STOCKDALE PROSPECTING LIMITED

EXPLORATION LICENCES 4385, 4386, 4390, 4392, 4438, 4439

ANNUAL REPORT 1985 - 1986

I.J. MACFARLANE

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**SUMMARY**

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<thead>
<tr>
<th>EL NOS:</th>
<th>4385, 4386, 4390, 4392, 4438, 4439.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE GRANTED:</td>
<td>29/09/83 (ELs 4385, 4386, 4390, 4392)</td>
</tr>
<tr>
<td></td>
<td>23/11/83 (EL 4483)</td>
</tr>
<tr>
<td></td>
<td>09/01/84 (EL 4439)</td>
</tr>
<tr>
<td>AREA:</td>
<td>4,411 km²</td>
</tr>
<tr>
<td>OCCUPANT AND OPERATOR:</td>
<td>Stockdale Prospecting Limited</td>
</tr>
<tr>
<td>COMMODITIES SOUGHT:</td>
<td>Diamonds</td>
</tr>
<tr>
<td>EXPLORATION:</td>
<td>Results of reconnaissance stream sampling in the Nicholson River drainage basin are encouraging, and suggest the possibility of a diamondiferous source within the area covered by the licences. Follow up sampling and aeromagnetic survey are in progress.</td>
</tr>
</tbody>
</table>
STOCKDALE PROSPECTING LIMITED

EXPLORATION LICENCES 4385, 4386, 4390, 4392, 4438, 4439

ANNUAL REPORT 1985 - 1986

1. INTRODUCTION

Exploration licences 4385, 4386, 4390, 4392, 4438 and 4439 are located on the Mt. Drummond and Calvert Hills 1:250,000 map sheets in the north-east of the Northern Territory (Map 1).

Date of granting varies as shown in Table 1. Approval has been given by the Northern Territory Department of Mines and Energy to report on these exploration licences as a single group by 29th October, 1985 and subsequent years.

Collectively these licences have now been reduced to cover an area of 4,411 km2 and were granted to Stockdale Prospecting Limited as part of a regional diamond exploration programme.

Exploration licence 4390 underwent partial relinquishment by Stockdale Prospecting on 2nd September, 1985 and again on 26th August, 1986 with separate reports being submitted for each relinquishment. Exploration Licence 4385 also underwent partial relinquishment on 26th August, 1986, again a separate relinquishment report being submitted. Exploration Licences 4384 and 4491 were previously reported at the same time however were relinquished in their entirety on 26th August, 1986 and 1st August, 1986 respectively. Separate Final Reports for these licences have been submitted.

<table>
<thead>
<tr>
<th>EL. NO.</th>
<th>DATE GRANTED</th>
<th>AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>4385-4386</td>
<td>29/09/83</td>
<td>1533km² (each, as granted)</td>
</tr>
<tr>
<td>4390</td>
<td>29/09/83</td>
<td>1093km² (as granted)</td>
</tr>
<tr>
<td>4392</td>
<td>29/09/83</td>
<td>854km²</td>
</tr>
<tr>
<td>4438</td>
<td>23/11/83</td>
<td>1059km²</td>
</tr>
<tr>
<td>4439</td>
<td>09/01/84</td>
<td>367km²</td>
</tr>
</tbody>
</table>

2. ACCESS

Access is poor with the only road passing through the area joining Bernara Station to the west with Doomadgee Aboriginal Mission (Queensland) in the east. This road is in average condition and can only be used during the dry season.
To facilitate access in the southern sector of the licences Stockdale graded a track approximately 50 km in length from Budycurrara Creek in the west to the headwaters of South Nicholson Creek in the east.

Two airstrips are serviceable for operations in the area. The first is located at Dry Creek in the north-east of EL 4390, the second at Berarra Homestead in the west and outside SPL ground. Only the latter strip was used by Stockdale Prospecting during 1986.

Most of the area is only accessible by helicopter. Operations during 1986 were carried out from a base camp located approximately 4km north of the Nudjaburra Aboriginal settlement (Map reference - Seigel 1:100,000, 156 119).

3. PHYSIOGRAPHY

The area covered by the exploration licences lies within the Gulf Fall - a term used to describe the area drained by streams which flow into the Gulf of Carpentaria (Stewart, 1954). The Nicholson river and its tributaries drain the area covered by these ELs.

3.1 CALVERT HILLS

Exploration Licences 4390, 4392 and 4438 cover significant portions of the China Wall structure located in the south of the Calvert Hills 1:250,000 sheet. The China Wall, the most striking physiographic feature in the region, comprises a series of elevated strike ridges of the Westmoreland Conglomerate approximately 70 km long and 4-8 km wide. Over most of its length a prominent scarp up to 130 m high separates the Wall from the lower (granite) country to the south.

3.2 MT. DRUMMOND

Exploration licences 4385, 4386 and 4491 occupy much of the eastern sector of the Mt. Drummond 1:250,000 map sheet. This area is characterised by north-east flowing streams and tributaries of the Nicholson River, the largest of which is the South Nicholson Creek.

The steep sided hills and rounded mesas of this area reflect the action of braided channels which have dissected the underlying Proterozoic strata. In the west (ELS 4438, 4385) an elevated flat lying erosionally stable area is dominated by the internally drained Caulfield Clay Flats system.

4. HABITATION, CLIMATE AND VEGETATION

The area is uninhabited except for a small Aboriginal community which during the dry season occupies the banks of the Nicholson River (see Section 7 - Aboriginal Land Claim).
The climate is semi-arid tropical with a warm dry season from April to September and a hot wet season from October to March. Much of the area is covered by scattered small trees, shrubs and spinifex grass. Larger trees are concentrated along the watercourses where water supply is assured.

5. GEOLOGY

The stratigraphy of the area is summarised in Table 2.

5.1 TECTONIC STRUCTURE

The exploration licences straddle the boundary between two major Proterozoic tectonic units, the Carpentarian McArthur Basin to the north and the Adelaidian South Nicholson Basin to the south. The boundary zone is a belt of Lower Proterozoic basement rocks that constitute the Murphy Tectonic Ridge which is thought to have formed a topographic barrier between the two main depositional areas. The presently exposed part of the Murphy Tectonic Ridge is known as the Murphy Inlier.

5.2 TECTONIC HISTORY

The effects of numerous major and minor tectonic events are preserved in the rocks of the Calvert Hills sheet area. A summary is given below:

5.2.1 LOWER PROTEROZOIC

The oldest rocks in the area, the Murphy Metamorphics, originated in the Lowerian Geosyncline. Pelitic sediments and volcanics in the Geosyncline were isoclinally folded, metamorphosed and intruded by the Nicholson Granite. After a period of erosion the Cliffdale Volcanics were extruded and the Norris Granite emplaced.

5.2.2 UPPER PROTEROZOIC

The lithology, thickness and distribution of the Upper Proterozoic rocks in this area were greatly influenced by the east-trending Murphy Tectonic Ridge which remained subaerial during most of the Upper Proterozoic (Sweet 1981).

To the north of the Murphy Tectonic Ridge the McArthur Basin subsided continuously during the deposition of the Tawallah Group but subsequently the basin was relatively more stable.

To the south of the Murphy Tectonic Ridge the South Nicholson Basin did not subside significantly until the deposition of the Fickling Beds (which marked the most active phase of sedimentation in the South Nicholson Basin). (Sweet et al, 1981).

Descriptions of the rock units in the South Nicholson Basin and the McArthur Basin sequence are detailed in the EMR Geology Notes (see References 1,2,3 & 6) and summarised in Table 2.
6. PREVIOUS INVESTIGATIONS

The first systematic geological mapping of the area was conducted during 1956 and 1957 by the BMR (Firman, 1959). During this time the BMR also conducted regional geochemical and geophysical surveys.

Most previous exploration work carried out by various companies has been for uranium and copper after the discovery of the Redbank copper deposit located in the NW of the Calvert Hills map sheet. Uranium anomalies were often located along the contact between the Seigal Creek Volcanics and the Westmoreland Conglomerate. To date they have been shown to be local concentrations of no economic importance.

7. ABORIGINAL LAND CLAIM

Exploration licences 4385, 4386, 4390, 4392 and 4439 fall within ground subject to a successful land claim (granted June, 1986), an area of approximately 5300 km2, comprising seven Aboriginal "estates" and encompassing the China Wall, South Nicholson Basin and the Carrara Range.

Because of the land claim status, SPL obtained information regarding sacred sites in the area and contacted the traditional owners to inform them of the proposed work programme.

7.1 TRADITIONAL OWNERS

Most of the Traditional Owners (TOs) are resident at either Doomadgee Mission, Mt. Isa or Robinson River Station. However, some of the TOs live within the reserve during the dry season. Their camp, known as Nudjuburra is located on the banks of the Nicholson River at reference 145 090 (Seigal 1:100,000 sheet). Recently, other communities have been established at Dry Creek and Cleanskin.

7.2 AGREEMENT

Prior to commencement of the 1984 work season an agreement was drawn up between the TOs and SPL with the Northern Land Council acting on behalf of the TOs. The agreement covered the provisional work to be carried out in the area whereby the social interests and sacred sites belonging to the people were protected and a workable relationship between SPL and the local people was established.

Agreement was signed on July 3rd, 1984, and allows for periodic reviews to ensure good liaison with the Aboriginal communities (see Appendix I in 1st Annual Report on exploration licences 4384 - 4390, 4392 and 4392).

7.3 SACRED SITES

Sacred site information was obtained from the Sacred Sites Protection Authority, Darwin. Further information was acquired from the TOs. An elected representative for each estate was employed as an Aboriginal guide to facilitate proper clearance of all sacred sites on each 1:100,000 map
sheet prior to commencement of field work. Clearance of the 1984, 1985 and 1986 work programmes was carried out to the mutual satisfaction of both the aboriginal community and Stockdale.

8. FIELD WORK

8.1 1983 FIELD SEASON

8.1.1 RECONNAISSANCE SAMPLING

Reconnaissance sampling commenced in July 1983 with 43 stream samples being taken from significant drainages in the ELs aimed at testing the area for kimberlitic indicator minerals (Map 2). Sampling statistics are shown in Table 3.

8.1.2 FOLLOW-UP

A limited follow-up exercise was conducted along the South Nicholson drainage in October, 1983.

Nine stream samples were taken along the South Nicholson Creek and its tributaries (Map 3). Approximately 100 litres of screened material was collected at each site, bagged and despatched to Stockdale's Kununurra Treatment Plant (W.A.) for treatment. Concentrates were then forwarded to Stockdale's Melbourne laboratory for further treatment and examination. No further diamonds were recovered from these samples.

One additional sample collected on EL 4439 also proved negative.

8.2 1984 FIELD SEASON

8.2.1 STREAM SAMPLING

A detailed follow-up and reconnaissance sampling exercise was initiated to further define the target area.

A camp site was established at Dry Creek (under Aboriginal guidance) at 948 360 on Seigal 1:100,000 map sheet and follow-up sampling commenced in May 1984. A total of 203 stream samples was collected (Map 3). Sample size varied from 20 - 500 litres of screened material (-1.7 +0.5 mm).

8.2.2 TREATMENT SITE

A field treatment site was set up at the base camp to overcome the logistical problem of transporting samples out of the area. All samples were treated at the site and concentrates despatched to Darwin for further treatment before forwarding to the Melbourne laboratory for examination.
### Table 3 - Sampling Statistics - 1983 - 1985

<table>
<thead>
<tr>
<th></th>
<th>EL 4384</th>
<th>EL 4385</th>
<th>EL 4386</th>
<th>EL 4390</th>
<th>EL 4392</th>
<th>EL 4438</th>
<th>EL 4439</th>
<th>EL 4491</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983 Reconnaissance</td>
<td>4</td>
<td>12</td>
<td>6</td>
<td>9</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>1983 Follow Up</td>
<td>-</td>
<td>8</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>1984 Follow Up</td>
<td>50</td>
<td>65</td>
<td>10</td>
<td>32</td>
<td>1</td>
<td>9</td>
<td>-</td>
<td>36</td>
</tr>
<tr>
<td>1984 Petrology</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1985 Follow Up/Reconnaissance</td>
<td>-</td>
<td>1*</td>
<td>56**</td>
<td>-</td>
<td>18</td>
<td>67***</td>
<td>14****</td>
<td>-</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>54</td>
<td>87</td>
<td>73</td>
<td>41</td>
<td>28</td>
<td>79</td>
<td>17</td>
<td>36</td>
</tr>
</tbody>
</table>

(Includes rock samples not noted on maps)

* Steelmaster Site  
** 18 Stream / 38 Loam Samples  
*** 8 Stream / 59 Loam Samples  
**** Loams Only

Approximately 100 litres of screened (-1.7 +0.5 mm) material was collected at each site. The material was bagged and despatched to Stockdale's Carnarvon Treatment Plant (W.A.) for treatment, concentrates were then despatched to Stockdale's laboratory in Melbourne for further treatment and examination. Results of this work proved encouraging with three diamonds recovered initially (two along South Nicholson Creek and one along the Nicholson River). A fourth diamond was recovered at a later stage (during sample re-examination) from the headwaters of the Nicholson River in EL 4438 (Map 2; Table 4).
### Table 4 - Diamond Results

<table>
<thead>
<tr>
<th>EL NO</th>
<th>SAMPLE NO</th>
<th>RESULT</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4384</td>
<td>T 7919</td>
<td>Diamond (0.0013 ct)</td>
<td>1983 Reconnaissance</td>
</tr>
<tr>
<td>V 2173</td>
<td></td>
<td>Diamond (0.0030 ct)</td>
<td>1984 Follow up</td>
</tr>
<tr>
<td>4385</td>
<td>V 2158</td>
<td>Diamond (0.0035 ct)</td>
<td>1984 Follow up</td>
</tr>
<tr>
<td>V 2042</td>
<td></td>
<td>Diamond (0.0492 ct)</td>
<td>1984 Follow up</td>
</tr>
<tr>
<td></td>
<td>T 7910</td>
<td>Diamond (0.0075 ct)</td>
<td>1984 Follow up</td>
</tr>
<tr>
<td></td>
<td>V 2129</td>
<td>Diamond (0.0193 ct)</td>
<td>1983 Reconnaissance</td>
</tr>
<tr>
<td>4390</td>
<td>T 7921</td>
<td>Diamond (0.0270 ct)</td>
<td>1984 Follow up</td>
</tr>
<tr>
<td>V 2040</td>
<td></td>
<td>Diamond (0.0143 ct)</td>
<td>1983 Reconnaissance</td>
</tr>
<tr>
<td>4392</td>
<td>V 2043</td>
<td>Diamond (0.0018 ct)</td>
<td>1984 Follow up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diamond (0.0034 ct)</td>
<td>1984 Follow up</td>
</tr>
<tr>
<td></td>
<td>V 3079</td>
<td>Diamond (0.0017 ct)</td>
<td>1984 Follow up</td>
</tr>
<tr>
<td>4438</td>
<td>T 7951</td>
<td>Diamond (0.0031 ct)</td>
<td>1985 Reconnaissance</td>
</tr>
<tr>
<td>V 3131</td>
<td></td>
<td>Diamond (0.0040 ct)</td>
<td>1985 Reconnaissance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diamond (0.0166 ct)</td>
<td>1984 Follow up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diamond (0.0020 ct)</td>
<td>1985 Reconnaissance</td>
</tr>
</tbody>
</table>
8.2.3 RESULTS

A total of 8 diamonds was recovered from stream sample sites on these ELs (Map 3; Table 4). These results were considered highly encouraging and enhanced the prospectivity of the area. Three of these diamonds were recovered from the South Nicholson drainage indicating the need for further follow up.

8.2.4 ROCK SAMPLES

In addition to the stream sampling exercise three rock samples were collected and despatched to Melbourne for identification. (Appendix 2).

8.2.5 GEOMORPHOLOGY AND LANDSAT

A geomorphological and Landsat study of the area was initiated by SPL's Research and Technical Services (RATS) in Melbourne. This work continued into 1985 and was designed to assist with interpretation of positive results and to gain a better understanding of the structural history of the area.

8.3 1985 FIELD SEASON

8.3.1 STREAM SAMPLING

Selected areas of the ELs did not receive adequate reconnaissance sampling during 1983/1984 field seasons. These areas were stream sampled during August/September 1985. Operations were carried out from a base camp located approximately 16 km east of Bernara Homestead (Map reference - Nicholson River 205 203).

A total of 44 stream samples was collected over certain areas of the ELs. Two types of samples were collected. These were 250 litres of -4 mm and 30 litres of -1.7 +0.5 mm material. All samples were despatched to Stockdale's Treatment Plant in Darwin for treatment. Concentrates were then forwarded to SPL's Melbourne laboratory for further treatment and examination.

8.3.2 RESULTS

Two samples (V 3069 and V 3079) each yielded a diamond (0.0031 ct and 0.004 ct respectively). A further 3 samples (V 3065, V 3067 and V 3077) yielded a total of 4 mineral grains which were identified as being spinels of a possible kimberlitic origin. The remainder of the samples were negative.

8.3.3 LOAM SAMPLING

Diamond positives obtained from stream samples collected in 1983/1984 indicated certain areas of limited exposure merited loam sampling. A total of 111 spot loams was collected from two areas (Map 4). These were :

- The pan system in the headwaters of the Nicholson River.
- An ill-drained area south of Caulfield Clay Flats.

Sample size was 5 kg -1.7 +0.5 mm screened material.
8.3.4 RESULTS

One diamond (0.002 ct) was recovered from sample V 3131, the remainder of the samples being negative.

8.3.5 STEELMASTER PROGRAMME

A bulk sampling programme was initiated to test the headwaters (Soak Creek) of the positive South Nicholson Creek drainage. This work was carried out during September/October 1985. It was necessary to blaze a 50 km access track to permit access for the Steelmaster unit. Aboriginal approval was given for this work.

A total of 100 tonnes of river gravel was treated at the Soak Creek 1984 positive diamond site (V 2129). Field treatment was carried out using a Steelmaster mini-jig bulk sampling facility. Size fractions collected were -5 +0.5 mm, the concentrates forwarded to Darwin Treatment Plant for treatment before examination in SPL's Melbourne laboratory.

8.3.6 RESULTS

Two diamonds (0.0096 ct and 0.0159 ct) were recovered from the concentrate produced from this sample (T 6409).

8.3.7 GEOMORPHOLOGICAL AND LANDSAT STUDY

The geomorphological and Landsat study commenced in 1984 was completed during the 1985 field season. This study involved a limited amount of fieldwork undertaken in May 1985.

In summary, the studies concluded that during the late Cretaceous, drainages flowed across the region in a north-north east direction towards the present Gulf of Carpentaria. The formation of the Barkly Tablelands in early-mid Tertiary was associated with Post-Cretaceous movement along a north west - south east upwarp zone extending through the China Wall area causing marked changes in the drainage picture. The drainages were further affected by subsequent minor flexuring and cutting back to the west by the Nicholson River.

8.3.8 GEOPHYSICAL STUDY

A regional geophysical study of the area was carried out by SPL Melbourne Research and Technical Services Division. This has led to a better understanding of the structure and further assisted with geomorphological modelling over the region.

8.4 1985 FIELD SEASON

8.4.1 GENERAL

The first period of the 1985 field season was spent following up previous years' positive samples and filling in gaps in the reconnaissance sampling. Positive results recovered from this wave of sampling resulted in a concentrated follow-up programme.
The programme included a combination of small and large volume stream sediment sampling, loam sampling, bulk sampling, rock sampling and aeromagnetic surveying (Maps 5 and 6, and Table 5).

**TABLE 5 - SAMPLING STATISTICS - 1986**

<table>
<thead>
<tr>
<th>EL</th>
<th>4384 4385 4386 4390 4392 4438 4439 4491</th>
</tr>
</thead>
<tbody>
<tr>
<td>STREAM SAMPLES (&lt; 100kg)</td>
<td>20 49 - - 29 10 - -</td>
</tr>
<tr>
<td>STREAM SAMPLES (&gt; 100kg)</td>
<td>2 9 2 - 35 11 - 4</td>
</tr>
<tr>
<td>LOAM SAMPLES</td>
<td>- 1 - - - 128 - -</td>
</tr>
<tr>
<td>BULK SAMPLES</td>
<td>- - - - - 3 - -</td>
</tr>
<tr>
<td>ROCK SAMPLES</td>
<td>- - - - - 15 - -</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>22 59 2 - 79 150 - 4</td>
</tr>
</tbody>
</table>

8.4.2 STREAM SAMPLING

A total of 106 stream sediment samples (hand screened on site to retain the \(-2 + 0.3\) mm fraction) of 100 kg or less was taken in the headwaters and minor tributaries of the major creeks within the areas of the licences. In the larger drainages a total of 62 stream sediment samples (hand screened on site to retain the \(-4.75 + 0.5\) mm fraction) weighing between 100 kg and 1600 kg (average of 300 kg for all samples) was taken.

All samples were despatched to Stockdale’s treatment plant in Darwin for processing. Concentrates from Darwin were then consigned to the Melbourne laboratory for further treatment and examination. To date, approximately 85% of the samples taken have been treated and examined, results for the remainder being unavailable at the time of writing this report.

8.4.3 RESULTS

An additional 2 diamonds have been recovered from the 2 samples V 4616 and V 4621 (weighing 0.0009 cts and 0.00165 cts respectively). A further eleven samples have yielded a total of 30 mineral grains identified as being spinels of possible kimberlitic origin (Table 6).

**TABLE 6**

SPINELS RECOVERED FROM 1986 SAMPLING PROGRAMME (TO 30/9/86)

<table>
<thead>
<tr>
<th>SAMPLE NO</th>
<th>NO OF GRAINS</th>
</tr>
</thead>
<tbody>
<tr>
<td>V 4616</td>
<td>1</td>
</tr>
<tr>
<td>V 4617</td>
<td>9</td>
</tr>
<tr>
<td>V 4618</td>
<td>3</td>
</tr>
<tr>
<td>V 4619</td>
<td>1</td>
</tr>
<tr>
<td>V 4623</td>
<td>3</td>
</tr>
<tr>
<td>V 4624</td>
<td>8</td>
</tr>
</tbody>
</table>

10
V 4625 1
V 4631 1
V 4714 1
V 4747 1
V 4748 1

All other samples examined were negative.

8.4.4 LOAM SAMPLING

As part of the follow-up to the 1985 positive sample V 3131, an area of approximately 120 sq km was vehicle loamed at a density of slightly better than 1 sample per kilometre square (Map 6). A total of 110 loam samples was taken during this exercise.

A limited vehicle and helicopter loam sampling exercise was also carried out resulting in the collection of a further 16 samples.

8.4.5 RESULTS

A total of 92 samples has been treated and examined. All were negative. Results for the remainder were unavailable at the time of writing.

8.4.6 BULK SAMPLING

A bulk sampling programme was initiated as part of the follow-up to positive sample V 3131. A total of 3 samples of 30m³, 40m³ and 10m³ were treated using the Steelmaster mini-jig plant. Concentrates from the -3 + 0.5mm size fractions were collected and forwarded to the Darwin treatment plant and then to Melbourne for final examination at the laboratory.

8.4.7 RESULTS

To date one sample (T 6417) has been examined, results from this being negative.

8.4.8 ROCK SAMPLING

As part of the follow-up work, a series of foot traverses were made along stretches of the Collins Creek and its tributaries in an attempt to identify source rocks of the indicator mineral grains. A total of 15 rocks were collected, the majority of which have been consigned for petrographical description and examination for the presence of indicator minerals.

8.4.9 RESULTS

To date 5 samples (T9343-47) have been analysed for indicator minerals, all being negative. A petrographic description for these samples is located in Appendix 2.
8.4.10 AEROMAGNETIC SURVEY

FIXED WING (AREA 1)

The major part of Exploration Licences 4385 and 4439 is poorly drained, flat lying terrain of recent sand and soil cover. As a result a fixed-wing aeromagnetic survey was flown over much of this area to determine the likelihood of there being a primary diamond source hidden beneath the cover (Map 7). A total of 1952 square kilometres was flown, the survey being carried out by the geophysical contractor Austirex during May, 1985.

All data from this survey have been received. From the processed data a total of 91 magnetic bodies was identified.

FIXED WING (AREAS 2 AND 3)

During August 1985, a similar exercise was carried out over two similar areas to the north (Map 8). Results from this survey were still awaited at the time of writing of this report.

8.4.11 HELICOPTER SURVEY

As part of the follow-up to the fixed wing magnetic survey of Area 1, a helicopter survey was flown over 25 of the anomalies for increased resolution to enable more accurate source location and possible identification. This survey utilised Stockdale's helicopter-magnetic system.

Results of this survey are not available at present.

9. FORWARD PROGRAMME

Results to date focus interest on two areas of the exploration licences:

- Caulfield Clay Flats area
- Upper reaches of Nicholson River (including tributaries)

A detailed work programme to investigate these areas will be established once all outstanding results are available.

At this stage a limited helicopter loam sampling exercise will be carried out over those anomalies in Area 1 considered for further follow-up. This is planned for October/November, 1985.

Additional helicopter magnetic survey work will be required over Areas 2 and 3 depending on the fixed wing survey results.
10. PERSONNEL

Field staff involved in the 1986 field programme were:

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<th>DESIGNATION</th>
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<tr>
<td>Geologist</td>
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<td>Field Hands</td>
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<td>Cook</td>
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<tr>
<td>Helicopter Crew (Contractors)</td>
<td>1 (Helicopter Operators, Mt. Isa)</td>
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<td>Machine Contractor</td>
<td>1 (Northern Industries P/L)</td>
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11. EXPENDITURE

Expenditure for the licences has been allocated as shown in Table 7.

I. J. MACFARLANE
Darwin N.T.

M. R. MARX
Chief Geologist - North

October, 1986
### Table 7

**Expenditure Report**

<table>
<thead>
<tr>
<th>Exploration Licence No.</th>
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<td>16579</td>
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**Total This Period**  --  $79393  $22303  $10832  $146713  $138514  $7925

**Total Previously Reported**  $341907  $200832  $234622  $87744  $197920  $42933

**Total Expenditure To Date**  $421300  $223135  $245454  $234457  $336434  $50858

JE:OFC182
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APPENDIX I:

APPROVAL FOR COMMON REPORTING
Mr L T Doig  
Regional Geologist  
Stockdale Prospecting Limited  
PO Box 3152  
DARWIN NT 5794

Dear Sir

Thank you for your letter dated 22 May 1985 outlining Stockdale's desired approach towards its licences in the Arnhem, Roper River, Calvert Hills and Nicholson River areas and for discussing the matter further with me on 30 May. I am pleased to advise that:

1. The Director of Geological Survey is prepared to accept common reporting dates for Exploration Licences in your various project areas as follows:
   - T2 - Roper River Project - 1st July;
   - T3 - Nicholson River Area - 29 October; and
   - T3 - North, Calvert Hills Area - 6th May.

2. With respect to the licences currently within these project areas, and under the circumstances which prevail concerning your company's overall commitment to exploration in these areas, it is likely that the Department would look favourably on applications to vary (reduce) the individual licence expenditure covenants.

Should you wish to discuss any future proposals, please do not hesitate to contact me.

Yours faithfully

C P SMITH
Principal Registrar
APPENDIX II:

PETROGRAPHIC REPORTS
PETROGRAPHIC REPORT FOR STOCKDALE PROSPECTING LTD

REFERENCE NO. AR1370 - NICHOLSON RIVER.

JULY 1984

R.N. Robson
Geology Dept.,
University of Melbourne
Parkville,
Victoria, 3052.
FETROGRAPHIC REPORT ON STOCKDALE SAMPLE V2210A

Reference No. AR1370

Hand Specimen

A light red-brown coloured sample, hard with surficial supergene silicification and a heavily pitted surface. Slabbing reveals a fine-grained weathered, volcanic porphyritic texture involving clay altered feldspar phenocrysts and weathered mafics set in a fine-grained groundmass.

Polished Thin Section

Advanced weathering and alteration involving large quantities of iron-chlorite, albite ± calcite, quartz and iron oxides have obliterated almost all indicators of primary texture and rock identity. Much of the fabric is stained by hydrous red-brown Fe-oxides.

However there are definite euhedral pseudomorphs almost certainly after plagioclase phenocrysts. These range up to 2mm in size, constitute 5 vol% of the rock and are replaced by chlorite, sphene, hydrated iron oxides, albite and minor quartz.

Parent groundmass features are obscured by alteration involving mesh-like platey intergrowths of albite and chlorite which are quite likely to pseudomorph primary felsic spherulitic textures. In parts least affected by weathering there are suggestions of relict fine basaltic intergranular textures.

Supergene quartz has replaced portions of the fabric. Optically continuous grains quite similar to quartz 'eyes' in dacitic rocks infill several fabric holes. However this quartz is packed with inclusion material and quite irregular in shape. Elsewhere fabric holes are infilled by supergene quartz exhibiting 'fibrous-like' habits indicative of growth in open spaces.

Haematite after magnetite is evident.
Rock Type

This sample is a weathered basic volcanic, rich in feldspar phenocrysts and affected by low-grade regional metamorphism. Identity is uncertain but it is named as a porphyritic basalt with close affinities to samples V2209A/B although it differs somewhat in degree of alteration.

R.H. Robson
Petrographic Report on Stockdale Sample V22108

Reference No. AR1370

Hand Specimen

A moderately friable and deeply weathered light brown coloured conglomerate with discernable red, ferruginized volcanic fragments set in a fine siliceous matrix.

Polished Thin Section

This rock is comprised of heavily ferruginized, weathered basaltic clasts set in a matrix of sutured, sand sized quartz grains.

The clasts comprise 60-70 vol% of the rock, they are well separated, matrix supported, are angular with low sphericity, poorly sorted and range of grain size is notably wide varying from 1mm to 1cm. No silt or mud fractions are evident.

Clast lithologies are described as follows:

Ferruginised Basalt: Chloritised, ferruginized relict spherulitic textures are evident in many clasts whereas others show fine-grained altered intergranular textures involving albitized, chlorite replaced feldspar laths, chloritised interstitial mafics, abundant fine haematite after magnetite and amygdules of fine quartz.

Altered Felsic Clasts: These show a medium-grained hypidiomorphic-granular intergrowth of equant interlocking albitised plagioclase crystals part altered to chlorite, interlayered clays and sphene.

Fine-grained sericitized fragments:
Siltstone/sandstone fragments: fine sand-sized quartz grains and muscovite laths are tightly packed and set in a matrix of chlorite, brownish clays and hydrated iron oxides. This lithology is interlayered with a fine siltstone in which laminations are well developed and weathering products include chlorite, sphene and hydrous iron oxides.

The matrix of this agglomerate consists of tightly packed, well sorted, rounded sand-sized (0.5mm) quartz grains. These grains are welded by recrystallized boundaries (pressure-solution effects) and contain numerous aligned secondary fluid inclusions and/or cracks and deformation lamellae, features consistent with a metamorphic/metamorphic source rock for these grains.

Rock Type

A weathered, poorly sorted medium-grained basaltic agglomerate. An origin within a fluviatile setting is favoured.

R.N. Robson
Petrographic Report on Stockdale Sample V2210C

Reference No. AR1370

Hand Specimen

A variety of brown fine-grained fragments up to 2cm in size are cemented in a matrix of sand-sized grains. A coarse bedding plane is indicated by the lie of the long dimensions of most clasts. The rock itself is quite friable and coated by limonitic weathering products.

Polished Thin Section

A poorly sorted rudite comprising a diversity of volcanic clast types and mineral grains. Clasts range in size from 0.5mm to 1cm and average in the gravel fraction around 2-3mm. Shapes are angular to rounded with moderate sphericities. There is no silt or clay fraction.

Compositions of the clasts include altered basaltic fragments in which fine intergranular feldspar laths are albitized and chloritised whereas interstitial clinopyroxenes are converted to Fe-chlorite. In addition haematite floods many volcanic clasts and chloritised relict spherulitic textures are further evident in others. Clasts involving fine aplitic textured quartz of likely metasomatic/hydrothermal source are common and similarly there are numerous fragments of allotriomorphic-granular albited feldspar with pervasive chlorite-clay alteration. Several clasts are completely sericitized.

These clasts are supported by a matrix of coarse sand-sized quartz grains (average size 0.3mm) with straight sutured boundaries produced by the pressure-solution of the original clastic quartz. The rough outlines of original grains are marked by traces of dark impurities.

Supergene dogtooth quartz veinlets form overgrowths on several basaltic clasts.
Rock Type

This rock is classified as a poorly sorted basaltic agglomerate. The composition of the mineral clasts, angularity of the grains, sphericity of matrix quartz, lack of clay fraction and general preservation (ferruginization) of volcanic textures suggests it was formed in a fluvial environment. The sample is quite similar to Y3210B.

R.H. Robson
Petrographic Report for Stockdale Prospecting Ltd

Reference No. AR1374

R.N. Robson
Geology Dept.
University of Melbourne,
Parkville,
Victoria, 3052.
Fetrowraphic Report on Stockdale Sample V2216

Reference No. AR1374

Hand Specimen

A hard, red-brown, deeply weathered mafic volcanic rock with prominent vesicular texture (siliceous amygdules) and scattered altered feldspar phenocrysts.

Polished Thin Section

The rock has a well developed, coarse-grained basaltic texture involving weathered, altered feldspar laths and abundant interstitial hydrated iron oxides. The plagioclase laths have been albitised prior to the development of weathering products (interstratified clays and iron oxides). Interstitial mafics are obliterated and spinels involve only haematite while the fabric as a whole is limonite stained.

Plagioclase phenocrysts constitute 5-10 vol% and range in size up to 5mm. They are pseudomorphed by interlayered clays, supergene quartz, chlorite and hydrated iron oxides.

Amygdules of quartz, chlorite and iron oxides comprise 35-40 vol% of the sample and range up to 0.5cm in size.

Rock Type

This sample is a weathered ferruginous vesicular basalt (tholeiitic) affected by low grade regional metamorphism.

R.H. Robson