MOBIL ENERGY MINERALS AUSTRALIA INC.

INCORPORATED IN DELAWARE, U.S.A.; LIMITED LIABILITY

8TH FLOOR, 31 QUEEN ST., MELBOURNE, VIC., 3000.
POST OFFICE BOX 4507, MELBOURNE, VIC., 3001.
TELEPHONE: 820 191
CABLE ADDRESS: "MOBILEMA"
TELEX: AA37000

PINE CREEK SD 52-8

MOBIL-SUTTONS JOINT VENTURE
EXPLORATION LICENCE 1356 - LITCHFIELD

ANNUAL REPORT
TO
NORTHERN TERRITORY DEPARTMENT OF MINES AND ENERGY
FOR
TWELVE MONTHS ENDING AUGUST 7, 1982

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Author(s): P.J. O'SHEA

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SUMMARY

EL 1356 (Litchfield) was first granted to Suttons Motors (Arncliffe) Pty. Ltd. on August 8, 1977, and has been renewed annually from that date. Area reductions took place in 1979, 1980, 1981 and 1982.


Exploration by Suttons/MEMA has consisted of airborne and ground geophysics, radon emanometry, track etch, geological mapping, auger, percussion and diamond drilling, and electric logging.

The target sought was stratabound uranium mineralisation similar to that found in the Alligator Rivers Uranium Field in the East Pine Creek Geosyncline.

Ground geophysical surveys at the Kilfoyle Creek Prospect failed to delineate any new drilling targets, and studies conducted by the C.S.I.R.O. on the Litchfield Granite has downgraded its potential as a uranium source.

Expenditure during the 12 months to August 7, 1982 was $11,133.69.
1. INTRODUCTION

Exploration Licence No. 1356 (Litchfield) was first granted to Suttons Motors (Arncliffe) Pty. Ltd., for twelve months from August 8th, 1977. It has been renewed annually for further twelve month periods since that date.

In the first two years of tenure, the E.L. was granted over an area of 238.82 square miles. The E.L. was successively reduced by half to 118.14 square miles in August 1979, to 59.06 square miles in August 1980 and to 29.53 square miles in August 1981. A joint venture agreement between Suttons Motors and Mobil Energy Minerals Australia Inc., was signed on August 25th, 1978, at which time Mobil assumed operatorship of exploration on the Licence area.

An airborne magnetic/radiometric survey was flown by Aero Exploration Pty. Ltd., for Suttons Motors between September and October 1977. Between September and November 1978 fifty-eight radiometric features picked from the airborne survey results were ground checked by MEMA. Of these, anomaly 45/34A (Kilfoyle Creek Prospect) which straddles the boundary between the EL 1356 and EL 1359 areas was selected for further work which for the year ended August 8th 1979, included gridding, detailed radiometrics, radon emanometry, auger and percussion drilling and ground magnetics (Cotton 1979).

During the year ended August 8th, 1980, a Track Etch survey together with auger, percussion and diamond drilling programmes were carried out over the Kilfoyle Creek Prospect, while an orientation airborne INFUT survey and a detailed airborne radiometric/magnetic survey were conducted over the licence areas as a whole (Pritchard, 1980). Exploration in the 1980-81 Licence year comprised completion of the Track Etch and drilling programmes, detailed geological mapping and ground spectrometry/magnetometry (O'Shea, 1981).
During the 1981-1982 Licence year, magnetics and electromagnetics (TEM) were
carried out over two lines in the licence area, with refraction seismic
profiling being carried out over one of these lines. In addition, two
granite samples were collected for granite fertility studies, and a photo-
geological interpretation of the area was completed. Expenditure during
the twelve month period August 8th, 1981 to August 8th, 1982 amounted to
$11,133.69.

2. LOCATION AND PHYSIOGRAPHY

Exploration Licence No. 1356 (Litchfield) is one of a number of Licences
held by the Suttons Group over the Tipperary Pastoral Property in the
western part of the Pine Creek Geosyncline (see Fig. 1). The Licence is
situated on the divide section between the Daly and Reynolds Rivers,
approximately 20 km north of the Daly River Mission and 120 km south-west
of Darwin in the Northern Territory.

The existing Licence area is bounded by $130^\circ 40'$ longitude on the west side,
$13^\circ 30'$ latitude on the northern side, $130^\circ 45'$ on the eastern side and
$13^\circ 36'$ on the southern side. (See Fig. 1)

Access to the main part of the Licence area is via the Litchfield Station
track off the main Daly River Road. The Kilfoyle Creek Prospect is reached
by a 4 wheel drive track off the Daly River Road in the south east corner
of the Licence area.

Creeks in the southern half of the Licence drain south and east into the
Daly River, while north of the Litchfield track drainage is north and east
into the Reynolds River. Black soil plains cover a large part of the Licence
area. Rock outcrop in the area is minimal, and most geological boundaries
have been photointerpreted, or extrapolated from drill-hole information.
2.1 Aboriginal Sacred Sites

The joint venture initiated a comprehensive programme of meetings with representatives of the local aboriginal community and the Northern Land Council to inform these bodies about the exploration activities of the joint venture and to obtain advice from these bodies to ensure that the activities of the joint venture did not affect aboriginal sacred sites. An independent consultant Mr. John Clark, has been engaged to assist with this work.

3. GEOLOGICAL SETTING

The Licence area lies within the Litchfield Block on the western edge of the Pine Creek Geosyncline. Sediments of probable Middle Cambrian age crop out in the northern half of the Licence area, and overlie Early Proterozoic metasediments intruded by, and faulted against Lower to Middle Proterozoic granites in the southern half of the Licence area (see Plate 2).

The Cambrian sediments dip at shallow angles to the north-east, and are capped by plateau remnants of transported laterite deposits, related to the Tertiary Koolpinyah Geomorphic Surface (Cotton, 1979). A distinctive arkose is developed where Litchfield Granite underlies the Cambrian. The Litchfield Granite crops out in the southern half of the Licence area where the Cambrian cover has been stripped off by the drainages of Kilfoyle Creek and Elliot Creek, a parallel tributary of the Daly River. Three granite types have been recognised in the area, (a) a foliated biotite granite, (b) a characteristically unfoliated porphyritic and leucocratic granite, and (c) pegmatite veins with a preferred east-west orientation.
In the south-east corner of the Licence area metamorphosed turbidite facies sediments of the Lower Proterozoic Noltenius and Burrell Creek formations form a complex synclinal structure. These sediments have undergone metamorphism to upper greenschist/lower amphibolite grades and in places have been subjected to thermal metamorphism associated with the intrusion of late Lower Proterozoic granites. This sequence of sediments hosts the Kilfoyle Creek Prospect.

To the west of these sediments is an area of metamorphosed Archean or Lower Proterozoic sediments and basic and possibly ultrabasic igneous rocks. These rocks have been subjected first to prograde metamorphism to upper amphibolite and granulite grades (which has been accompanied by the formation of S type granites) and then, in some zones, to retrograde metamorphism to greenschist facies rocks (Pritchard, 1980). This sequence has been termed the "Whealdanks Formation" by Cotton et al (1982) and may be tentatively correlated with the Hermit Creek Metamorphics.

4. PREVIOUS EXPLORATION

Prior to the granting of EL 1356 to Suttoms Motors in 1977, a considerable amount of work was done over the south-eastern sector of the Licence area by Keewane Australia Pty. Ltd., between 1970 and 1973. Keewane carried out magnetics, radiometrics, V.L.F. - E.M. and geological mapping over two extensive grid areas, and zones of interest were followed up by drilling using an air track percussion rig, and a power auger.

In 1974-75 BHP drilled 4 rotary holes adjacent to the Litchfield Road in the course of testing the basal Cambrian for phosphate. The unconformity was not reached due to drilling difficulties.
Tipperary Land Corporation searched for bauxite and phosphate over much of the area in 1967-68.

5. EXPLORATION PROGRAMME 8TH AUGUST, 1981 - 7TH AUGUST, 1982

Exploration on the Litchfield Licence area for the year ended 7th August, 1982, comprised of two phases, (a) continued prospect evaluation of the Kilfoyle Creek Prospect in the south-east corner of the licence, and (b) a regional evaluation of the whole licence as part of a general study of the West Pine Creek area as a whole.

5.1 Kilfoyle Creek Prospect - Geophysical Surveys

The Kilfoyle Creek Prospect, picked as an airborne radiometric anomaly from the 1977 survey, straddles the boundary between EL 1356 and EL 1359 to the east. Detailed geological mapping of the area carried out during August 1980 shows that Lower Proterozoic metasediments of the Burrell Creek Formation crop out in the prospect area (see Plate 1). Secondary uranium mineralisation has been reported from these metasediments in the adjacent EL 1359 (Manning, 1981).

Exploration work during 1980 and 1981 was directed towards locating repetitions of this mineralisation in EL 1356. In the event that buried mineralisation may have been overlooked during this work, ground E.M., magnetics and seismic traverses were conducted during the 1981-82 licence year over the Kilfoyle Creek prospect area. The location of these traverses is shown on Plate 1.

Survey specifications are listed below:

(a) T.E.M. (lines 400S and 780S)

100 metre coincident loops read at 50 metre intervals were used with the Sirotem system. Field data are stored on cassette tape and as printouts (Frankcombe, 1981).
(b) **Magnetics** (lines 400S and 780S)

Geometrics hand held proton precession magnetometer was used with readings at 25 m intervals.

(c) **Seismic** (line 780S)

A 200 m spread of 12 geophones with 20 m spacing was used, five shots were fired per spread and these shots were buried approximately 1 m below the surface. Two spreads were fired along line 780S, both within EL 1356 (see Plate 3) - these were set up such that Channel 12 for the first became Channel 1 for the second. The line was levelled by dumpy level after completion of the survey.

The T.E.M. data is plotted as a log (response) vs. station for each of the channels (Plates 4 and 5). Three anomalies were detected within EL 1356 after Sirotail removal. These have the same decay constants as the non-anomalous areas indicating shear zones or differing overburden thicknesses. None is indicative of a conducting body.

The magnetic profiles are plotted with the T.E.M. profiles on Plates 4 and 5 and indicate that there is little correlation between the two sets of data, supporting the conclusion that no conductive bodies exist.

Time-distance seismic plots are included as Plates 6 and 7. The seismic survey indicates an undulating, probably faulted, weathering surface. The fractures indicated by the seismic survey do not coincide with the E.M. anomalies.
5.2 Regional Evaluation

A study to determine the age and fertility of the major granites of the Litchfield Province is currently underway. This study is being conducted by the C.S.I.R.O. under a contractual agreement with M.E.M.A. Two granite samples have been collected from EL 1356, and their positions are shown in Fig. 1. Detailed results of this study are not yet available, but major findings are that the Litchfield granites have potential for tin/tungsten/tantalite mineralisation rather than for uranium, and are best correlated with the intrusive 1840 M.y. plutons of the central part of the Pine Creek Geosyncline.

A photogeological interpretation of the licence area was carried out by Robertson Research for MEMA, as part of a regional photogeological interpretation of the West Pine Creek. The results of this study in the licence area are shown on Plate 2. Cotton, Hill and Thomas (1982) consider the Kilfoyle Creek Prospect to be in the basal beds of the Burrell Creek Formation, and to be underlain to the west by the 'Whealdanks Formation', a dominantly metasedimentary sequence with some minor volcanic units.

6. CONCLUSIONS

Geophysical surveys conducted at the Kilfoyle Creek Prospect failed to delineate any definite drilling targets. Studies conducted by the C.S.I.R.O. on granites of the Litchfield Province indicate that the Litchfield Granite is Lower Proterozoic rather than Archean, and has potential for tin/tungsten mineralisation rather than uranium.
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STATEMENT OF EXPENDITURE FOR PERIOD
AUGUST 8, 1981 TO AUGUST 7, 1982 FOR
EXPLORATION LICENCE 1356 LITCHFIELD

Professional Fees of Geologists and Consultants 6,637.07
Travel and Accommodation 275.86
Freight 257.48
Field Supplies 93.95
Equipment and Facilities 6.75
Rental of Equipment 18.87
Motor Vehicle Hire 170.40
Vehicle Operating Costs 71.10
Ground Surveys 822.00
Air Photographs 508.00
Laboratory Services 71.90
Other Contract Services 457.66
Maintenance and Repairs 18.21
Motor Registration 4.93
Direct Overheads 267.29

Head Office Overheads at 15% of Direct Costs 1,452.22

$ 11,133.69

H.G. Milton
Accounting Manager