (Scintrex GSA-64), linked to a four channel gamma ray spectrometer, (Scintres GAD-4), and chart recorder.

Count Time: 1 count/second

Date recorded: 4 channels - Total Count, Potassium, Uranium and Thorium, The compton stripping facility was not employed.

Navigation: Visual reference system using 1:84,000 scale airphotos or 1:100,000 scale orthophotomaps. Reference points and corresponding fiducial numbers from a fiducial counter were marked on the appropriate flight line drawn on the air photography. A fiducial trace was recorded on the chart together with the radiometric data.

DATA PRESENTATION

Anomalies have been plotted onto plans reproduced from the survey flight patterns. Anomalies have been distinguished using three parameters, namely local total count in relation to total count regional background, uranium count in relation to local uranium background and uranium/thorium ratio. These parameters are shown in numerical form for each anomaly.

AIRBORNE SURVEY - RESULTS (Refer Fig.3)

Results of the survey, the anomalies are shown in plan form. This plan also accompanies a previously forwarded progress report.

Nothing was known concerning the relationship between anomaly parameters and geochemical uranium/thorium concentrations at this stage in the survey work. A desision was made to plot all anomalies satisfying certain very minimal criteria, namely a total count response of at least 50% above background, $1\frac{1}{2}$(-), or alternatively a uranium channel response of at least 100% above background, -(2.-), assuming in both instances that the uranium/thorium ratio exceeds 1, e.g. 1\frac{1}{2}(1\frac{1}{2}.2/1). Note background in this exercise includes both geologic and non-geologic contributions.
Airborne Survey - Results

Four radiometric anomalies are plotted (fig. 3). Three occur in the Mt Cornish Formation, in close proximity to the unconformity. The other occurs in Quaternary sand cover, overlying Mt Cornish formation sediments. As there appears to be a series of gentle folds in this area, the unconformity may not be at a great depth.
### DETAILS OF EXPENDITURE. EL1584 (12 months to 31/7/78)

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Head Office Overheads @33% .......... 1,388.38

**Grand Total** $5,595.60
OTTER EXPLORATION

PLANT LINES & PRELIMINARY RADIOGRAPH RESULTS

KEY

1. (1,4) Radioactive indicator, but not in relation to regional background.
   Uranium (concentrated) in relation to known uranium and thorium areas

2. (2,4) Special point

3. (3,4) Number of plant lines from above

[Diagram includes various numbers and points, with a legend and key for interpretation.]

Boundary of R.L.

EW Range

200
150
100
50
0

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