EL 7914
[UPPER LIZZIE CREEK]

EASTERN HARTS RANGE REGION, N.T., STRADDLING
NORTHEAST EDGE - ALICE SPRINGS SF 53-14
NORTHWEST EDGE - ILLOGWA CREEK SF 53-15

FINAL REPORT, 1995-'96

FOR RELINQUISHED AND SURRENDERED AREAS

FOR PERIOD ENDING 5-2-96

LICENCE HOLDERS:

CORPORATE DEVELOPMENTS PTY LTD 50%
JOHN WILLIAM BENER 50%
CHAMBINIGE RESOURCES PTY LTD EARNING A 90% SHARE IN EL 7914

REPORT COMPILED BY:
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1 SUMMARY

On the 11th October 1993 Chambigne Resources Pty Ltd entered into a joint venture on EL7914 with Corporate Developments Pty Ltd and Mr. John Benger, to earn a 90% interest in this licence. This report details the work carried out by Chambigne in all reporting periods, ending 5/2/96, for areas not covered by ongoing tenure applications. Within EL7914, Chambigne became solely focused on exploration and development of alluvial and detrital garnet, and other industrial minerals which may be extracted at profit from the existing alluvial resource.

The EL is dominated by the Irindina Gneiss and its various compositionally heterogeneous members, subunits and enclaves. The gneiss proper, and the Riddock Amphibolite Member, are both garnetiferous, and comprise the source of garnets in the EL. Garnets from the Irindina Gneiss are principally almandine-pyrope solid solutions, with minor grossular and spessartine components, and have very favourable mineralogical properties with respect to the end-uses of garnet. The potentially economic alluvial resource comprises the sands in the main bed of Lizzie Creek; its feeders and tributaries have good grades but low tonnages.

Working access to most of the EL away from the station tracks is not easy, and virtually all of the feeders to Lizzie Creek would be difficult to access without cutting new roads and tracks; in all cases, the latter would not be economically viable, and for the relatively low tonnages involved, would be environmentally unjustified. Consequently, the workable resource is confined to the central section of the EL, along upper Lizzie Creek proper, between a point just north of Log Cabin Dam, and south to below Lizzie Bore.

In the initial stage of exploration, considerable attention was paid to the reconnaissance for, and evaluation of, exposures of Irindina Gneiss and the Riddock Amphibolite, as potential sources of coarse grained "hard-rock" garnets. This concept was gradually abandoned as it became obvious that although random areas within the Irindina did indeed have higher garnet contents (up to 20 volume %) such areas were small (<1000 m²) and very localised, and not predictably continuous with any certainty to allow projection to worthwhile resource volumes. Additionally, the crushing process would have reduced the recovery of the coarser garnet fractions (which is what initially drove this phase of exploration) to the point where hard-rock operations would have been at best marginal. Finally, the impact on the environment of hard-rock operations and additional road cutting, plus the cost of rehabilitation, would have rendered such an effort totally unviable.
2 INTRODUCTION AND TENURE

EL7914 was granted to Corporate Developments Pty Ltd of South Australia and Mr. John Benger of Darwin on 5 February 1993. On the 11th October 1993, Chambigne Resources Pty Ltd entered into a joint venture with the EL holders to earn a 90% interest in this licence.

35 of the original 70 graticular blocks (comprising approximately 225km²) were relinquished, in keeping with sections 26 and 27 of the Mining Act. EL7914 was thus reduced to 35 graticular blocks (comprising approximately 112.5km²) for the 1995-96 reporting period. Both the relinquished and retained blocks are marked on the location plan of Appendix A.

This report encompasses all the work carried out by Chambigne over the lifetime of the EL, for those areas relinquished and surrendered. On 30/1/96, application was made for five contiguous mineral claims along Lizzie Creek; the remainder of EL7914 was allowed to expire on 5/2/96.

3 LOCATION AND ACCESS

EL7914 lies approximately 240km northeast of Alice Springs, on the eastern edge of the Harts Ranges, to the south of the Plenty Highway in the Huckitta Dome, or the southwestern Valley Bore area; the location plan is presented in Appendix A.

Access to the northern part of the EL is via the Plenty Highway; travel 29km east past the Harts Range Police Station, turn south on crossing Entire Creek and pass through a gate; head south past Valley Bore towards Inkamulla Bore, but turn west onto the track to Spriggs Creek Bore; turn south and head towards New Lizzie Bore; this track runs parallel to, and crosses some of the feeder creeks to Lizzie Creek.
Access to the southern part of the EL is via the Arltunga Tourist Road [The Gardens Road]; follow this road to Ambalindum Station; pass Ambalindum and then head east, cross the Hale River, and head towards the Plenty Highway signpost [but not towards Claraville Station]; at the signpost, head ENE through a gate and follow the road to Brumby Bore; continue east and then take the next north fork to reach the southern parts of Lizzie Creek.

4 GEOLOGY OF EL7914

The area encompassed by the EL lies along the mid-eastern edge of the Arltunga-Harts Range N.T. 1:100,000 Geological Special map, and along the western edge of the Quartz 1:100,000 Geological map. The regional geology of the EL is adequately summarised in the map commentary accompanying the Arltunga-Harts Range N.T. 1:100,000 Geological Special map [Shaw, Stewart & Rickard, 1984, Australian Government Publishing Service]; there is no equivalent in print for the Quartz Geological map, however the compilation notes appear as BMR Record 23, 1982, [Shaw et al.]. The lithological types outcropping over EL7914 are depicted in Appendix C.

Apart from small localised patches of Cainozoic cover and a minor [and questionable] inlier of Bruna Gneiss near the eastern protrusion of the EL at 23°14'20", the exposed rocks over the entire EL comprise the Irindina Gneiss, its two named subunits - the Stanovos Gneiss Member and the Riddock Amphibolite Member - and several unnamed subunits. The Irindina Gneiss is Proterozoic, and occurs midway up the Harts Range Group, the so called Division Two sequence of Shaw et al., 1984.

The Irindina Gneiss proper is a fairly schistose garnet-biotite-quartz-plagioclase gneiss which is quite heterogeneous in both grainsize and the relative proportions of the dominant minerals. Additionally, there are extreme
compositional enclaves on various scales within the Gneiss, giving rise on the one hand to near monomineralic assemblages of each of the dominant minerals, and to "new" pelitic assemblages which may contain sillimanite, cordierite and/or gedrite, or corundum and/or kornerupine on the other. There are a number of thin [0.2 to 2m] localised bands or lenses of calc silicate rocks throughout the unit, similar to a more massive outcrop of this type outside the northeastern part of the EL, but these are essentially non-garnetiferous and volumetrically insignificant. Most of the Irindina Gneiss proper is garnetiferous, with garnets ranging in size from 0.5mm to 12mm, [but locally to 28cm sic]; the garnet on average comprises around 15% of the rock volume.

The above mentioned calc-silicates grade compositionally into a more massive para-amphibolite unit, the Riddock Amphibolite Member, in the southern part of the EL. This contains massive amphibolite "lenses", but for the most part is compositionally banded on a variety of scales with intercalated para-amphibolites, calc-silicates and pelitic assemblages. Most of the pelitic subunits of this member are garnetiferous, as are some of the para-amphibolites.

The Irindina Gneiss and its subunits have been metamorphosed a number of times; the relict highest-grade assemblages represent the uppermost amphibolite facies, and locally, lowermost granulite facies. Compositionally, the protoliths comprised a sequence of silicic to intermediate pyroclastics, altered during diagenesis, with local deposition of chemically derived calcareous/magnesian carbonate components added to the detrital silicates; the massive amphibolites were probably basaltic. The Gneiss is the principal source for the detrital and alluvial garnet accumulations throughout both the 1:100,000 map sheets referenced in this report, however, the Riddock Amphibolite Member may also contribute locally significant amounts of slightly more magnesian garnet to the alluvial scree and stream sands.
5 EXPLORATION

5.1 1994 - 95

The first exploration effort within the EL was a two-day traverse of the southern part of the EL to examine the various amphibolitic units north of Mt. Ruby as sources for alluvial garnet, and in conjunction with the Irindina Gneiss, for potential hard-rock mining of coarser garnet (as clean product >1.2mm fetches a premium). The area examined was that of the upper drainage system of Talc and Illogwa Creeks, with access east and west off the Lindsay Mine - Boots Dam track, and south off the Brumby Bore - Claraville Station track.

Not surprisingly, the various amphibolitic units (para- and ?ortho-) are quite variable in their garnet content, ranging from zero to as much as 12% by volume, and in small patches (<1000m²) up to approximately 20%. Although the richer grades appear quite attractive, three factors preclude any possibility of exploiting these source rocks for profit at current and forseeable prices.

Firstly, the garnet rich patches are generally thin and very local stratified subunits within the amphibolite sequence, the maximum true thickness observed being some 4 metres - they are not continuous, but appear to have been local “depressions” in the depositional environment, and tend to lens out over strike distances of 35m or less. Consequently, these relatively garnet rich units do not carry sufficient garnet tonnages to warrant setting up hard rock crushing operations. The Irindina gneiss is more uniform in its garnet content, but again, the garnet-rich patches are small, non-continuous, and apparently randomly distributed.

The second factor that precludes hard-rock quarrying is the fact that most of the larger garnet porhyroblasts are all cracked or parted on scales generally
less than 1mm, in situ. Consequently, these larger garnet grains would break down during the crushing, leaving only small yields of larger garnet grain fragments.

The third factor involves the quarrying itself - this would perturb the environment to a degree that would probably be unacceptable, as it would in many cases involve the removal of trees and shrubs, the cutting of roads and tracks in terrain having very little topsoil, and the quarry sites themselves would be visual eyesores. In any case, proper rehabilitation and the re-establishment of the vegetation would have to be a long-term proposition, since elevated ground does not have groundwater readily accessible to small plants - all this would be prohibitively expensive for current economic constraints. Consequently, Chambigne has decided to abandon hard-rock quarrying in EL7914, (at least in the southern part of the EL) as it has in a number of other ELs in the Harts Range region.

GARNET MINERALOGY

Garnet compositions from a number of random samples collected from the Lirindina Gneiss proper in the northern portions of the EL were analysed on a 4-spectrometer Jeol 8800 Superprobe at the Centre for Microscopy & Microanalysis, University of Queensland, using a ZAF correction algorithm. The data were deconvoluted for the constraints of garnet stoichiometry using MINFORM, a proprietary computer program written by S.K. Dobos. On average, the garnet grains are relatively unzoned, and have the following molar composition expressed as percentages:

- Almandine 56.2
- Pyrope 38.8
- Grossular 3.0
- Spessartine 1.5
- Andradite 0.5

This composition is representative of the garnet derived from the pelitic gneisses, but will probably not apply to those from the Riddock Amphibolite.
Member, which is currently unsampled. In detrital grains, garnet is quite fresh, and most grains contain one or more inclusions, predominantly of biotite and quartz.

5.2 1995-96 (RELINQUISHED BLOCKS)

A number of geological traverses were undertaken in the relinquished blocks to examine potential hard-rock and alluvial targets, initially by G. Wakelin-King, and subsequently, by S. Dobos; no mapping was carried out.

Taking the alluvial garnet first, it was visually evident that virtually all the tributary and feeder creek sections (to Lizzie Creek) were garnetiferous, in some cases significantly so, but in all cases examined, there were insufficient tonnages to warrant exploitation. In any case, access for alluvial garnet exploitation in the southern parts of the EL is not particularly easy, and transport costs would precluded any profit from these small creeks. No sand samples were collected, and no resource estimations were carried out.

There is a premium for coarse grained (>2mm) garnet product in the current marketplace. It was initially considered that in situ hard rock garnet would comprise potential production targets if rocks with both sufficiently coarse grained garnet and having sufficiently high garnet modes could be identified.

The various traverses showed that while many areas of exposed Irindina Gneiss contained some 10% garnet by volume, and some small outcrops had even higher percentages, there were no places where sufficient tonnages of uniformly garnetiferous rocks would have made resource calculations worthwhile. Garnet rich patches were never continuous, (always <25m in any dimension), making the delineation of drilling targets pointless. More importantly, from the petrographic view, coarse grained garnet in these rocks is only very rarely homogeneous and free of fractures - crushing run-of-quarry
rocks would have yielded low returns of >1mm unfractured garnet grains (and fractured grains are unsuitable for the abrasive industry).

The Riddock Amphibolite, on average, contains less modal garnet than the Irindina Gneiss. These in general are usually less red, and more transparent, and reflect lower almandine content and higher grossular component; on average, they are less fractured than those in the gneiss, but at the same time, they are usually finer grained. Consequently, these would comprise an even less attractive hard rock target.

As in the previous year, it became clear that the cost of hard rock quarrying and on site crushing would be prohibitive considering the remoteness of EL7914 from any extant infrastructure. It also became clear that hard rock quarrying in an area of little topsoil, and sporadic rainfall, would require intense and long term efforts to establish the flora after rehabilitation, in addition to rehabilitating the quarry site(s). The cost of such rehabilitation would be quite prohibitive. For all the above reasons, hard rock garnet quarrying has been abandoned as a concept throughout EL7914. As a consequence, those areas having uneconomically low alluvial garnet resources have been abandoned.

6 EXPENDITURE

Total expenditure for work carried out in EL7914 by Chambigne Resources Pty Ltd in the 1994-95 reporting period was as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Vehicle &amp; Fuel Costs</td>
<td>$1,935</td>
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<tr>
<td>Consumables</td>
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<tr>
<td>Freight [samples]</td>
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<tr>
<td>Wages</td>
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<td>Administration</td>
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<tr>
<td>Consultants (field)</td>
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<tr>
<td>Mineralogical, Laboratory &amp; Reporting Costs</td>
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Engineering and Metallurgical Study (10%) $14,370

**TOTAL EXPENDITURE ‘94-95** $28,464

Total expenditure for work carried out in EL7914 by Chambigne Resources Pty Ltd (excluding surveyor’s fees) in the 1995-96 reporting period was as follows:

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<th>Item</th>
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<td>Travel</td>
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<td>Freight (samples)</td>
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<tr>
<td>Wages (general)</td>
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<td>Wages (mineral separations)</td>
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<tr>
<td>Consultants</td>
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<tr>
<td>Metallurgical Laboratory costs (pro rata)</td>
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**TOTAL EXPENDITURE ‘95-96** $13,067

Apportioned on the basis of time spent, the relevant totals for the non-retained areas of EL7914 were approximately:

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<th>Year</th>
<th>Cost</th>
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<td>1994-95</td>
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<td>1995-96</td>
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