KILMOT CREEK
ALCOOTA 1:250 000 Map, Section 70/5.

FINAL REPORT

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Baikal Homestead
PMB 41
ALICE SPRINGS NT 0872

Report compiled by Dr S K Dobos and L A Johansen.

YEAR ONE (Feb 25 1993, to Feb 24 1994.)

The exploration program aimed during the first year at testing the geological nature of the rocks underlying a series of iron laterite caps in the Bleechmore Valley, with particular emphasis on identifying any deep seated ultrabasic intrusive occurrences. This program involved ground reconnaissance and percussion RAB drilling, and a total of $4,870.00 was spent on the EL area during this twelve month period. The results were unambiguously negative.

YEAR TWO (1994-1995)

Year two saw a shift of focus to that of an exploration program aimed at assessing the natural concentrations of heavy minerals in the drainage system. The program involved reconnaissance sampling and testing of the principal stream running through the Exploration Licence. A total of $4,000.00 was spent on the project area during the second twelve months of the Licence.

YEAR THREE (1995-1996)

TRANSFER TO CHAMBIGNE RESOURCES

After negotiating an agreement during the third anniversary year of EL 7959 the licencee provided Chambigne Resources, GPO Box 865, Brisbane QLD, with a signed transfer document and other items as required, but for reasons best known to Chambigne this transfer application was not acted upon.

Chambigne did however conduct extensive tests on a bulk sample consignment that the licencee delivered to their agent in Alice Springs. This material was, after preparation, consigned to laboratories in the USA for tests using different concentrating techniques. These tests were carried out by Chambigne’s metallurgist, and samples of the different separates were shipped back to Chambigne, (and to Dobos and Associates, their geological consultants), for specific investigation.

Total expenditure for EL 7959 third anniversary year is calculated at $3,951.00

YEAR FOUR (1996-1997)

No substantive activity appears to have been recorded by Chambigne Resources during this final year, therefore expenditure for the period is reported as Nil.

TOTAL EXPENDITURE during the four year term of the licence was $12,821.00.
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MAP 2. 1:50 000 (Approx) map of Licence Area
EXPLORATION PHILOSOPHY AND PROJECT AIMS

This area was initially selected to explore a series of iron laterite caps which follow a north/south strike trend along the floor of the valley encompassing the Kilmot Creek, the system that drains Webbs Pound and the northern part of the Mt. Bleechmore hills. The aim of this project was to test these small roughly circular ferricrete deposits to determine whether they might be the surface expression of intrusive structures of a type which could carry economic mineralisation of, (for example), Diamond, Platinum Group Metals, Gold, Niobium, Rare Earth Elements, or other minerals in economic quantities, such as Apatite, Vermiculite, etc.

Negative results in this, and the observation of natural concentrations of garnet sand in the Kilmot Creek, led from the second year onward to a change of focus in the exploration program. During these years attention shifted to sampling and testing the sands of the Kilmot Creek itself, so as to determine if any economic potential existed in the garnet fraction.

Samples were collected to obtain preliminary figures on grades and tonnages, and separation tests were carried out to discover if there might be factors which could complicate any proposed recovery and/or saleability of the garnet concentrates; such things as separation difficulties with other heavy minerals in the sand, or deleterious materials in the concentrate itself etc.

LOCALITY

The Exploration Licence 7959 was situated in the northern section of the Mount Bleechmore Hills locality, (ALCOOTA 1:250 000 Geological map, section 70/5). This area is accessed via well developed station roads from the Plenty Highway, (Map 1), and is comprised of hills which take the form of a long north-trending ‘U’ shaped complex, the most prominent of these - including Mt Bleechmore itself - being situated in the broad southern section of the formation.

The Kilmot Creek drains a large pound in the central section of the hills, (Webbs Pound), and from there flows northward for about nine kilometers before abruptly turning north west for another four km, where it joins the Mueller Creek.

Waters that fall on the slopes outside the Kilmot system drain outward from the center of the hills area in small gullies and creeks, and these tend to flood out onto the surrounding country and do not join together to form larger channels. This means that Kilmot is the only sandy channel of any consequence rising in the garnet rich rocks of the Bleechmore formation, and is certainly the only creek in the locality to contain any significant amounts of garnet reserves.
EXPLORATION TECHNIQUES

(Year one)

In the first year the isolated laterite caps which comprised the targets were identified using airphoto, geological and magnetic map research. This was followed up by ground reconnaissance to confirm the topographical nature of the features.

Following an inspection of the general locality it was decided that some of the more accessible of these features would be amenable to sampling with a percussion drill. In this way information about the mineral and chemical make-up of the underlying rocks and their possible intrusive nature could be obtained.

WORK COMPLETED (year one).

DRILLING

A total of 69 meters was drilled at three target features in the EL area during the year, (Maps 2 & 3). These are detailed as follows:

- BLE 2  24 meters
- BLE 4  24 meters
- BLE 5  21 meters

None of these holes penetrated the deep lateritic profile.

DRILLING EQUIPMENT

The drill rig used in the first year was an Ingersol-Rand ECM 350 air track machine, mounted along with an I-R 900cfm compressor on a semi-trailer. It has a boom mounted air hammer and is probably best described as a percussion RAB drill.
DRILL SAMPLES

Samples were recovered at three meter intervals. A portion of the last sample from each hole was forwarded to Analabs, Brisbane, for trace element analysis. (See Table 1.)

KILMOT CREEK SAND SAMPLING PROGRAM

(YEAR TWO of EL 7959).

For the initial part of the program to assess the reserves and grade of the garnet contained in the sands of the Kilmot Creek it was necessary to obtain representative hand samples from cross-sections of the Kilmot sand-channel.

Six sections of the creek were were sampled, comprising five samples from each section, (Map 2). These returned about 10 to 12 kg per section, depending on channel depth.

SAMPLING EQUIPMENT

A hand sampling device was developed to produce a sample of the predominantly dry creek sand that had a high integrity in terms of consistent volume to depth ratio. It is in the form of a 55mm light gauge steel sleeve which is turned into the sand via a removable bar. A close fitting tube of similar construction is then inserted into the first tube, and this is used to load and remove the sample.

The first tube thus acts as a casing, isolating the dry sand outside the tube, and ensuring that the sample collected represents a true vertical section through the subject material.

The bulk sample was simply collected in bags.

SAMPLES

The section samples were transported to Baikal Homestead where they were dried and quartered, and a 2kg parcel of each was forwarded to the project geologist, (Dr S K Dobos), for assessment.
Weighed amounts of the remainder were used for hand separation tests in order to establish reasonable estimates of the garnet percentages contained in the samples. (See Table 2.)

The 120kg of bulk sample was used to establish the suitability of a Reichert spiral for concentrating the garnet fraction of bulk samples. A single spiral unit was set up at Baikal Homestead, and while this functioned as it should, it was found to lack the sharp accuracy required to establish reliable data, at least on a test scale.

TEST COMMENTS

The hand separated garnet concentrate from the test samples (tabled below), appeared virtually free of any other heavy minerals. All size fractions above 75 microns had a few iron-rich fragments of lateritic residue, and below 300 microns there were small amounts of magnetite. In the minus 75 micron fraction a trace of a dense colourless mineral was observed, which was possibly zircon. Very little hornblende was seen in the concentrates, which simply reflects the limited amount available to the stream from the rocks weathering into the catchment.

As regards both the sand and the garnet, the predominant grain size was in the range between 500 microns and 1600microns, this fraction accounting for slightly more than 50% of the mass of each of the samples. The largest garnet fragments observed were about 3mm to 4mm in size, but above 1.6mm the garnet values were only a few percent. Not surprisingly, the tailings fraction was essentially quartz, with a lesser amount of feldspar and a trace of mica and other light minerals.

The amount of 'tramp' material in the samples, (stones and gravel fragments larger than 5mm, and containing no garnet), varied between 3.6% and 10%, the latter being from the sample taken furthest upstream, (sample 1).

Of the samples, numbers 2, 3, 4, and 5 probably represent the “closest to average” sections through the creek sand, and the garnet values from these show an interesting descending downstream gradient. Sample 1 was taken (as it happened) in a slightly more stony section of creek, while the high value in sample 6 was probably the result a ‘trap’ in the creek which has raised the heavy fraction ratio.
KILMOT CREEK BULK SAMPLE TESTING

(Year three of EL 7959)

A bulk sample of Kilmot Creek sand was collected by the licencsee from three selected (average) channel locations within the EL, and delivered to an agent of Chambigne Resources in Alice Springs. After the material was dried and screened a 200 litre drum was filled with the (nominal) minus 1.2mm fraction and subsequently freighted to Spokane, Washington, where in tests carried out under the supervision of Chambigne's metallurgist the sample material was processed on a LaVigne Dry Concentrator.

The machine was set at a throughput of 40 tonnes per hour, and at this feedrate the Kilmot Creek material yielded an almost perfect separation of garnet from quartz. Subsamples of the various separates produced during these tests were then shipped back to Chambigne for further investigation.

In this it was observed that the resulting garnet concentrates contained most of the other heavy minerals from the sample, so the efficiency of the separation of garnet from magnetite, rutile and ilmenite (and lesser biotite, amphibole and pyroxene) was considered by Chambigne to be unacceptable for the purposes of their plant proposal primary separation stage.

The sand and concentrates were then recombined and shipped to Colorado Springs, Colorado. Here they were tested on Satake dry tables, (again by Chambigne's metallurgist), then all of the concentrated material was shipped back to Chambigne for future additional testing.

On the Satake devices the Kilmot Creek sand performed very well, but the tests indicated a marked positive correlation between efficiency and purity versus garnet grade in feed, as well as the sensitivity to narrow sizing that was expected. These tables were also quite effective in separating the other heavy minerals present in the sample, although lack of available time prevented any further tests to be carried out on the non-garnet minerals.
MINERALOGICAL EXAMINATION

It became clear when the various concentrates from the above metallurgical tests were examined by stereomicroscope, that compared to the Plenty River and Entire Creek sands, those from the Kilmot Creek are relatively deficient in amphibole, biotite and pyroxene. At the same time though, it was observed that the Kilmot Creek is somewhat richer in magnetite, and to a lesser degree in rutile and ilmenite.

During this exercise attention was mostly focussed on examining the nature of the various garnet concentrates, where it became immediately obvious that in each of the examined size fractions above 200μ - but especially in the coarser fractions - significant numbers of the garnet grains were either "coated" or encrusted with clayey minerals.

Under higher magnification these encrustations were seen to represent cracks in the garnet that are infilled with clays, or are comprised of garnet-feldspar intergrowths in which the feldspar is partly altered to clays. In the final reports to Els 7696 and 7971 thin section photomicrographs of garnet in the Bleechmore Granulite clearly show the intergrown nature of many of the larger garnet grains present in the source rocks, while in this document (see appended photographs 1 through 3) the problems of product quality associated with the garnet separates derived from the weathering of these rocks are clearly described and depicted.

These observations are quite a serious setback to the quality aspirations for any garnet concentrates that might be produced from the sand of Kilmot Creek. The clayey coating can be clearly felt and easily seen when the + 200μ separates are rubbed either between the fingers or on a clean sheet of white paper, and it follows that the clayey residue such a product would leave on any work surface during sand blasting operations would prove unacceptable. It is apparent as well that wet processing of the garnet concentrates will not provide an immediate answer to the problem, as it will only remove the superficial clay elements from the grains, leaving the more protected fractions to be exposed during impact-attrition with any work surface.

Ignoring the clayey grains, the clean garnet grains are quite glassy and fresh, with acceptably low inclusions. They have an excellent form factor (blocky to elongate angular) with quite high concentrations of sharp to very sharp edges. Their occurrence in a freshwater creek bed would almost certainly produce low concentrations of soluble salts, but in use these concentrates would produce measurable amounts of fine suspended solids.
CONCLUSIONS

It is self-evident that in applications requiring a clean surface after sand blasting it is unacceptable to have even small amounts of clay residues remaining on the work surfaces, and it follows therefore that because of this the quality of any garnet concentrates produced from the sands of the upper reaches of Kilmot Creek would - certainly in an untreated form - in no way measure up to the expectations of the market.

ENVIRONMENTAL CONSIDERATIONS

The Kilmot Creek locality is reached via a station road which runs parallel to the creek for most of its length, and as a result no roads or tracks needed to be established to access the sample sites.

The drillholes were backfilled before departure, and all refuse was collected and removed, not buried. No timber or trees were cut down for any purpose.

ABORIGINAL CEREMONIAL AND SIGNIFICANT SITES

Shortly after the EL was granted, an excursion through the Mt. Bleechmore locality was conducted with Mr Dick Purvis, one of the specific Senior Traditional Owners of the area. This was done with the express purpose of ensuring that the exploration program in no way conflicted with any sensitive Aboriginal areas within the EL boundaries.

During this trip certain localities in the hills surrounding the valley were declared as out of bounds, as well as one site adjacent to Kilmot Creek. Apart from this one site - for which a two hundred metre exclusion zone was agreed upon - no restriction was placed on exploration in the valley itself.

As a matter of courtesy we in any case continued to liaise with Mr Purvis during the tenure of the Exploration Licence, and kept him informed of our activities in the area.
EL 7959
EXPENDITURE TO 24/2/94 (Year One)

Expenditure details for the anniversary year are as follows:

- Percussion RAB drilling, (69m @ $35/m), $2,415.00
- Share of Mob/demob drill, (155km @$6/km), $930.00
- Toyota field vehicle, (880km @ $1.00/km), $880.00
- Time engaged in exploration activities other than drilling
  (13hrs @ $35.00/hour), $455.00
- Share of Aboriginal Sites clearance costs, $85.00
- Travel, (Toyota, 85km @ $1.00/km), $105.00

TOTAL $4,870.00

EL 7959
EXPENDITURE - 1994/95 (Year Two.)

SAMPLE COLLECTION
Two field trips for sample collection
  Toyota Landruiser, 1000km @ $1.00/km $1,000.00

Sample collection, self plus one assistant,
  (22 hours x 2 @ $35.00/hour) $770.00

SAMPLE TESTS
Reichert Spiral tests, (including setting-up costs) $490.00
Hand separation tests $1,260.00

S K DOBOS and ASSOCIATES
Geoligical consultants. (part costs of area visit) $320.00

Rent, freight, office costs, reporting etc. $160.00

TOTAL $4,000.00
EL 7959

EXPENDITURE, 1995 -1996. (Year Three.)

BULK SAMPLE

Collection
  Toyota Land Cruiser - 380 kms @ $1.00/km $380.00
  plus self : 8 Hours @ $35.00/hour $280.00

Freight
  Transport to and within USA,
    plus return freight of subsamples and concentrates $986.00

Travel and Accommodation costs to and within USA
  for Chambigne’s metallurgist $2315.00

TOTAL $3951.00

EL 7959

### TABLE 1

**EL 7959 (Year One)**

Trace Element Data - PPM  (SKD/Analabs 2/94)

<table>
<thead>
<tr>
<th>Hole No.</th>
<th>Sc</th>
<th>Cr</th>
<th>Ni</th>
<th>Cu</th>
<th>Zn</th>
<th>Sr</th>
<th>Y</th>
<th>Nb</th>
<th>Zr</th>
<th>Ba</th>
<th>La</th>
<th>Ce</th>
<th>Nd</th>
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</thead>
<tbody>
<tr>
<td>BLE 2</td>
<td>17</td>
<td>78</td>
<td>35</td>
<td>26</td>
<td>89</td>
<td>20</td>
<td>7</td>
<td>16</td>
<td>12</td>
<td>270</td>
<td>&lt;5</td>
<td>&lt;15</td>
<td>&lt;10</td>
</tr>
<tr>
<td>BLE 4</td>
<td>30</td>
<td>152</td>
<td>21</td>
<td>28</td>
<td>79</td>
<td>6</td>
<td>5</td>
<td>&lt;10</td>
<td>33</td>
<td>200</td>
<td>8</td>
<td>33</td>
<td>&lt;10</td>
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<tr>
<td>BLE 5</td>
<td>9</td>
<td>97</td>
<td>29</td>
<td>8</td>
<td>48</td>
<td>13</td>
<td>4</td>
<td>&lt;10</td>
<td>17</td>
<td>280</td>
<td>&lt;5</td>
<td>&lt;15</td>
<td>&lt;10</td>
</tr>
</tbody>
</table>

Av. Kimberlite  110  250  150  200  
Av. Lamproite   95  922  240  400  207  
Av. Lamprophyre 83  350  105  195  100  

(SKD - U/Q, 7/93)

### TABLE 2

**EL 7959**

**KILMOT CREEK**

Garnet Sand Samples. (Year Two)

(Hand separated from 1kg of quarted sample.)

<table>
<thead>
<tr>
<th>Sample Site Number</th>
<th>By Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>19.2%</td>
</tr>
<tr>
<td>No. 2</td>
<td>24.8%</td>
</tr>
<tr>
<td>No. 3</td>
<td>20.2%</td>
</tr>
<tr>
<td>No. 4</td>
<td>15.2%</td>
</tr>
<tr>
<td>No. 5</td>
<td>13.1%</td>
</tr>
<tr>
<td>No. 6</td>
<td>24.7%</td>
</tr>
</tbody>
</table>
Photo #1 - Kilmot Creek bulk sample: -1500+1000\(\mu\) Dry Table concentrate. Field-of-view approximately 11x7.3mm; nominal magnification = 14x

This is a “product quality” garnet concentrate finished on an air table, in an entirely dry separation process.

The concentrate is quite clean, with negligible contamination by other single phase mineral grains. The concentration of composite grains, such as the garnet-magnetite composite near the bottom centre of the photo, and the garnet-quartz composite near the left centre, is also quite low, and certainly acceptable for product.

Shape factors are excellent, and most grains have one or more sharp to very sharp edges, indicating high cutting efficiency in abrasive applications.

A significant number of grains, however, are partly or completely “covered” in a clayey coating, evidenced by a dull, non-reflective yellowish appearance - this is quite deleterious.
Photo #2 - Kilmot Creek bulk sample: -1500+1000µ Dry Table concentrate. Field-of-view approximately 11x7.3mm; nominal magnification = 14x

This is another view of “product quality” garnet concentrate finished on an air table, taken to the northeast of photo #1.

As before, the concentrate is quite clean, with negligible contamination by other single phase mineral grains. The concentration of composite grains, such as the garnet-magnetite composites near the bottom left hand corner and towards the top right hand corner, is quite low, and certainly acceptable for product.

Shape factors are excellent, and most grains have one or more sharp to very sharp edges, indicating high cutting efficiency in abrasive applications.

The concentration of clay encrusted granet grains is somewhat lower than in the previous photo, but still not acceptable.
Photo #3 - Kilmot Creek bulk sample: -1500+1000μ Dry Table concentrate. Field-of-view approximately 11x7.3mm; nominal magnification = 14x.

This is a view of "dirty" or clay encrusted garnet grains picked from the sample depicted in the previous photos. The larger central grain is kyanite, which because of its smaller cross-section passed into this size fraction. To the right of the kyanite, for comparison, is a single clean garnet grain, and above it, a garnet grain clean at one end and clayey at the other.

It is quite obvious, in this view, that the clay coverings or encrustations on grains such as depicted here are not just trivial occurrences in the coarser Kilmot Creek garnet concentrates. Simply put, clay residues on the work surface in applications requiring a clean surface after sand blasting are not acceptable.
Map showing sample locations and drill hole locations.